Proceedings of the Seventh
Agricultural and Food Policy Systems Information Workshop

STRUCTURAL CHANGE AS A SOURCE OF TRADE DISPUTES UNDER NAFTA

Edited by

R.M.A. Loyns
Karl Meilke
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EXECUTIVE SUMMARY

TRADE LIBERALIZATION UNDER NAFTA-REPORT CARD ON AGRICULTURE

The seventh Policy Disputes Information Consortium workshop, held in Tucson, Arizona, in February 2001, addressed the changes in market structure and trade that have occurred since the inception of the NAFTA agreement, and the relationship between those changes and trade disputes. The workshop theme arose out of the realization that risk, fear, and uncertainty associated with structural change in agriculture could be an important contributor to lack of progress in achieving free trade in the NAFTA region.

There have been substantial gains from NAFTA in terms of increased efficiency in production and distribution, and growth in trade. However, there appear to be continuing concerns among farmers, laborers, and some agribusinesses that they will be reorganized or displaced, that production will be relocated, that economic rents that may have existed in a protected market will disappear, and that the nature of agriculture, including its institutions and culture, will be forever changed. There has also been an increase in the level of trade stress and number of trade actions in several areas. On the other hand, there are many farmers and agribusiness managers who view NAFTA as creating opportunities to adjust crop mixes and business operations into more profitable and more efficient configurations.

All of this has occurred in a trading environment governed by the set of agreements among the United States, Mexico and Canada referred to as the North American Free Trade Agreement (NAFTA). Experience has demonstrated that NAFTA is, at most, a limited "free trade" instrument as significant areas of regulation, government support and trade limitations were not dealt with in the NAFTA. In fact, the NAFTA has been described as never being intended to be a "free trade" arrangement, rather one to achieve greater trade among the member countries, and a method of deregulating some sectors. That description is consistent with the trading framework established by the agreement, and with its accomplishments. This situation does, however, raise interesting questions about how structure and trade would evolve if the agriculture and agri-food industries in the three countries were, in fact, subject to full free trade conditions. For purposes of the workshop, full free trade was defined as the absence of government institutions (policy, programs and regulations) which influence or impede trade within and among the three NAFTA countries. Analysis of this situation was one of the objectives of the workshop.

The overall conclusion of the workshop was that NAFTA has made major contributions to farming and, particularly, to agribusiness and consumers in the United States, Canada, and Mexico; full free trade would allow the comparative advantages of agriculture in the three countries to be fully realized. It was often cited that NAFTA has been blamed for many adversities and adjustments that would have happened with or without NAFTA. Illustrative of these situations are reductions in the level of farm prices and incomes, reduced U.S. wheat production, reductions in farm numbers, changes in consumer tastes and preferences, changes in currency values, increased concentration, and increased integration. While NAFTA may contribute to one or more of these trends, they will continue regardless of what happens to trade. Following are more specific conclusions reflected in the papers and discussion.

Structural Change. The greatest structural change attributable to NAFTA has occurred in Canada and Mexico. In Canada, NAFTA (and other significant policy changes) have contributed to increased diversification of farming operations and to the development of a robust cattle feeding and hog industry increasingly located on the prairies of Canada. In Mexico, NAFTA has contributed to the development of the fruit, vegetable, and poultry industries,

with pressure on comercial corn and wheat producers. There has been a smaller impact on the indigenous and subsistence corn production systems than had been anticipated, because these producers are insulated from market forces.

Under genuine free trade within NAFTA, structural changes would be more pervasive because U.S. farm program subsidies (totaling $32 billion in 2000) would not be present to protect farmers from the forces of change. The major impacts would be in wheat (where Canada likely has a comparative advantage), in corn (where the US has a comparative advantage), and in high-risk production areas (where U.S. farmers receive protection from farm program subsidies on prices, income, insurance, and disaster assistance). In Mexico, the greatest impacts would be on small commercial farms that are forced to compete in a commercial environment. In general, the cattle/beef and hog/pork sectors are evolving toward free trade conditions now. In Canada and the United States, the protected sectors especially dairy would undergo substantial structural change.

There would be distributional impacts from full free trade. Larger farms producing to their comparative advantage would realize the greatest benefits from free trade. Crop farms would become increasingly integrated in some of their activities with agribusiness, as has happened in poultry and is happening in hogs, beef, and dairy. These effects are simply an extension/acceleration of those structural changes otherwise occurring in the agricultural economy.

Policy and Trade Conflict . Most of the major policy and trade conflicts occur in the commodities where regulation (including state trading), support programs and quality and health standards are significant aspects of market structure. Wheat, dairy and supply management generally in Canada; sugar, dairy, wheat, avocado in the United States; and sugar in Mexico are examples. Predictably, the most structural change and trade stress under a free full trade environment would likely occur in these areas as well. Plant and animal health and sanitary procedures, and environmental standards have not much altered market structure so far nor contributed to serious trade stress. However there is cause for concern, particularly that differential environmental standards across the three countries could produce trade stress. The level of subsidization of the grains sector in the United States in absolute terms and relative

to Canada and Mexico has produced an unbalanced playing field in grains and livestock. A major benefit of a full free trade arrangement would be more level terms of trade inside and outside of NAFTA.

Trade remedy laws in each of the three NAFTA countries have been demonstrated to be highly inefficient and disruptive policy instruments for addressing trade disputes and promoting trade harmony. Antidumping duties make no sense in agricultural markets where farm prices are frequently below costs of production, due to market cycles, or due to other-country impacts. Serious consideration is required to develop alternative, more effective means of dispute resolution that reflect the economic characteristics of the agriculture and food industries.

Competition. Trade economists usually assume that open borders help discipline uncompetitive behavior in domestic markets. The argument is that trade expands the geographic reach and commercial volume of markets. Increased market size allows firms to expand to realize available scale economies, thereby lowering costs. At the same time, by combining previously separate markets, expanded market size brings local dominant firms into new competition with one another in the larger market, thereby driving prices closer to costs. The combined effect can lead to sharply reduced prices for products where scale economies are larger relative to the size of the market.

This economic evolution is more likely to occur in Mexican and Canadian markets than in the United States where the large national market means that trade agreements will generally have only incremental effects on market sizes and competition. In addition, expanded trade, by increasing the reach of some markets, will play a role in corporate integration and merger evaluations. There are serious questions of whether antitrust/competition laws in their present form is the best approach for dealing with agricultural issues of concentration, contracting, and pricing. There is also a need to increase data sharing, market analysis, and even policy development across the three countries.

Role of Government in Free Trade. The closing paper and discussion examined policies and programs currently operation in the three countries, their consistency across countries and their compatibility with genuine

free trade. The evidence indicates reasonable compatibility in some areas but major conflict in some of the regulatory framework and in the protection and public support offered particular groups of producers. Mexico has moved the furthest in deregulation and removal of public support, the United States retains the highest level of public support to agriculture, and Canada has a highly skewed support system (in favour of supply management) and retains significant trade inhibiting regulation in the grains sector. Movement toward full free trade would require major adjustment in public support in the United States, and significant deregulation in Canada.

Because of the sensitivity of subsidies, state trading and supply management programs, the workshop concluded that initial emphasis should be placed on important but less sensitive areas such as differences in grade standards, infrastructure support, plant and animal protection, food safety, and environmental standards. This is not to say that the other issues should be ignored. Indeed the NAFTA Secretariat, properly organized and funded may also serve as an instrument of change and facilitator of reduced policy and trade barriers.

A NAFTA Secretariat. Several of these areas of common interest and conflict could be removed if there were continuing institutional analysis, research and policy development capacity within NAFTA. This strategy could be institutionalized through the implementation of an arms-length Secretariat charged with fostering and monitoring progress toward free trade under NAFTA. Issues of the evolution of market structure and competition might also be productively examined in a joint framework.

ORDERING THE PUBLICATION

This publication is available at a nominal cost ($15, including shipping and handling) in Canada and the United States. Prices on multiple copies and in Mexico are negotiable. First copies are available to universities, libraries, government departments and associations without charge.

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Several universities, interest group organizations, the private sector, and interested individuals are among our presenters and discussants. We pay a small honorarium for the preparation of main papers but it does not cover the time and effort expended by those researching and writing the papers, let alone resubmitting them after the workshop for publication. These contributions are part of the way this workshop has evolved, and we could not maintain our program without these generous contributions.

The Agricultural and Food Policy Center at Texas A&M University took the lead role in administering the workshop, and providing print-ready copy of the publication. Rene Ochoa did all the detailed organization before, during, and following the workshop. David Ernstes provided summaries of our discussion sessions and the print-ready copy. All of these functions are time consuming tasks, essential to a good workshop, and required for the publication. Finally, we acknowledge the ongoing contributions of Brenda Pitt in AAFC for keeping the committee connected through conference calls, Lenore Loyns for the “final reads and edits”, and Friesen Printers for expert printing services, all of which are also essential to publication of these proceedings.

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TABLE OF CONTENTS

BACKGROUND AND PURPOSE OF THE WORKSHOP
"*Structural Change As A Source Of Trade Disputes Under NAFTA*"

R.M.A. Loyns, Karl Meilke, Ronald D. Knutson and Antonio Yunez-Naude

The potential for structural change in agriculture is an important and largely unexplored factor affecting progress toward freer trade and a source of trade disputes. While substantial gains from trade in terms of increased efficiency and growth have been realized, there appear to be inherent concerns among farmers, laborers and some agribusinesses that they will be reorganized or displaced, that production will be relocated, that economic rents that may have existed in a protected market will disappear, and that the nature of agriculture, including its institutions and culture, will be forever changed. This potential for structural change is believed to be a substantial reason for protests by farmers against NAFTA and its perceived effects. At the same time, there are many farmers and agribusinesses who view NAFTA as creating opportunities to adjust crop mixes and business operations into more profitable and more efficient configurations.

NAFTA has had a direct impact on market structure by making exports a new competitive variable and providing the potential for continued export pressure. For some agricultural commodities, NAFTA has created major changes in trade flows, benefitting new sellers in exporting regions but causing production relocation or reorganization stress for importing country producers. There is evidence that these increased trade flows have been the cause of some trade

disputes. But there are also indirect and less obvious impacts on market structure. Past workshops have suggested that NAFTA, in combination with other market forces, has resulted in:

- geographic expansion of markets and market activity;
- increased vertical and horizontal combinations of business activities;
- elimination of some government programs and associated marketing institutions;
- harmonization of infrastructure support facilities and systems used in conducting business; and
- globalization of business and market planning

Previous workshops and other research have not systematically analyzed the structural changes associated with these developments. In addition, the final provisions of NAFTA excluded trade-oriented changes in major aspects of domestic farm policy resulting in many aspects of the agriculture and agri-food industry remaining subject to substantial government intervention. In other words, the "free trade agreements" have substantially altered many aspects of market structure and produced freer trade in much of the agriculture and agri-food industry in Canada, Mexico and the United States but certainly has not produced a genuine or full-free trade structure.

Genuine free trade has the potential for significantly changing the nature of competition in agricultural markets and the agri-food sectors. These changes may be either positive, as a larger number of firms come into cross-border competition with one another, or negative, if incentives for mergers and acquisitions are strong enough to actually reduce competition. The linkages between freer trade, structural change, and competition are not immediately obvious, and there are almost sure to be distributional effects from these changes that create gainers and losers. To a significant extent, the tensions and unanswered questions associated with these changes may result from a fear of the unknown, they may be unfounded, but they are real.

The purpose of this workshop on *Structural Change as a Source of Trade Disputes Under NAFTA* was to provide a thorough analysis of the relationships between NAFTA and structural change, and to answer questions re-

garding the impacts of free trade on structure and competition within agriculture and the agri-food industry. It is essential in undertaking such an analysis to recognize that there are three levels of structure and industry organization to be considered, not two as conventional wisdom might suggest. First, it is relatively easy to describe conditions prior to the "free trade agreements"; that is the subject of historical analysis. Second we know, or we can determine, where we are after several years of the operation of "free trade" as defined by CUSTA and NAFTA; this is the second level of free trade analysis. What is most difficult to know, and it requires some forecasting to analyze, is where we would be in the structural, locational, competition, and trade dispute picture if we had genuine free trade within the NAFTA region. *Analyzing these three levels of free trade effects was the basic objective of this workshop.*

For purposes of our analysis, we asked authors and participants to use the following definitions of 'structure', 'competition', and 'free trade':

Market Structure. As this term is used in economics, it refers to the basic organization of an industry and the inherent market characteristics of that industry. Several components are specified to describe market structure:

- number of buyers and sellers, and their size distribution;
- amount of product differentiation;
- barriers to entry;
- cost structures, particularly importance of fixed or sunk costs;
- extend of vertical integration;
- conglomerate integration and other business linkages; and importantly
- regulations, subsidies and other forms of government influence including, in this analysis, NAFTA arrangements.

This definition of structure is derived from the literature of industrial organization and provides a useful conceptual framework for analysis of markets and change in market organization. It was originally developed to describe and analyze business organization in the manufacturing and industrial sectors of a modern economy but it is believed to be equally applicable to agriculture as specified here. For purposes of this workshop, the relevant markets and related structures include the farms themselves, the supply of inputs to farmers, the configuration of processors who purchase products from farmers, and other

levels of the agri-food industry such as further processing, food service and retailing.

Competition means different things to different people. However, to economists and as used in this workshop, *competition* refers to the *intensity of rivalry among firms*. When competition is keen, information is full, and there are no externalities, efficiency of production and processing is promoted; consumer demands are satisfied; progressiveness and investment are fostered; and normal profits consistent with performance and management capabilities are achieved. Conventional wisdom asserts that competition in agriculture and agri-food markets is enhanced by free trade agreements such as NAFTA. Two important dimensions of competition for our analysis include:

- competition of firms within and among the NAFTA countries; and
- competition of firms between the NAFTA countries and the rest of the world.

Another term, *competitiveness*, has crept into the literature in recent years. It appears to derive from the issue of whether, under conditions of freer trade, the products and producers of one country can survive in the face of competition (i.e. rivalry) imposed by another country. In relation to traditional economic theory, *competitiveness* should be interpreted in relation to *the amount of competition* required to get acceptable performance in terms of not generating excess profits or distorting resource allocation. The objective of this workshop was to deal with competition as an instrument or process of business rivalry and as a tool for improving economic performance in markets.

Free Trade as used in the workshop, was intended to mean *the absence of governmental institutions (policies, programs, and regulations) that impede trade within and among the NAFTA countries*. This would involve the elimination of regulation and many institutions that restrain or act as barriers to trade but are currently legal under the terms of NAFTA. Such institutions include governmental subsidies to farmers (domestic farm programs), marketing boards and orders that have market regulatory powers, supply management programs, and trade restricting remedies through institutions such as the U.S. International Trade Commission (USITC) and its counterparts in Canada and Mexico. The term would not likely include governmental programs/institutions consid-

ered to be "green" under the provisions of the World Trade Organization (WTO) such as publicly supported research, extension, food safety (HACCP) regulations, grade standards, prompt-pay provisions, price reporting, etc. The last paper identifies the issues in determining what government policy and programs might be acceptable in a free-trade environment, and discusses those institutions considered important to promoting competition under free trade.

This publication contains most of the papers and discussion comments presented at the workshop in Tucson in February, 2001. Papers have been edited only to produce a common format and consistent style of presentation. Each section includes an overview of comments made in our open discussion sessions. The workshop was organized to first present an overview of evolution of market structure and competition since, and in response to, the 'free trade agreements'. The next sessions were directed to tracing the evolution of these factors for the livestock and crops sectors, and attempting to project how genuine free trade might influence market organization. The final paper provides an overview of existing government policies and programs in the three NAFTA countries and indicates compatabilities and inconsistencies with genuine free trade.

Section 1

Structural Parameters for the Agri - Food Industry Within NAFTA

The objective of this section is to present structural data and analysis on the agri-food industry within the NAFTA region.

STRUCTURAL CHANGE IN AN ERA OF INCREASED OPENNESS: A BACKGROUND PAPER ON THE STRUCTURE OF U.S. AGRICULTURE

Steven S. Zahniser, Robert A. Hoppe, James Johnson, and David Banker[1]

INTRODUCTION

Agriculture is one of the more trade-oriented sectors of the U.S. economy. As measured by the ratio of trade (exports plus imports) to total output, the farm sector in 1999 had an openness ratio of 0.52, compared with 0.19 for the entire economy (Figure 1).[2] This difference is rooted in the fact that a great portion of agricultural output consists of tradeable goods – products that either are traded or have the potential of being traded across international borders.

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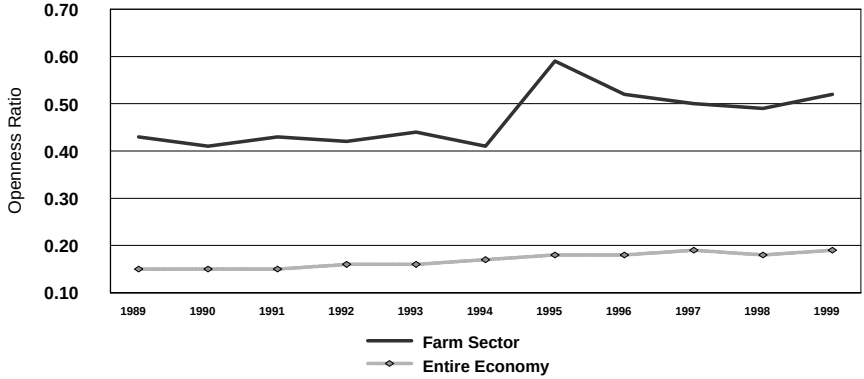
[1] The authors thank Andy Anderson, John Dunmore, David Harrington, William Kost, Janet Perry, and Kitty Smith for their comments and suggestions.

[2] The trade data used to calculate the openness ratios for the farm sector correspond to the two-digit standard industrial classification (SIC) codes for agricultural products (01) and livestock and livestock products (02). This definition of agricultural trade differs from that used in the U.S. Department of Agriculture's Foreign Agricultural Trade of the United States (FATUS) database. Our departure from convention here is necessary if the industry GDP and trade data are to be matched correctly. FATUS considers as agricultural trade some products that correspond to two-digit SIC codes other than 01 and 02. Examples include agricultural chemicals, manufactured tobacco products, and farm machinery.

Figure 1: Openness of the U.S. Farm Sector and the U.S. Economy, 1989-99.



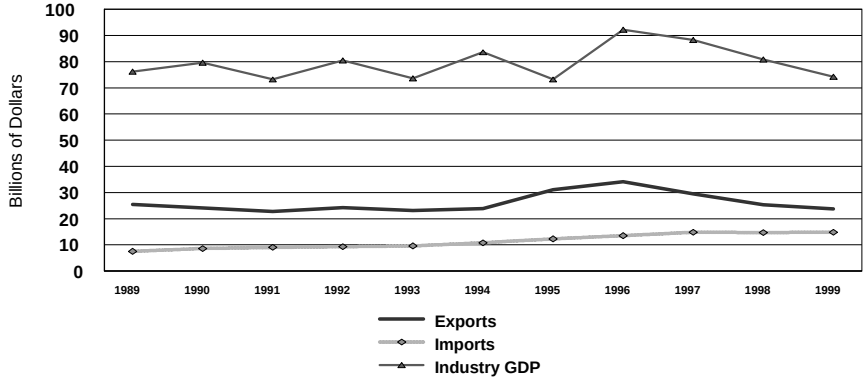
Note: Openness ratio is calculated by dividing the total trade (exports plus imports) of the farm sector by its industry GDP. The farm sector corresponds to the two-digit SIC codes 01 (agricultural products) and 02 (livestock and livestock products).
Sources: Industry GDP data are from U.S. Department of Commerce, Bureau of Economic Analysis (2000). Trade data were obtained directly from U.S. Department of Commerce, Bureau of the Census.

Trade has become more important to U.S. agriculture in recent years, although it remains to be seen whether this is a lasting development. If we ignore 1995, when farm exports reached unusually high levels, and compare the periods 1989-94 and 1996-99, it is evident that the openness ratio of the farm sector has increased. During 1996-99, the ratio averaged 0.51, compared with 0.42 for 1989-94.

An examination of the ratio's components reveals that the numerator increased by a greater proportion than the denominator. In the numerator, the largest change occurred in the imports of farm products, with an increase of 58 percent between 1989-94 and 1996-99. In fact, these imports increased without interruption during the 1990s (Figure 2). In addition, farm exports climbed by 18 percent between 1989-94 and 1996-99. Together, the sum of exports and imports increased by 29 percent across the two periods.

In contrast, the denominator – the gross domestic product (GDP) of the farm sector – experienced slower growth, increasing by only 8 percent between 1989-94 and 1996-99. Moreover, farm GDP experienced many ups and downs during the 1990s. The steady rise of imports during a period of rela-

Figure 2: Key Economic Indicators for the U.S. Farm Sector, 1989-99.



Note: All figures are expressed in current dollars. The farm sector corresponds to the two-digit SIC codes 01 (agricultural products) and 02 (livestock and livestock products).
Sources: Industry GDP data are from U.S. Department of Commerce, Bureau of Economic Analysis (2000). Trade data were obtained directly from U.S. Department of Commerce, Bureau of the Census.

tively slow growth and sharp fluctuations in the farm economy helps to explain why people look to the farm sector's evolving relationship with the domestic and the world economies in order to understand structural developments in U.S. agriculture.

This background paper profiles the structure of U.S. agriculture and highlights some of the primary forces that are driving structural change in the sector. Specifically, six sources of structural change are discussed: trade liberalization, domestic agricultural policy, domestic economic policy, the adoption of new technologies, new commercial relationships, and the relative strength of the non-agricultural economy. Most of these forces originate within the U.S. economy, even though they usually have international dimensions as well.

In addition, the structure of U.S. agriculture is described in further detail using the ERS Farm Typology, a unique conceptual framework developed by the U.S. Department of Agriculture's Economic Research Service (ERS). The ERS Farm Typology divides farms into eight distinct, relatively homogeneous groups, based on the amount of farm sales, type of ownership (family versus non-family), the principal occupation of the farm operator, and whether the economic resources of the farm are limited. This framework allows for a

more in-depth understanding of U.S. agriculture and how the attributes of farms vary across farm types. Throughout the paper, there is a reliance primarily upon research conducted by ERS, which is available on the Agency's web site at <*www.ers.usda.gov*>.

FORCES BEHIND STRUCTURAL CHANGE

Economists have offered many explanations for structural change in agriculture. Perhaps the most comprehensive treatment of this subject in the North American context is a collection of studies published in the *Canadian Journal of Agricultural Economics* (Harrington, et al., 1995). These studies assess and compare the forces and conditions affecting the structure of agriculture in Canada and the United States for the period before the enactment of NAFTA.

Trade Liberalization

The last decade and a half featured several important accomplishments for the United States in the area of agricultural trade liberalization. Within North America, Canada, Mexico, and the United States established a free-trade area through two historic agreements: the Canada-U.S. Free Trade Agreement (CFTA), implemented in 1989, and the North American Free Trade Agreement (NAFTA), which took effect in 1994 and subsumed CFTA. Through these accords, the three countries are eliminating the vast majority of tariff and quota restrictions that formerly governed trade among them. Many of these restrictions already have been lifted in their entirety, and the provisions originally in CFTA are now in full effect.

In the multilateral arena, the Uruguay Round of trade negotiations (1986-94) focused on agricultural issues more closely than any previous round associated with the General Agreement on Tariffs and Trade (GATT). The Uruguay Round culminated in the replacement of the GATT with the World Trade Organization (WTO). This multilateral institution, established in 1995, is responsible for administering the trade rules and disciplines to which its member countries have agreed. These rules include the provisions of the Uruguay Round Agreement on Agriculture (URAA), which requires WTO mem-

Table 1: Estimated Impact of NAFTA on U.S. Trade of Selected Agricultural Commodities.

Commodity	*Estimated change in trade volume due solely to NAFTA*		*Annual Average of Actual Trade Volume (in thousands of specified units)*			*Value (in millions of U.S. dollars)*	
	Direction	*Strength*	*1989-93*	*1994-98*	*Units*	*1989-93*	*1994-98*
Selected exports to Canada							
Beef and veal	Increase	High	72,708	95,236	mt	304	329
Processed tomatoes (1)	Increase	High	64,332	127,431	mt	58	107
Vegetable oils	Increase	Moderate	82,621	200,613	mt	71	166
Cotton	Increase	Moderate	42,092	62,009	mt	61	94
Fresh tomatoes	Increase	Moderate	122,344	127,516	mt	94	103
Selected exports to Mexico							
Cattle and calves	Increase (2)	High	144,543	130,824	no	95	77
Dairy products	Increase (2)	High	—	—	—	162	155
Apples	Increase	High	45,094	93,068	mt	23	50
Pears	Increase (2)	High	29,325	42,068	mt	14	21
Sorghum	Increase	Moderate	3,415,520	2,567,078	mt	377	308
Vegetable oils	Increase	Moderate	123,642	338,149	mt	73	218
Beef and veal	Increase	Moderate	46,425	81,789	mt	135	236
Hogs	Increase	Moderate	100,335	83,143	no	11	8
Pork	Increase	High	26,663	35,107	mt	59	69
Cotton (including linters)	Increase	Moderate	66,940	213,575	mt	85	326

* = Negligible

(1) Trade data for processed tomatoes exclude tomato juice.

(2) Without NAFTA, the volume of trade would have decreased more.

(3) Without NAFTA, the volume of trade would have increased more.

Estimates reflect changes in trade due solely to NAFTA and are based on assessments of ERS analysts:

Increase — High = Volume of trade was more than 15 percent higher during 1994-98 than it would have been without NAFTA.

Increase — Moderate = Volume of trade was 5-15 percent higher.

Decrease — High = Volume of trade was more than 15 percent lower.

Table is adapted from Link and Zahniser (1999). Trade data for peanut imports from Mexico and processed tomato imports from Canada are from HS Imports; all other trade data are from the Foreign Agricultural Trade of the United States database.

Table 1: Estimated Impact of NAFTA on U.S. Trade of Selected Agricultural Commodities (continued).

Commodity	*Estimated change in trade volume due solely to NAFTA*		*Annual Average of Actual Trade Volume (in thousands of specified units)*			*Value (in millions of U.S. dollars)*	
	Direction	*Strength*	*1989-93*	*1994-98*	*Units*	*1989-93*	*1994-98*
Selected imports from Canada							
Beef and veal	Increase	High	106,517	233,637	mt	246	509
Fresh and processed potatoes	Increase	High	360,410	618,015	mt	98	221
Fresh tomatoes	Increase	Moderate	3,604	28,066	mt	5	45
Cattle and calves	Decrease (3)	High	967,742	1,268,483	no	668	908
Seleted imports from Mexico							
Peanuts (shelled and in-shell)	Increase	High	*	4,147	mt	*	3
Sugar	Increase	High	29,664	31,030	mt	8	12
Fresh tomatoes	Increase	Moderate	335,083	609,887	mt	256	477
Processed tomatoes (1)	Increase (2)	Moderate	21	14	mt	16	12
Melons	Increase	Moderate	286,567	358,679	mt	80	108

* = Negligible

(1) Trade data for processed tomatoes exclude tomato juice.

(2) Without NAFTA, the volume of trade would have decreased more.

(3) Without NAFTA, the volume of trade would have increased more.

Estimates reflect changes in trade due solely to NAFTA and are based on assessments of ERS analysts:

Increase — High = Volume of trade was more than 15 percent higher during 1994-98 than it would have been without NAFTA.

Increase — Moderate = Volume of trade was 5-15 percent higher.

Decrease — High = Volume of trade was more than 15 percent lower.

Table is adapted from Link and Zahniser (1999). Trade data for peanut imports from Mexico and processed tomato imports from Canada are from HS Imports; all other trade data are from the Foreign Agricultural Trade of the United States database.

bers to reduce substantially agricultural support and protection in the areas of market access, domestic support, and export subsidies.

NAFTA and the WTO are having a myriad of effects – some profound, others subtle– on the structure of U.S. agriculture. ERS's 1999 NAFTA Report (Link and Zahniser, 1999, 2000) finds that NAFTA generally is exerting a small, positive effect on U.S. agricultural trade with Canada and Mexico. The report places NAFTA in the constellation of other factors affecting this trade, including unusual weather conditions, changes in exchange rates, and the macroeconomic performance of the three countries. However, the report identifies several commodities for which NAFTA has had a dramatic effect on the volume of trade, with an estimated change due solely to NAFTA in excess of 15 percent (Table 1).

The 1999 NAFTA Report also suggests that regional patterns of trade and production have intensified and that new patterns have been established. For instance, pork producers in western Canada tend to export to the U.S. west coast, while U.S. producers tend to export to eastern Canada. Similarly, Mexican ranchers, when confronted with drought, have marketed their cattle for slaughter in the United States. These examples are likely to be the tip of the iceberg with respect to such regional changes in production, processing, and trade.

ERS has not conducted a comparable study about the WTO's impact on U.S. agriculture. However, Normile (1998) identifies a number of the organization's early accomplishments, including reduction in subsidies for agricultural exports, the establishment of new rules for policies governing agricultural imports, and the creation of new multilateral disciplines for sanitary and phytosanitary trade measures.

Domestic Agricultural Policy

The Federal Agriculture Improvement and Reform Act of 1996, commonly referred to as the FAIR Act, the 1996 Farm Act, or "Freedom to Farm," represented perhaps the most ambitious legislative attempt to foster greater market orientation within U.S. agriculture. Broadly speaking, the Act suspended or abolished many long-standing elements of U.S. agricultural policy, includ-

ing price-sensitive deficiency payments and acreage-use restrictions. In their place, the Act created a 7-year program of predetermined direct payments to farmers. The provisions of the Act generally expire in 2002, and the U.S. Congress is already engaged in the process of crafting a replacement Farm Bill.[3]

The 1996 Farm Act took effect at a time of high commodity prices. When these prices plummeted, the U.S. Congress enacted legislation to provide producers with extensive emergency assistance (Appendix 1). Although the emergency assistance does not appear to violate WTO ceilings for domestic agricultural support, it was negatively received by some foreign leaders because of its sheer size and potential influence on world markets.

The impact of the 1996 Farm Act and subsequent emergency-assistance programs is of great interest to agricultural decision-makers. Lin, et al. (2000) concluded that the Act has increased supply responsiveness for major field crops – especially corn, soybeans, and cotton – to changes in their own prices and the prices of competing crops. In addition, the authors found that the Act has not greatly affected regional patterns in the production of these crops.

A crucial dimension of the structural impact of these measures is how the size and type of assistance vary by region, commodity produced, and farm type, and how these differences affect the economic behavior and performance of producers. For instance, government payments could spur additional purchases of farm implements, or they could increase the demand for farmland, driving up rents and land prices. Moreover, they could alter the relative economic rewards to the production of specific crops, thereby influencing the crop mix throughout agriculture. Westcott and Young (2000) indicate that these differential effects are a definite concern, as the major field crops – most notably, corn, soybeans, wheat, and cotton – are associated with nearly all direct government payments, even though they account for only one-fifth of forecasted cash receipts for 2000.

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[3] The 1996 Farm Act contains many other elements, including new and extended programs in the area of conservation. See Nelson and Schertz (1996) for a more complete summary of the Act.

Domestic Economic Policy

Of equal importance in shaping the structure of agriculture is the role of general economic policy, notably macroeconomic and tax policies. Macroeconomic policies affect the availability and terms of credit, exchange rates, inflation, profit expectations, and asset values. Over much of the 1970s, macroeconomic policies were favorable to the accumulation of wealth in agriculture. The macroeconomic adjustments instituted in the 1980s to cool inflation in the general economy created severe adjustment problems for farm families, communities, and agricultural lenders (Duncan and Harrington, 1986). The result was widespread financial stress in the farm sector and losses of wealth for many farm families over the mid- to late 1980s, which agricultural policies were largely unable to correct.

Income tax, property tax, and succession tax policies also play major roles in shaping the structure of agriculture. Differences in the deductibility of farm losses against non-farm income have led to very different distributions of farms by size in Canada and the United States (Freshwater and Reimer, 1995). In the United States, farm losses can be deducted from non-farm income in the calculation of income tax. In Canada, such write-offs of farm losses are severely limited. As a result, the United States has a very large proportion of very small farms that post losses for tax purposes, while Canada has a much smaller proportion of farms in the very small category. Other tax and succession policies affect the structure of agriculture through the market adjustments that farm households make to take advantage of tax preferences. Such adjustment may adversely affect market returns in agriculture, if they increase the supply of agricultural commodities (Harrington and Reinsel, 1995).

Adoption of New Technologies

U.S. farmers and ranchers have a rich history of incorporating mechanical, biological, information, and management technologies into their business operations (Offutt, 1997). As a result, agricultural productivity has increased at an estimated average annual rate of 1.94 percent over the period 1948-94 (Ahearn, et al., 1998).

Producers who are among the first to adopt new technologies typically are perceived as achieving lower costs and increased profits, at least for a short

period of time (U.S. Congress, Office of Technology Assessment, 1985). The concepts of economies of size and the adoption and diffusion of technology have been used to construct models of structural change, with the notion being that the underlying productive relationships and technologies are key determinants of the long-run costs of production (Boehlje, 1992). Some analysts have noted that technology may also influence specialization and the capital requirements of farms and have written about the complex relationships between technology, productivity, and profitability (U.S. Congress, Office of Technology Assessment, 1985; Miranowski, 1986).

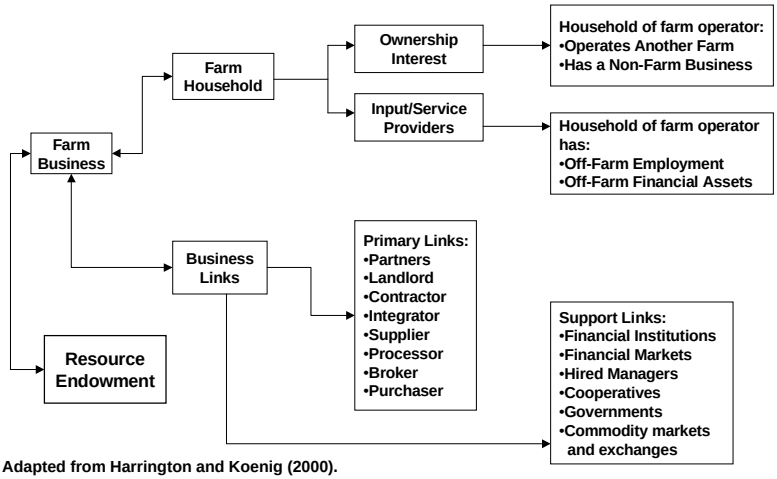
Bio-engineered seed, precision production and harvesting techniques, and high-speed, high-capacity planters and harvesters are examples of recent technological advances in agriculture. Several studies (Daberkow, Fernandez-Cornejo, and McBride, 2000; Daberkow and McBride, 2000; Smith and Heimlich, 2000) indicate that bio-engineered seed and precision farming are being diffused throughout the farm sector. While larger operations are more likely to use these technologies at the present time, more work remains to assess how the adoption of technology affects the costs of production, crop yields, and financial performance of farms under a broad range of conditions and geographic locations.

Application of computer and information technologies to farm decision-making is another example of technology that may influence the selection of inputs and field practices, and of market channels for inputs and outputs. The number of farms with access to the Internet more than doubled between 1997 and 1999, reaching 29 percent in the latter year (Morehart and Hopkins, 2000). Like bio-engineered and precision technologies, the use of computers and the Internet to conduct transactions seems to be positively correlated with farm size. The importance of size differences in the use of emerging information technologies is reflected in potential cost savings of substantial magnitude (Miller, 2000; Smith, 1999).

New Commercial Relationships

In the not too distant past, farm organization tended to exhibit an extremely close relationship between agricultural production and household consumption at a central site – the farm (Heady, Back, and Peterson, 1953). Mem-

Figure 3: A More Current Perspective of Farm Business Linkages, Farm business structure is complex.



Source: Adapted from Harrington and Koenig (2000).

bers of the farm household primarily devoted their labor to agricultural production and the maintenance of the household. In return, the household obtained the lion's share of its income from the sale of farm output, and in many instances, the members of the household directly consumed a portion of that output.

Over time, farmers have adapted their business arrangements to respond to changing economic conditions and to better pursue their personal, household, and business goals. As a result, the business structure of farming is far more complex now than in the past (Figure 3). The current structure features a combination of traditional arrangements and newer innovations in business relationships.

Like their non-farm counterparts, farm households make employment and investment decisions aimed at achieving household financial goals. These decisions often involve off-farm employment. For a majority of farms, the primary occupation of the operator is something other than farming. In these

cases, farming is pursued on a part-time basis for reasons ranging from supplemental income to the enjoyment of nature and outdoor activities.

Off-farm employment is also important to many persons whose primary occupation is farming. Similarly, spouses may be engaged in farm work or hold a wide variety of off-farm occupations. Even on large farms, it is not uncommon for spouses to hold off-farm jobs. In addition to off-farm employment, more than one-tenth of farm households own another farm or a separate non-farm business. While the operator's household has an ownership interest in the farm, it may not be the only household with such an equity position. Two other sets of households – partners and shareholders in corporations – also may hold equity in the farm. But even in the case of proprietorships, outside equity capital may come from other households, as farmers seek additional assets or financing to grow their businesses.

The expanded use of production and marketing contracts is one of the most widely discussed issues in agriculture. A *production contract* is a legal agreement between a farm operator (contractee) and another person or firm (contractor) to produce a specific type, quantity, and quality of agricultural commodity. Usually, the contractor owns the commodity being produced, and the farm receives a service fee for producing the output. Under a *marketing contract*, the contractor buys a known quantity and quality of a commodity from a farm at a negotiated price. The farm owns the commodity while it is being produced and receives a price reflecting the value of the commodity upon its sale. Much discourse has focused on how the expanded use of such contracts may affect the market access of farmers, price transparency, and the farm operator's control of production and marketing decisions. However, it is important to note that substantial use of these contracts, along with concerns about their social and economic ramifications, dates back at least to the 1960s.

While contracts have captured considerable public attention, farmers also have incorporated and pursued other arrangements in order to market their farm output. Among these arrangements are pre-harvest agreements to pool output for marketing, the electronic sale of livestock, participation in farm networks to build and operate common facilities for the production of inputs or the processing of output, and direct sales to consumers and to wholesale and

Table 2: Real GDP by Selected Industry, in Billions of Chained (1996) Dollars.

		Agriculture, forestry, and fishing.		
Year	***Entire economy***	***Subtotal***	***Farms***	***Agricultural services, forestry, and fishing***
1987	6,113.3	110.3	78.8	31.8
1988	6,368.4	101.2	70.2	31.4
1989	6,591.8	111.4	79.5	32.1
1990	6,707.9	118.5	84.2	34.6
1991	6,676.4	121.3	85.6	36.0
1992	6,880.0	130.7	95.7	35.4
1993	7,062.6	122.6	85.8	36.8
1994	7,347.7	135.8	100.3	36.2
1995	7,543.8	123.1	85.5	37.6
1996	7,813.2	130.4	92.2	38.3
1997	8,159.5	143.7	103.6	40.3
1998	8,515.7	144.0	100.2	43.2
1999	8,875.8	150.9	106.3	44.4

Source: U.S. Department of Commerce, Bureau of Economic Analysis (2000)

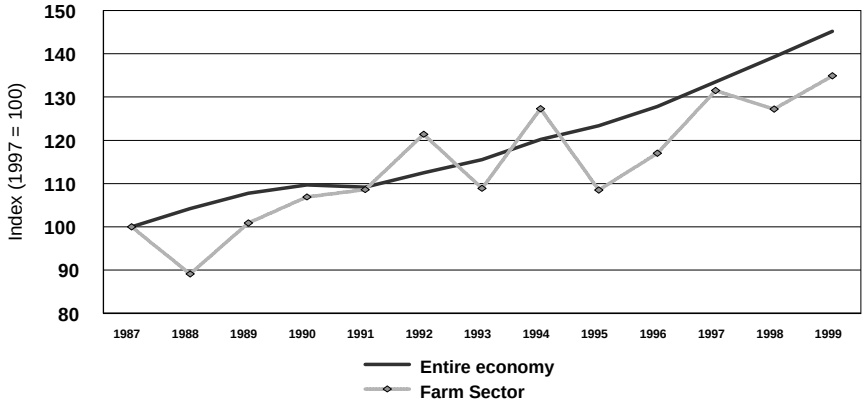
retail outlets. Such direct sales are not yet typical, and thus the growth of such arrangements reflects an important and complex organizational achievement.

New arrangements to procure inputs also are emerging, supplanting purchases from traditional local suppliers. Farmers now band together to purchase big-ticket inputs, participate in buying clubs, and use the Internet to purchase inputs. Operators also lock in the price of inputs before they need them for production and negotiate price discounts with full-service suppliers. Many of these transactions extend well beyond the local community of the farm operator, particularly in the case of larger operations. The same characterization applies to the sale of output. While operators of many small farms still take their output to the local elevator or auction, a substantial percentage of the operators of larger farms opt for different outlets, ranging from dealers and brokers to networks and electronic sales.

Strength of the Non-Agricultural Economy

The structure of U.S. agriculture is also affected by the relative performance of other economic sectors. Agriculture must vie with other industries for entrepreneurial talent, hired labor, investment capital, farmland (which could

Figure 4: Real GDP for the U.S. Economy and the U.S. Farm Sector, 1987-99.



The farm sector corresponds to the two-digit SIC codes 01 (agricultural products) and 02 (livestock and livestock products). Indices were calculated using real GDP data, expressed in chained 1996 dollars.
Source: Calculated using industry GDP data from U.S. Department of Commerce, Bureau of Economic Analysis (2000).

be converted to non-agricultural uses), and a variety of other inputs. In turn, the outcome of this competitive process shapes the size and composition of U.S. agriculture.

Although economic growth has slowed in recent months, the United States continues to enjoy a period of unprecedented economic expansion. Agriculture has shared in this growth, albeit at a slower rate than the economy as a whole. Between 1987 and 1999, real GDP rose steadily from $6.1 trillion to $8.9 trillion (as measured in chained 1996 dollars), an increase of 45 percent (Table 2). Over the same period, real GDP for the farm sector increased 35 percent, from $79 billion to $106 billion. However, farm output experienced a number of wild upswings and downswings during this period (Figure 4).

Perceived differences in the economic rewards to agricultural and non-agricultural activities (and in the risks involved in pursuing those rewards) affect the entry-and-exit decisions of agricultural producers. In recent years, the overall strength of the economy has enabled farmers and ranchers who otherwise would have left agriculture to continue in the sector through non-farm employment. However, the expected differential in economic rewards has en-

ticed many prospective producers, including persons who grew up in farm families, to select a full-time occupation outside agriculture. The decision of these individuals not to enter agriculture is perceived by many farmers as a genuine loss, even though these individuals may receive higher pay in the non-farm economy than they would have in agriculture.

Despite the differing economic performance of agriculture and non-agricultural industries, U.S. agriculture generally is able to secure the inputs necessary for production. For instance, Zahniser and Treviño (2001) conclude that U.S. agriculture is "holding its own" in the market for hired farm labor, securing similar numbers of farm laborers as in previous years and offering real increases in wages. However, they emphasize that crop agriculture relies heavily on foreign-born workers, perhaps more so than in the past, and that many of these workers lack legal authorization to work in the United States.

The continued expansion of human settlements is squeezing agriculture out of some locations, as farmland is sold and then converted to non-agricultural purposes. The sale of farmland does not necessarily reflect the insolvency of the farm operation or some other economic weakness. Some operators liquidate land holdings in order to finance retirement or to transfer wealth to their children. Others utilize receipts from land sales to relocate their farm operations. Also, the conversion of farmland to non-agricultural purposes is sometimes accompanied by efforts to change zoning requirements and other land use regulations that concern the area's remaining farm operations.

Quickly earned gains in non-agricultural industries during the late 1990s may have inspired riskier behavior on the part of some agri-businesses. In at least one instance, this seems to have resulted in a business failure, with adverse consequences for the farm operations that did business with the firm. In January 2000, a major seed firm called AgriBioTech (ABT) filed for bankruptcy protection. Through a series of 34 mergers and acquisitions, ABT had attempted to become a vertically integrated developer, purchaser, and seller of turfgrass and forage seeds. Although the effects of this bankruptcy were localized, the firm's collapse created enormous difficulties for seed producers with ABT contracts.

Defining the ERS Farm Typology

Small Family Farms (sales less than $250,000)

- **Limited-resource farms.** Small farms with sales less than $100,000, farm assets less than $150,000, and total operator household income less than $20,000. Operators may report any major occupation, except hired manager.
- **Retirement farms.** Small farms whose operators report they are retired.*
- **Residential/lifestyle farms.** Small farms whose operators report a major occupation other than farming.*
- **Farming-occupation farms.** Small farms whose operators report farming as their major occupation.*
  - **Lower-sales.** Sales less than $100,000.
  - **Higher-sales.** Sales between $100,000 and $249,999.

*Excludes limited-resource farms whose operators report this occupation.

Other Farms

- **Large family farms.** Sales between $250,000 and $499,999.
- **Very large family farms.** Sales of $500,000 or more.
- **Non-family farms.** Farms organized as nonfamily corporations or cooperatives, as well as farms operated by hired managers.

THE STRUCTURE OF U.S. AGRICULTURE

ERS Farm Typology

In late 1997 and early 1998, ERS developed a typology, or classification system, to categorize U.S. farms into eight mutually exclusive, relatively homogeneous groups (see box entitled "Defining the Farm Typology"). Compared with classification systems based on sales alone, the ERS Farm Typology is far more reflective of operators' expectations from farming, the position of farm operators within the life cycle, and their reliance on agriculture for income. Examining agriculture within the framework of more homogeneous

Table 3. Distribution of farms and farm product sales, by type of farm organization, 1978-97.

Farm organization	*Share of farms*					*Share of farm product sales*				
	1978	*1982*	*1987*	*1992*	*1997*	*1978*	*1982*	*1987*	*1992*	*1997*
	Percent									
Individual or family (sole proprietorship)	87.1	86.8	86.7	85.9	86.0	61.6	59.2	56.3	54.1	52.2
Partnership	10.3	10.0	9.6	9.7	8.9	16.1	16.4	17.1	18.0	18.1
Corporation	2.2	2.7	3.2	3.8	4.4	21.6	23.9	25.6	27.2	28.9
Family-held[1]	2.0	2.3	2.9	3.4	4.0	15.1	17.4	19.5	21.1	23.3
Stockholders:										
10 or fewer	1.9	2.3	2.9	3.3	3.9	13.9	15.7	18.0	18.3	20.7
More than 10	0.1	0.1	0.1	0.1	0.1	1.2	1.7	1.5	2.9	2.6
Not family-held	0.3	0.3	0.3	0.4	0.4	6.5	6.5	6.1	6.0	5.6
Stockholders:										
10 or fewer	0.2	0.3	0.3	0.4	0.4	3.6	4.2	4.3	4.0	3.7
More than 10	0.1	0.1	*	0.1	0.1	3.0	2.4	1.8	2.0	1.9
Other (cooperative, estate or trust, institutional, etc.)	0.4	0.5	0.6	0.6	0.8	0.6	0.5	0.9	0.7	0.9

Note: Detail may not add to totals due to rounding.

* = Less than .05 percent.

[1]Family-held corporations have more than 50 percent of their stock owned by people related by blood or marriage.

categories based on several key characteristics enhances our understanding of farm structure and how resources are organized for farm production.

The ERS Farm Typology focuses on the family farm, which is defined as any farm organized as a sole proprietorship, partnership, or family corporation. Family farms exclude farms organized as non-family corporations or cooperatives, as well as operations with hired managers. Contrary to popular belief, agricultural production is not dominated by non-family corporations (Gale and Harrington, 1993). In fact, the share of farms and farm sales corresponding to non-family corporations is small and has been stable for decades.

Nevertheless, significant changes have occurred in the marketing of farm products (Hoppe, 1996). Farmers depend less on terminal markets and spot pricing and rely more on production and marketing contracts. A farm may also coordinate its activities with a vertically integrated firm, where the same company owns several farm-related businesses, such as hatcheries, feed mills, processing plants, and packing facilities. The integrated firm may also own farms or, more likely, contract with farmers. Contracting and vertical integration have become the main modes of production and marketing in the broiler, turkey, egg, milk, and certain specialty crop markets.

Distribution of Farms, Production, and Assets

Although the vast majority of U.S. farms are small family farms, agricultural production is highly concentrated in large and very large family farms (Table 4). In 1998, large and very large family farms made up only 8 percent of all farms, but they accounted for 53 percent of the total value of agricultural production. This large share of production is a reflection of the growing concentration of agricultural production over the past century (Figure 5).

Small family farms, which constituted 91 percent of all farms in 1998, accounted for only 33 percent of agricultural output. Most of this production was concentrated in the high-sales group (17 percent of the total value of production) and the low-sales group (8 percent). However, small family farms produced a large share of certain commodities. Prominent examples include hay (62 percent of the total value of production), tobacco (54 percent), soybeans (49 percent), wheat (47 percent), corn (47 percent), and beef (40 per-

Table 4: Selected structural characteristics of farms, by farm typology group, 1998.

	Farm typology group								
	Limited Resources	*Retirement*	*Residential/ lifestyle*	*Farming-occupation, low-sales*	*Farming-occupation, high-sales*	*Large*	*Very large*	*Non-family*	*All farms*
					Number				
Total number of farms	150,268	290,938	834,321	422,205	171,469	91,939	61,273	42,296	2,064,709
					Percent				
Distribution of:									
Farms	7.3	14.1	40.4	20.4	8.3	4.5	3.0	2.0	100.0
Value of production	0.6	1.4	6.1	7.8	17.1	16.8	36.7	13.6	100.0
Area owned	1.2	10.2	15.7	24.4	16.8	11.2	10.0	10.5	100.0
Farms with sales less than $10,000	79.8	75.5	70.2	34.6	0.0	0.0	0.0	31.1	52.5
Distribution of CRP and WRP area	3.8	28.9	20.6	17.5	13.5	8.2	3.9	3.5	100.0
Positive net cash income	35.2	39.6	31.6	49.5	81.7	87.1	91.7	55.9	45.6
Type of farm:									
Cash grain	*10.0	7.1	14.0	22.6	42.8	44.1	20.3	25.0	18.6
Other field crops	22.1	31.6	24.5	15.9	10.7	12.6	13.5	21.9	21.5
High value crops	d	*7.4	7.8	6.6	4.9	7.3	14.0	20.5	7.7
Beef	40.6	39.0	32.4	36.6	13.0	9.7	8.8	14.7	31.1
Hogs	d	d	d	2.3	4.2	4.7	5.9	d	2.5
Dairy	d	d	d	6.4	20.4	15.6	14.0	d	4.5
Other livestock	*15.7	*14.5	18.0	9.5	4.0	6.0	23.5	*11.5	14.0

CRP = Conservation Reserve Program
WRP = Wetlands Reserve Program
d = Data suppressed due to insufficient observations.
* = Standard error is between 25 and 50 percent of the estimate.

Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

Figure 5: Smallest percentage of U.S. farms accounting for half of U.S. agricultural sales, selected census years, 1990-97.

Source: USDA, Economic Research Service, based on Census of Agriculture, various years.

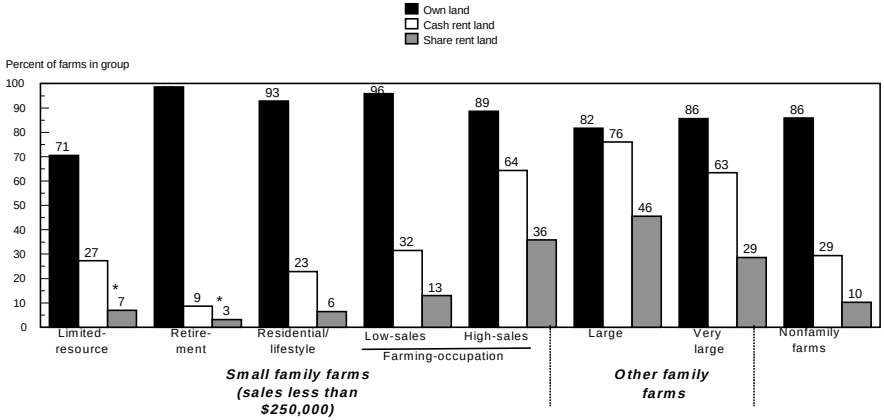
cent). These large shares reflect common specializations among small family farms (Table 4). A relatively large share of high and low -sales small family farms specialized in cash grains in 1998 (43 and 23 percent, respectively). At the same time, between one-third and two-fifths of each small family farm group – except the high-sales group – specialized in cattle. Cow-calf enterprises in particular have relatively low labor requirements (Holcomb, 1982) and often are compatible with off-farm employment, retirement, or scaling back an operation in preparation for retirement.

Despite their relatively minor share of production, small family farms collectively held 69 percent of farm assets, including 68 percent of the land. As custodians and managers of the majority of U.S. farmland, these farms play a major role in policies aimed at protecting and conserving natural resources. In fact, small family farms accounted for 84 percent of the land enrolled in the Conservation Reserve Program (CRP) and Wetland Reserve Program (WRP).

Accessing Resources

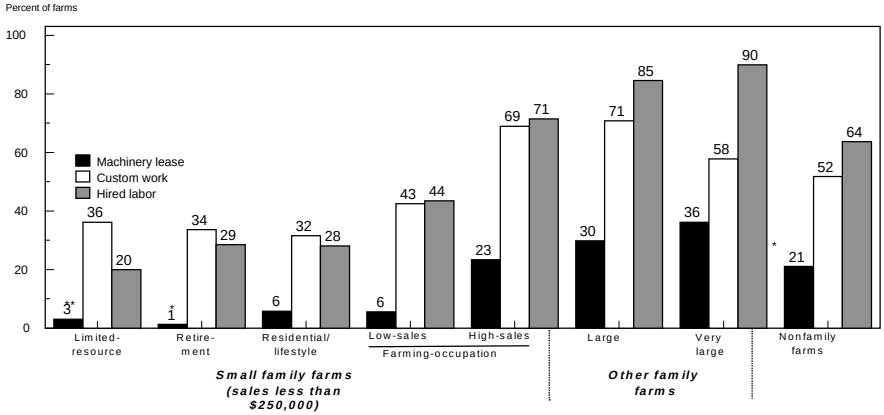
Obtaining farmland and other resources necessary for agricultural production is vital to any farm operation. In many instances, this is accomplished

Figure 6: Methods of accessing land, by farm typology group, 1998, *Ownership of land is most common among retirement, residential/lifestyle, and low-sales small farms.*



* = Standard error is between 25 and 50 percent of the estimate.
Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

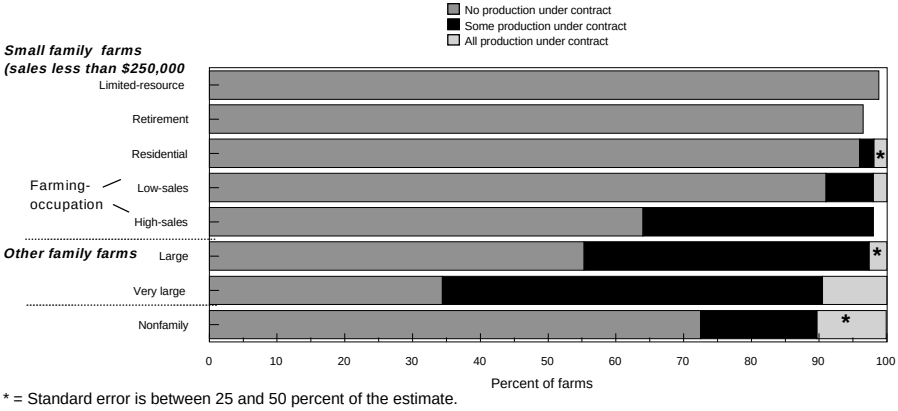
Figure 7: Selected methods of input procurement, by farm typology group, 1998, *Custom work and hired labor are common, even among small farms.*



* = Standard error is between 25 and 50 percent of the estimate.
**= Standard error is between 51 and 75 percent of the estimate.
Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

by renting the asset in question rather than buying it outright. Similarly, farm operations often utilize hired labor or custom work instead of family labor. The manner in which productive resources were secured in 1998 varies across the ERS Farm Typology. Farms in all typology groups commonly accessed

Figure 8: Distribution of farms, by production under contract and farm typology group, 1998, *Production without contracts prevails among small farms.*



* = Standard error is between 25 and 50 percent of the estimate.
Estimates of farms with some production under contract and farms with all production under contract were suppressed for selected groups, due to insufficient observations.
Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

farmland through direct ownership, but this approach was most common among small family farms in the retirement, residential/lifestyle, and low-sales categories (Figure 6). Renting land, in exchange for either cash or crop shares, was more prevalent than owning land among family farms with sales greater than $100,000.

Farms in each typology group reported leasing machinery, using custom work, and hiring labor (Figure 7). No less than one-third of each group reported using custom work, and at least one-fifth of each group reported using hired labor. In contrast, the proportion of farms that leased machinery was greater than or equal to 20 percent only in the non-family farm group and for family farms with sales of at least $100,000. Thus, there may be a size threshold below which the leasing of machinery is not economical to farms, to suppliers, or both.

Coordinating Activities

Coordinating activities refer to ways in which farms work with other firms to produce output, to sell or otherwise dispose of their product, and to purchase inputs. Coordinating activities include production and marketing

contracts, strategic alliances, direct sales to retailers and consumers, forward pricing of inputs, and cooperative membership.

Contracting and Integration. Most small family farms had no production under contract (Figure 8). Small family farms with high sales, however, had a substantially larger share of farms with production under contract than other categories of small family farms. In fact, the high-sales and large family farm groups had similar proportions of farms engaged in contracting. These last two groups used marketing contracts much more commonly than production contracts (Table 5). Both small family farms with high sales and large family farms specialized heavily in cash grains and dairy production – activities that are more likely to feature marketing contracts than production contracts. Only among very large family farms did a majority of operations (66 percent) engage in contracting for at least some of their production (Figure 8). One-third of very large family farms had production contracts, about triple the rate for small family farms with high sales and large family farms (Table 5). Two-thirds of very large family farms with production contracts specialized in poultry production.

Although most typology groups for small family farms had a relatively small proportion of operations with production or marketing contracts, small family farms accounted for a large share of all farms with such contracts. However, this result is not entirely unexpected given the large share of farms that are small family farms. Nearly two-thirds of farms with marketing contracts and over 40 percent of farms with production contracts were small (Table 6). However, they accounted for only 22 percent of the value of production under marketing contracts and about 15 percent of the value under production contracts. At the same time, very large farms (about 3 percent of all farms) accounted for over half of the value of contracted production.

The degree of coordination through contracting varies substantially by commodity (Table 7). For instance, the broiler industry evolved into a highly coordinated supply chain during the 1950s (Martinez, 1999; and Perry, et al., 1999). In contrast, hog production became increasingly integrated via contracting during the 1990s. Preliminary estimates for 1999 indicate that 60 percent of the value of hog production is coordinated through contracts, compared

Table 5: Percent of farms with selected coordinated activities, by typology group, 1998.

Typology group	*Has marketing contract(s)*	*Has production contract(s)*
	Percent	
Small family farms		
Limited-resource	*1.2	0.0
Retirement	3.0	**0.5
Residential/lifestyle	3.6	0.5
Farming-occupation		
Low-sales	7.7	1.5
High-sales	31.0	7.1
Large family farms	36.7	10.3
Very large family farms	37.8	32.5
Non-family farms	26.3	2.6

* = Standard error is between 25 and 50 percent of the estimate.
** = Standard error is between 51 and 75 percent of the estimate.
Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

with 10 percent in 1993. Other commodities with large shares of production under contract include cotton, fruits, vegetables, cattle, and dairy products.

Other Coordinating Activities. In addition to contracting, farmers engage in a variety of methods to purchase inputs and to market their output (Table 8). While cash sales were the predominant marketing method of small farms, other methods such as networks, farmer cooperatives, dealer/brokers, wholesaling, retailing, and direct sales to consumers were also used. Price locking, farmer-owned cooperatives, and negotiated price discounts were the methods most frequently used by farmers to coordinate input purchases. Use of the Internet to purchase inputs is likely to increase substantially over the next several years.

Sources and Level of Operator Household Income. For most groups of small family farms, virtually all income came from off-farm sources (Table 9). On average, farming made a substantial contribution to household income only for groups with sales of $100,000 or more, and the contribution of farming increased with sales. Households operating very large family farms (sales of $500,000 or more) received only 16 percent of their income from

Table 6: Distribution of farms and value of production under contract, by typology group, 1998.

	Typology group				
	Small family farms[1]	*Large family farms*	*Very large family farms*	*Non-family*	*All farms farms*
			Number		
All farms	1,869,201	91,939	61,273	42,296	2,064,709
			Percent		
Distribution of farms:					
All farms	90.5	4.5	3.0	2.0	100.0
Farms with contracts	61.0	17.2	16.9	4.9	100.0
Farms with marketing contracts	64.9	17.4	11.9	5.7	100.0
Farms with production contracts	44.2	17.3	36.5	2.0	100.0
Distribution of production:					
Value of production	33.0	16.8	36.7	13.6	100.0
Value under contract	19.2	12.3	53.3	15.1	100.0
Value under marketing contracts	21.9	15.8	50.4	11.9	100.0
Value under production contract	15.3	7.3	57.5	19.9	100.0
Share of value of production:					
Under contract	20.4	25.7	50.9	39.0	35.0
Under marketing contract	13.8	19.6	28.6	18.2	20.8
Under production contract	*6.6	6.2	22.3	*20.8	14.2

* = Standard error of the estimate is between 25 and 50 percent of the estimate.

[1] Includes limited-resource, retirement, residential/lifestyle, and farming occupation low and high-sales farms.

Source: USDA, Economic Research Service, 1998 USDA Agricultural Resource Management Study Phase 3, version 1.

Table 7: Share of all contract production by commodity and share of commodity produced under contract, 1998.

Commodity	*Commodity share of all contract production*	*Share of commodity produced under contract*
	Percent	
Corn	3.7	13.1
Soybean	3.2	12.2
Cotton	3.0	50.6
Vegetables	7.5	45.4
Fruit	8.7	56.7
Cattle	11.7*	25.3*
Hogs	5.5	42.9
Poultry	24.3	94.9
Dairy[1]	22.7	54.8
All other commodities	9.7	14.4
All commodities	100.0	35.0

* = Standard error of the estimate is between 25 and 50 percent of the estimate.

[1]Fluid milk is typically produced under a marketing order. However, because neither a pricenor quantity is specified before sale, farmers may or may not consider this a “contract.”

Source: Perry and Banker (2000)

Table 8: Selected coordinating activities, by farm typology group, 1999.

	Farm typology group								
	Limited Resources	*Retirement*	*Residential/ lifestyle*	*Farming-occupation, low-sales*	*Farming-occupation, high-sales*	*Large*	*Very large*	*Non-family*	*All farms*
	Number								
Number of farms	126,920	297,566	931,561	480,441	175,370	77,314	58,403	39,374	2,186,950
Percent of farms	5.8	13.6	42.6	22.0	8.0	3.5	2.7	1.8	100.0
Percent of value of production	0.6	1.2	5.9	8.6	15.6	14.1	40.4	13.6	100.0
	Percent of farms using market alternative								
Sale of commodities and products									
Had cash sales only	93.8	98.0	96.9	90.7	70.0	56.3	35.9	75.8	89.9
Local or rural elevator	9.0	7.0	10.6	25.0	49.4	51.7	35.8	17.0	18.5
Networks	d	d	1.8	*1.9	3.2	5.4	6.6	d	1.9
Farmer cooperative for sales	d	2.9	6.7	18.4	40.0	40.1	34.4	*18.7	13.4
Dealer or broker	d	d	4.1	7.0	14.8	19.9	21.1	11.7	6.6
Wholesale or retail sales	d	d	2.9	4.8	6.7	9.2	10.9	9.2	4.0
Direct sales to consumers	11.2	16.3	21.0	18.1	13.5	14.1	14.3	27.1	18.2
Purchase of Inputs									
Locked-in crop input prices	d	2.5	4.0	11.3	40.4	48.8	40.7	15.5	11.0
Received price discounts	d	d	4.6	9.3	28.2	33.0	33.9	19.0	9.2
Buying club for inputs	d	d	d	d	3.5	4.6	4.9	d	1.1
Internet purchases	d	d	2.4	2.4	6.9	9.4	10.5	*6.2	3.0
Farmer-owned coop for purchases	15.6	12.9	15.5	25.3	46.5	48.6	42.8	23.6	21.9

d = Data suppressed due to insufficient observations.
* = Standard error is between 25 and 50 percent of the estimate.

Source: USDA, Economic Research Service, 1999 Agricultural Resource Management Study Phase 3.

Table 9: Income and net worth of farm operator households, by farm typology group, 1998.

Item	Operator households	Total household income			Off-farm income		Total net worth		
		Average amount	From off-farm sources[1]	Percent of U.S. average household income[2]	Average amount	From earned sources	Average amount	From off-farm sources	Percent of U.S. average household net worth[3]
	Number	Dollars per household	Percent	Percent	Dollars per household	Percent	Dollars per household	Percent	Percent
All operator households	2,022,413	59,734	88.1	115.2	52,628	74.4	492,195	17.0	174.2
Farm typology:									
Small family farms									
Limited-resource	150,268	9,924	132.5	19.1	13,153	53.3	78,718	16.0	27.9
Retirement	290,938	45,659	103.3	88.1	47,158	34.9	535,943	19.8	189.7
Residential/lifestyle	834,321	72,081	106.0	139.0	76,390	88.7	347,909	26.3	123.2
Farming-occupation									
Low-sales	422,205	34,773	106.9	67.1	37,186	57.7	576,402	14.2	204.0
High-sales	171,469	50,180	57.2	96.8	28,717	72.3	669,458	10.4	237.0
Large family farms	91,939	106,541	44.4	205.5	47,252	65.7	944,533	9.0	334.3
Very large family farms	61,273	209,105	15.9	403.2	33,240	65.1	1,508,151	6.8	533.9

Note: Household data are not collected for non-family farms.

[1]Income from off-farm sources can exceed 100 percent of total household income if earnings of the operator household from farming activities are negative.

[2]Average farm household income divided by U.S. average household income ($51,855).

[3]Average farm household net worth divided by U.S. average household net worth ($282,500).

Sources: Farm operator and farm household data are from the 1998 Agricultural Resource Management Study (ARMS) for farm operator and farm household data. U.S. average household income is from the Current Population Survey. U.S. average household net worth is from the Survey of Consumer Finances.

off-farm sources, much less than the other groups. These households also had the highest average household income ($209,100) among the typology groups, about four times the average for all U.S. households.

Households operating residential/lifestyle farms or large family farms (sales between $250,000 and $499,999) also had an average income above the U.S. average, but the sources of income differed between the two groups. Households with residential/lifestyle farms received practically all their income from outside the farm, largely from earned sources (self-employment or wage or salary jobs). In contrast, households with large family farms received only 44 percent of their income from off-farm sources.

Households operating retirement farms or high-sales small farms had an average income that did not differ statistically from the average for all U.S. households. Nearly all the income of households with retirement farms came from outside the farm, mostly from unearned sources such as Social Security. Households operating high-sales small farms relied much more heavily on farming for income than their counterparts with retirement farms, with farming accounting for 43 percent of household income, on average. Low-sales and limited-resource farm households received income below the U.S. average. Most of their income came from off-farm sources, with unearned income (Social Security and other transfer payments, interest dividends, etc.) making up nearly all of their off-farm income. This distribution reflects the relatively high percentage of elderly farmers in these groups. Approximately one-third of limited-resource farmers reported that they were retired. By definition, the operators of low-sales small farms reported farming as their major occupation, but 36 percent of these operators were over age 65.

Financial Status of Farm Businesses

Another important dimension of farm status is financial position. One approach to the analysis of financial status is to classify each farm into one of four financial performance categories based on the farm's net income and debt-to-asset ratio (Table 10). Farm businesses classified as favorable (positive net farm income and a debt-to-asset ratio less than 40 percent) are considered to be in the strongest financial condition. Those in the vulnerable group (negative net farm income and a debt-to-asset ratio greater than 40 percent) are in the

Table 10: Number of farms and financial performance classification, by farm typology group, 1998.

Item	Small family farms					Large family farms	Very large family farms	All family farms
	Limited-resource	Retirement	Residential/lifestyle	Farming-occupation				
				Low sales	High sales			
	Number							
Number of farms and households	150,268	290,938	834,321	422,205	171,469	91,939	61,273	2,022,413
	Percent							
Financial performance[1]								
Favorable	55.2	68.5	52.9	59.3	66.4	66.7	59.5	58.6
Marginal income	34.3	30.3	38.0	35.1	19.3	17.3	13.2	32.7
Marginal solvency	d	d	3.2	*2.1	9.6	11.0	22.0	3.9
Vulnerable	d	d	6.0	3.5	4.7	5.0	5.4	4.7

d = Data suppressed due to insufficient observations.

* = Standard error is between 25 and 50 percent of the estimate.

[1]Definition of financial performance classes:

Favorable: positive net farm income and debt-to-asset ratio less than or equal to 40 percent

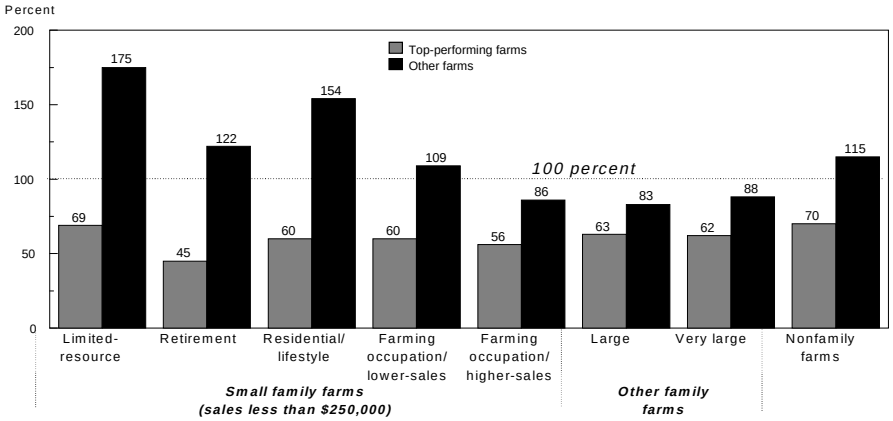
Marginal income: negative net farm income and debt-to-asset ratio less than or equal to 40 percent

Marginal solvency: positive net farm income and debt-to-asset ratio greater than 40 percent

Vulnerable: negative net farm income and debt-to-asset ratio greater than 40 percent

Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1.

Figure 9: Operating expense ratio for top-performing farms, 1997, *Top-performing farms in each typology group control costs.*



The operating expense ratio measures percentage of gross cash income absorbed by cash operating expenses. Expenses exceed income when the ratio is greater than 100.
"More successful" farms are defined as the top 25 percent of each group, ranked by returns to operators' labor and management.
Source: USDA, Economic Research Service, 1997 Agricultural Resource Management Study.

weakest financial position. About 59 percent of all farms were in the favorable group in 1998, while fewer than 5 percent were classified as vulnerable. About 5 percent of agricultural output was produced by financially vulnerable operations. A majority of these farms were very small, with less than $10,000 in sales, and focused on the production of beef, grains, or field crops.

Since this classification system evaluates the financial condition of farm businesses, it is most meaningful when applied to operations where farming provides a substantial portion of household income, namely small family farms with high sales, large family farms, and very large family farms. About 5 percent of these farms were in a vulnerable financial position in 1998. While 6 percent of residential/lifestyle farms were identified as vulnerable, their households generated sufficient income from off-farm sources to offset losses from farming.

Financially successful farms exist in all typology groups. For example, one may define top-performing farms as the top 25 percent of farms in each group, when farms are ranked by returns to the operator's labor and management (Hoppe, et al., 2000; Mishra, El-Osta, and Johnson, 1999; Mishra, El-Osta,

and Steele, 1999).[4] Top performers in each group had an expense ratio well below 100 percent, meaning that they earned positive returns (Figure 9). By controlling costs, top-performing farms in each group achieved a gross cash margin of 30-50 percent, where this margin is defined as 100 percent minus the expense ratio.

Perry and Johnson (1999) examined top-performing low-sales and high-sales farms, the two groups of small family farms whose operators report farming as their major occupation. In both groups, top-performing farms were more likely than other farms to use specific production strategies to control costs, to actively market products, and to use effective financial strategies.

Farm Size and Efficiency

In any discussion of 'efficiency', it is important to state whether the concept is defined in technical or financial terms. *Technical efficiency* measures how effectively inputs (land, labor, and capital) are employed to create output. *Financial efficiency* measures the effectiveness of management decisions in the generation of gross income. Farms may be efficient by one measure, but not the other. For example, a farmer could be highly efficient in combining the factors of production to grow crops, but financially inefficient because of shortcomings in marketing output and purchasing inputs.

Analysts frequently assert that increases in efficiency contribute to increased farm size, because large farms are likely to become more efficient than smaller farms and thus are more likely to survive and grow. However, both types of efficiency help to determine the relative economic success (or failure) of farm businesses of all sizes. Moreover, both large and small farms can be efficient by either definition of the term.

Technical Efficiency. Kumbhakar, et al. (1989) and Bagi (1982) support traditional assertions that larger farms possess greater technical efficiency. However, a more recent study (Peterson, 1999) presents evidence that small farms are as efficient as large farms if factors such as off-farm employment, land quality, and the value of the farm dwelling are incorporated in mea-

[4] The operator's returns to labor and management equal net farm income, less returns to capital and a deduction for unpaid labor performed by partners and family members.

Production Strategies	**Marketing Strategies**	**Financial Strategies**
• Control use of inputs. • Rent land or equipment to control fixed costs. • Use forward-pricing of inputs. • Diversify crops and livestock produced. • Allocate some operator labor to off-farm work.	• Use hedging or futures contracts. • Use marketing contracts. • Spread sales throughout the crop year.	***High-Sales*:** • Maintain cash or credit reserves. • Purchase supplements to basic crop insurance. ***Low-Sales***: • Purchase supplements to basic crop insurance.

sures of input and output. Nehring, Banker, and Brenneman (2000) estimated the technical efficiency of small and larger farms in the Corn Belt and the Northeast, with adjustments for land quality.[5] Estimates of average technical efficiency in the states of the Corn Belt indicate that small farms tend to be less efficient than large farms (Table 11). However, specific types of small farms in some locations are more efficient than large farms in other locations. For instance, high-sales small farms in Minnesota/Wisconsin are more efficient than large farms in Illinois/Indiana, and residential/lifestyle farms are more efficient than low-sales small farms in Illinois/Indiana and Iowa/Missouri.

The authors employed a pair of Tobit models (one for the Corn Belt and one for the Northeast) to estimate the impact of various factors on the technical efficiency of farms. A number of explanatory variables were found to be statistically significant. In the Corn Belt, government income, the magnitude of livestock sales, and the respective proportions of bio-engineered corn and bio-engineered soybeans were found to increase technical efficiency, but efficiency was found to decline with the age of the farm operator. In the Northeast, the magnitude of livestock sales and the proportion of bio-engineered

[5] Ten states comprise the traditional Corn Belt: Illinois, Indiana, Iowa, Missouri, Ohio, Nebraska, South Dakota, Minnesota, Wisconsin, and Michigan. Eighteen states make up the Northeast: Illinois, Indiana, Ohio, Wisconsin, Michigan, Massachusetts, New Hampshire, Vermont, Rhode Island, Maine, Connecticut, New York, Pennsylvania, Maryland, Delaware, Virginia, North Carolina, and Georgia.

Table 11: Average technical efficiency by selected farm typology groups and states, 1998.

Type	*Illinois/ Indiana*	*Iowa/ Missouri*	*Mich./ Ohio*	*Minn/ Wisc.*	*Neb./ S. Dak.*
Small farms					
Residential/lifestyle	0.662	0.673	0.652	0.681	d
Farming-occupation, low sales	0.629	0.651	0.648	0.698	0.675
Farming-occupation, high sales	0.701	0.707	0.725	0.733	0.720
Total for small farms	0.672	0.678	0.665	0.712	0.699
Large family farms	0.721	0.708	0.744	0.757	0.738
Very large family farms	0.742	0.768	0.778	0.779	0.783
Total for large farms	0.735	0.761	0.765	0.770	0.756
All Farms	0.704	0.706	0.700	0.730	0.721

d = Data suppressed due to insufficient observations.
Source: Nehring, Banker and Brenneman (2000)

corn boosted efficiency, while the amount of off-farm income, operator age, and the debt-to-asset ratio decreased efficiency. Interestingly, 'area operated' was not a significant factor in either region.

These findings are preliminary and limited to the farm types and locations examined by the study. However, they suggest that while larger farms are in general more efficient than smaller farms, some small farms are as efficient, if not more efficient, than larger farms. The factors that affect variation in technical efficiency are likely to vary by the attributes of the farms, such as location, type, and commodity specialization.

Financial Efficiency. The relationship between size and efficiency can also be analyzed from a financial perspective. Morehart, Kuhn, and Offutt (2000) examined the financial efficiency of wheat farms, according to the ratio of economic costs to farm revenue.[6] Farms with revenue greater than or equal to economic costs were considered to be financially viable for several years. Farms with revenue greater than or equal to total cash costs were assumed to be

[6] The study covered any farm that obtained at least half of its total value of production from wheat. Economic costs included total cash costs, an allowance for depreciation, and an imputed return to management and unpaid labor of the operator and household. Farm revenue included estimated cash receipts from market sales of crop and livestock production, direct government payments, and crop insurance indemnity payments.

viable for at least one year. While nearly two-thirds of wheat farms were able to cover total cash costs, permitting survival in the short term, just over one-third earned enough to cover economic costs and thus remain in business over several years. To provide additional perspective on efficiency and cost/size relationships, farms were grouped into three efficiency categories:

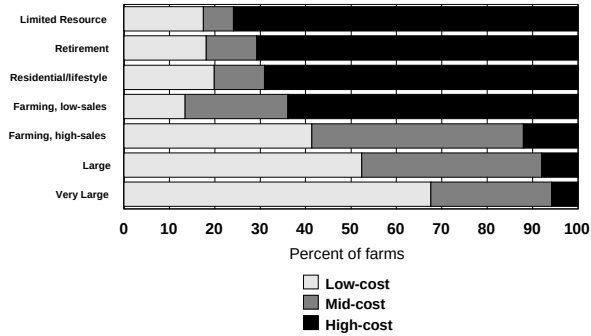
- low-cost farms, with a cost-revenue ratio less than 1;
- mid-range farms, with a cost-revenue ratio between 1 and 1.5; and
- high-cost farms, with a cost-revenue ratio greater than 1.5.

Farm size and scale economies were found to account for a large part of cost differences between low-cost and high-cost farms. However, input costs were a key differentiating factor for low-cost and mid-range farms. The authors concluded that the difference in efficiency between mid-range and low-cost farms was probably explained by relative effectiveness in management decisions on production practices and technologies, marketing strategies, and financing.

To extend these results, the cost-revenue ratio was computed for all farms by typology group for 1999 (Figure 10). The cost distribution contained two distinct clusters, with a much higher proportion of small family farms with high sales, large family farms, and very large family farms falling in the low-cost category. At least 60 percent of low-sales, residential/lifestyle, retirement and limited-resource farms fell into the high-cost category, compared with only 6-12 percent of high-sales, large, and very large farms. As with wheat farms, management decisions are likely to play an important role in determining financial efficiency.

In a study of financial returns by farm size during the period 1960-85, Harrington and Carlin (1987) found that small farms with annual sales of less than $40,000 performed nearly as well as large, commercial-size farms, in terms of real after-tax returns per dollar of annual expenditure. Real after-tax returns on annual expenditures measure the short-run financial efficiency of the farm household. It combines the household's net cash income from the market place plus constructive after-tax income from capital gains and from sheltering off-farm income from taxation as a proportion of annual cash expenditures. Over the study period, the average farm in each size group received a similar,

Figure 10: Distribution of Family Farms by Economic-Cost Category and Farm Typology Group, 1999.



Cost-to-revenue ratio is less than one for low-cost (the most financially efficient) farms, greater than or equal to one and less than 1.5 for mid-cost farms, and greater than or equal to 1.5 for high-cost farms. Economic costs include total cash costs, an allowance for depreciation, and an imputed return to management and unpaid labor of the operator and household. Revenue includes estimated cash receipts from market sales of crop and livestock production, direct government payments, and crop insurance indemnity payments.

Source: U.S. Department of Agriculture, Economic Research Service, 1999 Agricultural Resource Management Study Phase 3.

positive rate of return to its cash expenditures, although the proportions derived from the market place, asset appreciation, and tax benefits varied greatly by sales class.

Government Payments

Government payments to farms in calendar year 1998 consisted of four major components:

- loan deficiency payments (LDP's) for both the 1997 and 1998 crops;
- transition payments, which included transition payments for 1998 crops, minus advances paid in 1997 for 1998 crops, plus advances paid in 1998 for 1999 crops;
- CRP payments; and
- Disaster Assistance Program payments, which included all payments for market loss or disaster assistance but excluded indemnity payments under Federal Crop Insurance and other programs.

Although the size and composition of government payments in 1998 are not necessarily representative of current or future assistance, they do allow us to draw important general conclusions about the structural dimensions of government assistance. First, although government payments are an important

source of farm income, the operations that receive such payments make up a minority of U.S. farms. In 1998, 36 percent of all farms received some form of government payment (Table 12). These payments averaged $4,488 per farm and accounted for 5.3 percent of gross cash farm income. When only farms that received government payments are considered, these figures rise to $12,343 per farm and 8.7 percent, respectively.

Second, the proportion of farms receiving government assistance varies greatly across the Farm Typology. The typology groups of large family farms and small family farms with high sales had the first and second largest proportions of farms receiving payments, both at 76 percent. Fifty-eight percent of very large family farms received government payments, compared with 45 percent of non-family farms and 44 percent of low-sales, small family farms. Small family farms in the limited-resource, retirement, and residential/lifestyle categories were less likely to receive government payments, with the share falling between 20 and 28 percent.

Third, the proportion of gross cash farm income derived from government assistance also varies across the Farm Typology. Of the eight typology groups, retirement farms derived the highest share of income from government payments, 13 percent. This unusually high share is due to high CRP payments, averaging $1,179 per retirement farm. At the other extreme, very large family farms and non-family farms obtained 3.1 and 1.6 percent, respectively.

By treating each typology group as a separate observation, one may use the data in Table 12 to calculate Gini coefficients for the distribution of gross cash farm income and the distribution of gross cash farm income less government payments for farms receiving such payments. These calculations reveal that government payments had a negligible impact on the income distribution across typology groups, increasing the Gini coefficient from 0.2203 to 0.2248 (Figure 11).[6] This small impact was due in part to the fact that government payments were a small proportion (9.6 percent) of gross income less payments for all farms receiving such assistance. Moreover, since government

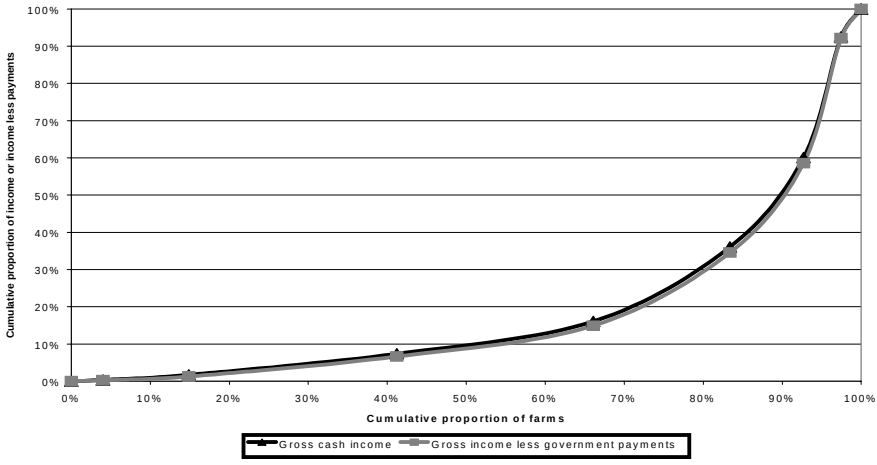
[7] See Appendix 2 for an explanation of how the observations for Figure 11 were calculated.

Table 12: Number of farms and financial performance classification, by farm typology group, 1998.

Item	Small family farms					Large family farms	Very large family farms	non-family family farms	All farms
	Limited-resource	Retire-ment	Residential/ lifestyle	Farming-occupation					
				Low sales	High sales				
Total farms	150,268	290,938	834,321	422,205	171,469	91,939	61,273	42,296	2,064,709
Average gross cash farm income ($)	7,361	12,255	13,780	35,800	161,036	348,769	977,037	566,289	84,651
Average government payment per farm ($)	*722	1,566	993	2,833	12,870	24,539	29,971	8,970	4,488
Percent of gross cash farm income (%)	*9.8	12.8	7.2	7.9	8.0	7.0	3.1	1.6	5.3
Average transition payment per farm ($)	*172	178	370	1,489	7,137	13,714	17,141	4,738	2,300
Average loan deficiency payment per farm ($)	**68	*114	149	430	2,865	5,436	7,082	1,860	898
Average CRP payment per farm ($)	*355	1,179	348	491	781	961	*850	*925	585
Average disaster payment per farm ($)	*36	27	57	254	1,466	*3,277	2,778	*692	446
Farms receiving government payments	30,022	81,684	197,692	186,787	129,644	70,096	35,597	19,255	750,777
Percent of all farms (%)	20.0	28.1	23.7	44.2	75.6	76.2	58.1	45.5	36.4
Average gross cash farm income ($)	13,350	17,308	30,404	49,264	163,785	362,918	964,596	414,763	141,217
Average government payment ($)	*3,615	5,578	4,189	6,403	17,022	32,185	51,589	19,704	12,343
Percent of gross cash income (%)	*27.1	32.2	13.8	13.0	10.4	8.9	5.3	4.8	8.7
Transition payment, share of total (%)	*23.8	11.4	37.2	52.5	55.5	55.9	57.2	52.8	51.3
Loan deficiency payment, share of total (%)	**9.4	*7.3	15.1	15.2	22.3	22.2	23.6	20.7	20.0
CRP payment, share of total (%)	49.2	75.3	35.1	17.3	6.1	3.9	*2.8	*10.3	13.0
Disaster payment, share of total (%)	**5.0	1.7	5.7	9.0	11.4	13.4	9.3	*7.7	9.9
Farms with no government payments	120,246	209,254	636,629	235,418	41,825	21,843	25,676	23,041	1,313,932
Percent of all farms (%)	80.0	71.9	76.3	55.8	24.4	23.8	41.9	54.5	63.6
Average gross cash farm income ($)	*5,866	*10,283	8,618	25,118	152,517	303,365	994,287	692,915	52,329

* = Standard error is between 25 and 50 percent of the estimate. ** = Standard error is between 51 and 75 percent of the estimate.
Source: USDA, Economic Research Service, 1998 Agricultural Resource Management Study, version 1, as reported in Green (2001), Table 26.

Figure 11: Cumulative distribution of gross cash farm income and gross income less government payments, for farms receiving such payments, 1998.



payments were paid out mostly on the basis of the farm's volume of sales, their impact on larger farms was greater than it would have been if payments were made under a different basis.

The composition of payments also varied across typology groups. The composition for farming-occupation small farms, large family farms, very large farms, and non-family farms was extremely similar. Each of these groups received at least half of its government payments in the form of transition payments. For small farms with high sales, large family farms, very large farms, and non-family farms, LDP's were of the next greatest importance, providing 21-24 percent of government assistance. For small farms with low sales, CRP payments had the second greatest share, with 17 percent. For other groups of small farms (limited-resource, retirement, and residential/lifestyle), transition payments and CRP payments were most prominent. As mentioned above, retirement farms received about three-fourths of their government payments in the form of CRP payments. For limited-resource farms, most payments came in the form of CRP payments (49 percent) and transition payments (24 percent). For residential/lifestyle farms, payments from these sources were balanced almost equally, at 35 and 37 percent, respectively.

IMPLICATIONS OF U.S. AGRICULTURAL STRUCTURE

The ERS Farm Typology reveals that U.S. agriculture is incredibly diverse. Most operations are small family farms, but most of the value of production is contributed by large family farms, very large family farms, and non-family farms. Nevertheless, small family farms make an important contribution to U.S. agriculture and to international trade. Small family farms – largely those in the high-sales, farming-occupation category – produce about half of U.S. corn, soybeans, and wheat. These three crops are extremely important to U.S. agricultural trade, both as exports themselves and as inputs to the production of livestock and processed foods. As unprocessed commodities alone, corn, soybeans, and wheat accounted for 28 percent of U.S. agricultural exports in 1999 (U.S. Department of Agriculture, Economic Research Service, 2001). Moreover, because small farms own a large share of U.S. farmland, they are extremely important to resource management and conservation efforts.

Farm businesses and the households of farm operators are connected to a wide variety of other firms and households. These outside entities may own equity in the farm operation, supply inputs that are necessary to the farm operation (including financial capital and commercial services), and purchase and market the farm's output. Farmers who effectively use these linkages and successfully adopt new technologies are likely to be among the more efficient, top-performing farms. By both technical and financial measures, larger farms tend to be more efficient. This does not mean that there are no efficient small farms, however. Small farm households may optimize over a larger set of economic opportunities, where off-farm income, tax sheltering, and the imputed rental value of the farmhouse are included as output. Harrington and Carlin (1987) and Peterson (1999) argue that small farms are more efficient than larger farms, if these items are included as output. If small farms really are equally or more efficient than larger farms, they may endure longer than one would expect, given traditional analyses of efficiency.

The increased use of contracts and heightened vertical integration are important facets of increased concentration in farming. These developments involve small farms as well as larger ones, because small farms account for

nearly two-thirds of the farms with marketing contracts and over 40 percent of the farms with production contracts.

During the course of the twentieth century, farm production has become much more concentrated. According to agricultural censuses, 17 percent of U.S. farms produced 50 percent of farm sales in 1900, compared with only 2 percent of farms in 1997. Technological advances and the relative efficiency of larger farms suggest that this trend will continue. However, it is important to keep discussions of present or future concentration in historical and comparative perspective. Even in 1900, the U.S. farm sector exhibited a substantial degree of concentration. Moreover, farming is still much less concentrated than other industries. Although 2 percent of farms produce half of U.S. farm output, this group encompasses 46,100 different producers. As Stanton (1993, p. 66) points out:

> *It is important to remember that the competitive structure of agriculture, characterized by many thousands of farms, stands in stark contrast to most industries in the United States, including those that sell inputs to farmers on one side and those that buy farm products on the other. Structural change, so important in farming, is still modest when compared to the changes in farm machinery, meat packing, or the grain trade.*

These changes in the structure of farming may generate a number of positive effects, including greater efficiency in production, less dependence on government assistance, and increased competitiveness in world markets. Possible adverse effects include further depopulation of rural areas still dependent on farming, reduction in the independence of family farms, abuses of market power, and the disappearance of open signals of market price.

Additional research is needed to understand the international dimensions of structural changes in U.S. agriculture. In many instances, the forces driving structural change in this country also are altering the structure of agriculture in other countries. A meaningful contribution would be to extend the analysis of business structure presented in this paper to encompass exchanges across international borders. Another aspect to consider is the extent to which the economic integration fostered by trade agreements such as NAFTA and

more ambitious initiatives such the European Union allows for deeper utilization of scale economies.

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APPENDIX 1

EMERGENCY AND SUPPLEMENTAL ASSISTANCE

The text for this appendix is adapted from Young, Westcott, and Nelson (2000).

Ad hoc emergency assistance has played a prominent role in U.S. agricultural policy. Direct payments have been provided to producers to partially offset financial losses due to severe weather and other natural disasters or stressful economic conditions. Four recent legislative packages provide for additional emergency and supplemental assistance.

1. The *Agriculture, Rural Development, Food and Drug, and Related Agencies Appropriations Act of 1999* provided for $5.936 billion in emergency and market-loss assistance. Coverage included:
    - Crop loss disaster assistance of:
      $1.5 billion for emergency assistance to farmers who suffered losses in 1998 due to natural disasters,
      $875 million as compensation to farmers who suffered multi-year losses between 1994 and 1998, and
      $400 million of the emergency assistance and multi-year funds as an incentive for farmers to purchase higher levels of crop insurance coverage for 1999.
    - Emergency livestock assistance totaling $200 million.
    - Marketing loss assistance (MLA) payments totaling $2.857 billion to compensate farmers for the loss of markets for 1998 crops. These payments were proportional to production flexibility contract payments paid to farmers in 1998. An additional $200 million was paid to dairy producers.
    - Miscellaneous provisions totaling $279 million.

2. The *Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2000* provided assistance for Fiscal Year 2000. Coverage included:
    - 5.5 billion in MLA payments to compensate farmers for the loss of markets for 1999 crops. MLA payments were equal to production flexibility contract payments paid to farmers in 1999.
    - $475 million for direct payments to oilseed producers to compensate for market losses. Payments were based on production in 1997 or 1998 (or 1999 for new producers).
    - $1.2 billion for crop loss assistance similar to the single-year program for 1998.
    - $125 million for payments to dairy producers.
    - $328 million for payments to tobacco producers.
    - Doubling of payment limitations for loan deficiency payments and marketing loan gains from $75,000 to $150,000 for 1999 crops.
    - $200 million for a livestock indemnity program to provide relief to producers whose livestock perished due to natural disaster.
    - $400 million for a 1-year crop insurance buy-up incentive.
    - $25 million for emergency disaster loans.
    - Funding for Step 2 payments for cotton handlers.
    - $30.50 per ton in support payments for quota peanuts and $8.75 per ton for additional peanuts.

3. The *Agricultural Risk Protection Act of 2000* reformed crop insurance and provided additional emergency assistance. Coverage included:
    - $8.2 billion (over 5 years) for crop insurance reform. This included an 80-90 percent increase in insurance subsidies.
    - $5.465 billion for MLA payments to compensate farmers for the loss of markets. These payments were equal to production flexibility contract payments paid to farmers in fiscal year 2000. These funds were disbursed in September 2000.
    - $500 million for direct payments to oilseed producers in 2000 to compensate for market losses. All producers who are eligible for marketing assistance loans are eligible for assistance.
    - $5 million for loans to apple producers suffering economic loss due to low prices.

- $61.6 million in payments to peanut producers.
- $340 million for payments to tobacco producers whose quantity of quota-eligible tobacco was reduced in 2000 from 1999 levels.
- $10.5 million for direct payments to wool and mohair producers.
- $100 million for payments to first handlers of cottonseed to alleviate problems caused by unusually low prices.
- Loan deficiency (LDP) like payments on grazed acreage of wheat, oats, and barley for the 2001 crop year.
- Producers of contract crops with no production flexibility contract are eligible for LDP's for the 2000 crop year, if they meet conservation requirements.
- $10 million for boll weevil eradication loans.
- $35.2 million for non-interest loans to producers of 1999 crop grass, forage, vegetable, and sorghum seed due to the bankruptcy of AgriBiotech.
- $24 million for loss of cropland due to flooding.
- Revision of the Non-Insured Crop Disaster Assistance Program.

4. The *Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act of 2001* provided emergency disaster assistance for Fiscal Year 2001. Coverage included:
   - $80 million for the Emergency Conservation Program to restore conservation structures.
   - $13 million for the Federal Crop Insurance Corporation (FCIC) to provide premium discounts to purchasers of crop insurance reinsured by FCIC.
   - $110 million for the Emergency Watershed Program to repair damages due to flooding.
   - $200 million for the Rural Community Advancement Fund to assist communities in depressed areas, with high energy costs, who experienced major natural disasters, with water and waste grants and loans, etc.
   - $35 million for conservation technical assistance for CRP and the Wetlands Reserve Program (WRP).
   - $19 million for disease-loss compensation.

- $473 million for supplemental assistance to dairy producers of an amount equal to 35 percent of the reduction in market value of milk production in 2000.
- $490 million for livestock assistance to be administered using criteria established to carry out the 1999 livestock assistance program.
- $117 million to expand the area that can be enrolled in the WRP.
- $2.4 million for assistance to Vermont sheep producers for losses due to public health reasons.
- $58 million to compensate commercial citrus and lime trees removed due to citrus canker.
- $100 million to compensate apple producers for market losses and $38 million to compensate producers of apples or potatoes for quality losses due to fireblight or natural disasters.
- $20 million for honey non-recourse marketing assistance loans that can be repaid at the prevailing domestic price as determined by the Secretary or the producer may elect to receive loan deficiency payments in lieu of participation in the loan program.
- $10 million for livestock indemnity program for losses due to disasters, including fires and anthrax.
- $20 million for direct payments to wool and mohair producers.
- $1.6 billion for crop quantity, quality, or severe economic losses for 2000 crops, guidelines for similar programs in previous years with revised criteria for quality losses.
- $20 million for cranberry market loss and not less than $30 million to purchase cranberry juice concentrate and frozen cranberry juice.
- $2.5 million to capitalize a South Carolina grain dealers' indemnity fund.
- $6 million for technical assistance for Wildlife Habitat Incentives Program.
- $7.2 million to assist Hawaii's sugar transportation cooperative.
- $14 million for Emergency Watershed Program projects in selected States.
- $10 million for business and industry grants.
- $10 million for business and industry guaranteed loans, eliminates trigger provisions for sugar loans to become recourse if import lev-

els of tariff-rate quota fall below specified limits, raises the cap on LDP's for 2000 crops from $75,000 to $150,000.

- $20 million for payments to producers who were unable to market crops due to insolvency of a cooperative in California.
- $50 million to allow forfeitures of burley tobacco regardless of quality, and prohibits charging any costs incurred by the Commodity Credit Corporation (CCC) against the no net cost tobacco account.
- $5 million for marketing loan gains and LDP's for producers who were prohibited from receiving payments because they were debtors (eligibility is limited to the time between March 21, 2000, and the date of enactment).
- $40 million for changes in eligibility criteria for the Food Stamp Program.

APPENDIX 2

EXPLANATION OF OBSERVATIONS USED TO CALCULATE THE GINI COEFFICIENTS FOR THE INCOME OF FARMS RECEIVING GOVERNMENT PAYMENTS

For each typology group, the data in Table 12 were used to calculate the total number of farms, total gross cash farm income, total government payments, and the difference between total gross cash farm income and total government payments (see Appendix Table B.1). These totals were used to calculate cumulative amounts for these totals, as one proceeds through the Farm Typology from limited-resource small family farms to non-family farms. Note that the Farm Typology groups are ordered according to average sales per farm. Next, the cumulative amounts were expressed as percentages. It is these percentages that are graphed in Figure 11.

The Gini coefficients for the distribution of gross cash farm income were then calculated according to the following procedure.

Step 1: For each Typology Group, the total number of farms is multiplied by the total gross cash farm income for the group.

Step 2: The resulting numbers from Step 1 are added together.

Step 3: The total number of all farms is multiplied by the total gross cash farm income for all farms.

Step 4: The resulting number is multiplied by 0.5.

Step 5: The result from Step 2 is divided by the result from Step 4 to obtain the Gini coefficient for gross cash farm income.

A similar procedure is used to calculate the Gini coefficient for gross cash farm income less government payments.

Appendix Table 2: Values Used to Calculate the Gini Coefficients for the Income Distribution of Farms Receiving Government Payments and to Construct Figure 12.

	Data from Table 12			*Totals for Farm Typology Group*			*Cumulative Amounts*			*Cumulative Percentages*		
Farm Typology Group	***Number of Farms***	***Average gross cash farm income per farm***	***Average government payment per farm***	***Gross cash farm income***	***Govt. payments***	***Gross cash farm income less government payments***	***Number of farms***	***Gross cash farm income***	***Gross cash farm income less government payments***	***Number of farms***	***Gross cash farm income***	***Gross cash farm income less government payments***
Unit of Measure	*Number*	*Dollars*	*Dollars*	*Millions of Dollars*	*Millions of Dollars*	*Millions of Dollars*	*Number*	*Millions of Dollars*	*Millions of Dollars*	*Percent*	*Percent*	*Percent*
Small family farms												
Limited Resource	30,022	13,350	3,615	401	109	292	30,022	401	292	4.0	0.4	0.3
Retirement	81,684	17,308	5,578	1,414	456	958	111,706	1,815	1,250	14.9	1.7	1.3
Residential/lifestyle	197,692	30,404	4,189	6,011	828	5,182	309,398	7,825	6,433	41.2	7.4	6.6
Farming-occupation, low sales	186,787	49,264	6,403	9,202	1,196	8,006	496,185	17,027	14,439	66.1	16.1	14.9
Farming-occupation, high sales	129,644	163,785	17,022	21,234	2,207	19,027	625,829	38,261	33,466	83.4	36.1	34.6
Other farms												
Large family farms	70,096	362,918	32,185	25,439	2,256	23,183	695,925	63,700	56,649	92.7	60.1	58.5
Very large family farms	35,597	964,596	51,589	34,337	1,836	32,500	731,522	98,037	89,149	97.4	92.5	92.1
Non-family farms	19,255	414,763	19,704	7,986	379	7,607	750,777	106,023	96,756	100.00	100.00	100.00

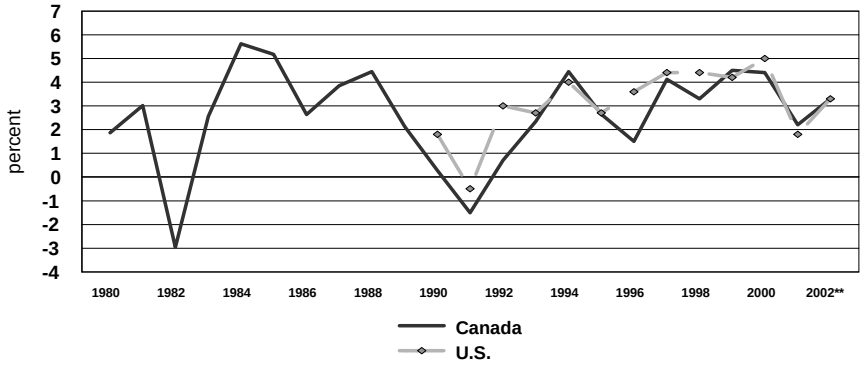
OVERVIEW OF AGRICULTURE STRUCTURAL PARAMETERS FOR CANADA

Margaret Zafiriou and David Smith

INTRODUCTION

Before analyzing the impact of the North American Free Trade Agreement (NAFTA), it is important to have an understanding of the structure of the Canadian agri-food sector and the pressures that are driving recent structural changes. The purpose of this paper is to present background information and data describing the current structure of the Canadian agri-food sector. The paper begins with a brief discussion of developments on the macroeconomic, trade and domestic agricultural policy fronts that have influenced the sector's structure since 1980. A brief description of the technological advances and consumer attitudes that are impacting the structure of the sector follow in the third and fourth sections. Then a structural overview of the agri-food sector follows, including a description of the farm input, primary, food processing and distribution sectors. The paper provides a summary including comments about the impact NAFTA has had, and will continue to have on agri-food sector structure.

Figure 1: Economic Growth in Canada and the U.S., 1980 to 2002*.



Source: Statistics Canada, National Income and Expenditure Accounts, Bureau of Economic Analysis, Survey of Current Business

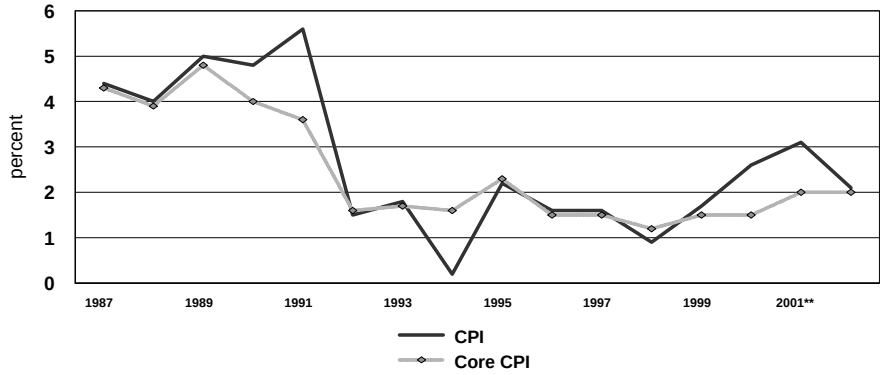
* measured by annual percent change in Real Gross Domestic Product: Canada (constant 1992 dollars) U.S. (constant 1996 dollars) Forecast July 2001 by TD Bank

POLICY ENVIRONMENT

Macroeconomic Policy Environment

Throughout the 1990s, Canada, like the United States, experienced almost a decade of unprecedented economic growth in an environment of low inflation, increased productivity, falling unemployment rates and stable interest rates (Figure 1). After the stagflation of the 1970s, restrictive monetary policies in the 1980s brought inflation under control and resulted in significant restructuring of the North American economy (Figure 2). In addition, policies aimed at reducing government budgetary deficits at both the federal and provincial levels in Canada and in the United States meant lower government spending throughout the mid 1990s. Fiscal restraint resulted in government surpluses by 1999 (Figure 3) when governments were able to lower tax rates and work on reducing government debt. Since the early 1990s, the creation of the knowledge-based economy including the rapid expansion of computer technology and the more recent introduction of the Internet and e-commerce contributed to significant economic restructuring. At the same time, North American stock markets boomed, resulting in real gains in consumer wealth until corrections took place in early 2001.

Figure 2: Inflation in Canada, 1987 to 2001*.

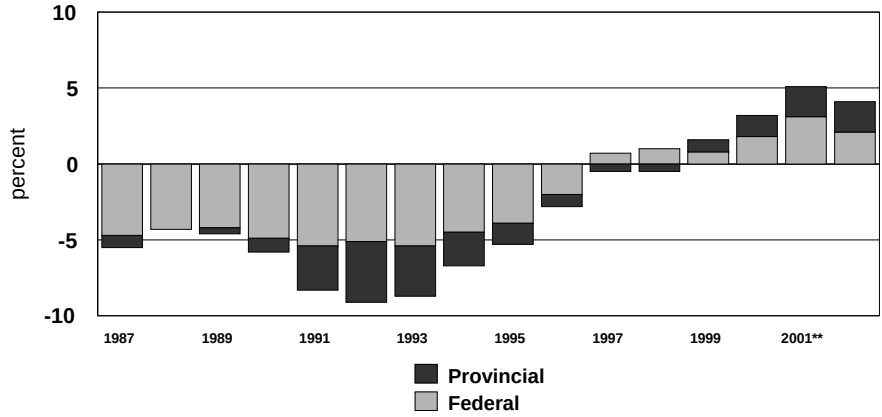


Source: Bank of Canada, Toronto Dominion Bank

*Inflation is measured by the percentage change in the Conumer Price Index (CPI). Core Inflation is measured by the percentage change in CPI excluding food and energy (1992 = 100).

**Projections made by the Toronto Dominion Bank, Quarterly Economic Updates, July 2001

Figure 3: Federal and Provincial Government Surplus/Deficit as a Percent of GDP, Canada, 1987 to 2000.

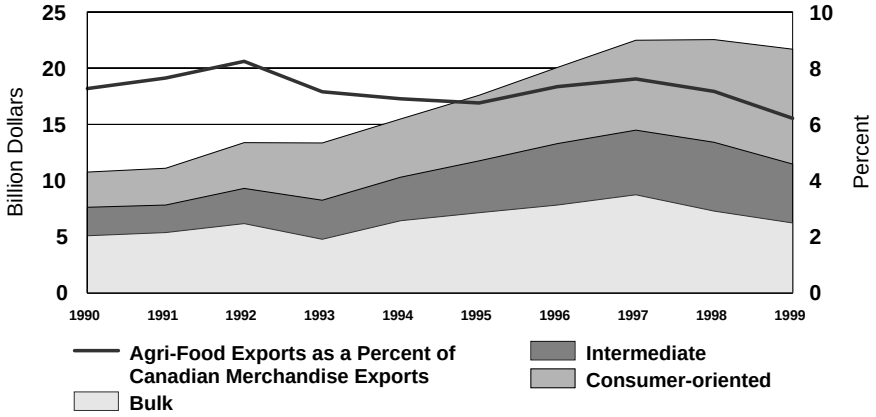


Source: Bank of Canada Review, August 16, 2001

Trade Policy Environment

Since 1988, significant changes in the trade policy environment affected the structure of the agri-food sector. First of all, Canada benefitted from the Canada–U.S. Free Trade Agreement, signed in 1988, which lowered tariffs

Figure 4: Growth in Agri-food Exports, Canada, 1990 to 1999.



Source: Statistics Canada, Merchandise Trade Database

and removed barriers to trade between Canada and the United States, Canada's most important trading partner. The Dispute Settlement Mechanism, an important component introduced at this time, has helped arbitrate trade disputes, particularly before countervail and trade sanctions can be enforced.

The signing of the North American Free Trade Agreement (NAFTA) in 1994 further extended the liberalized trading area to include Mexico, with its market of an additional 100 million people. NAFTA was soon followed by the signing of the World Trade Organization (WTO) Agreement in late 1994 which introduced further trade disciplines on agricultural support, improved market access, and attempted to end agricultural (export) subsidy wars. The resulting increase in trade and market access for Canadian agri-food participants resulted in increased competitiveness of the industry in global markets. Figure 4 shows how Canadian agriculture and agri-food exports increased over the period 1990 to 1999 and the breakdown between bulk and consumer-oriented products.

Domestic Agricultural Policy Environment

Partly in response to developments in the trade policy environment and partly in response to government fiscal restraints, major revisions to Canadian agricultural policy changed the focus of farm programs over the 1990s. Federal

support to agriculture is delivered through five safety net programs that fall under the *Farm Income Protection Act* (FIPA). This Act (FIPA), introduced in 1991, encouraged a more "market-oriented" and "self-reliant" philosophy that was at the same time intended to be trade-and production-neutral (decoupled), equitable across provinces and environmentally sustainable with minimum administrative overlap or duplication. Labeled a "whole farm approach", FIPA governs programs that stabilize income from all commodities rather than on a commodity by commodity-basis. Funding for safety nets is negotiated between the federal and provincial governments every three years and outlined in a federal/provincial Safety Net Agreement Framework. The objectives of safety net programs, as stated in the most recent Safety Net Agreement Framework (July 2000), include "encouraging risk management by producers" and "stabilizing income" (Richardson, 2000). The five safety net programs include:

- Net Income Stabilization Account (NISA)
- Crop Insurance
- Provincial Companion programs
- Cash advance programs, and
- Agriculture Income Disaster Assistance (AIDA) / Canadian Farm Income Program (CFIP)

The ***Net Income Stabilization Account*** (NISA), helps producers achieve long-term farm income stability on an individual basis. Producers deposit money annually into NISA accounts and receive matching government contributions. In lower income years, producers can make withdrawals from the funds they have set aside. Withdrawals are triggered when gross margins fall below a three-year average (gross margin trigger) or when family income falls below a minimum family income level (minimum income trigger) (Gellner and Rattray, 2001). NISA covers most commodities except those participating in supply management systems such as chicken, turkey, eggs and fluid and industrial milk, and those produced in Quebec. Federal and provincial expenditures of $230 million were spent on NISA in the 2000-01 fiscal year.

Crop Insurance is a provincially-delivered program to which the federal government contributes, on a cost-shared basis, according to FIPA guidelines. Producers, provincial governments and the federal government contribute to premiums and administrative costs in insuring crops against natural haz-

ards such as drought, flood, hail, frost, excessive moisture and insects. Payments are triggered when a producer's yield falls below 70 to 80 percent of the farm's average historical yield. Crop Insurance is a voluntary program that covers most crops across the country. In 2000-01, $223 million net of premiums was spent on crop insurance.

Provincial Companion Programs provide safety net funding to the provinces to design programs that address unique provincial differences in agricultural structure. A wide gamut of programs are funded under this program. In fiscal year 2000-01, $192 million were spent on companion programs.

The purpose of the fall ***cash advance payments programs*** (APP) is to improve producers' marketing of eligible crops by providing them with cash advances of up to $250,000 on their stored crops after harvest so they can market their crops later in the season when market conditions result in better prices. The first $50,000 of cash advances is interest-free and loans are repaid as the crops are marketed. The ***spring cash advance program*** **(SCAP)**, on the other hand, introduced in March of 2000, provides interest-free loans to eligible crop producers to help with spring seeding. In 2000-01, $39 million were allocated to cash advances by the federal government, primarily to cover the interest costs of these loans.

With the dramatic decline in hog and grain prices in 1998 and 1999, a federal/provincial cost-shared program was introduced called the ***Agriculture Income Disaster Assistance*** (AIDA) program, to provide disaster relief. This program was initially funded for two years and was similar to disaster programs already in place in British Columbia, Alberta, and Prince Edward Island. Under AIDA, producers were compensated for up to 70 percent of their previous (three-year or middle three out of five year) average gross margin if the gross margin for the current year fell below this average. AIDA was designed to be integrated with NISA in many provinces in an effort to eliminate duplication of payments. Federal funding for AIDA was $196 million in 2000. AIDA was replaced by the ***Canadian Farm Income Program*** (CFIP) in July 2000, a second generation disaster program that works on the same principals as AIDA. Minor adjustments were made to the program such as better integration with

NISA and the inclusion of all labour (family and non-family) costs as an allowable expense.

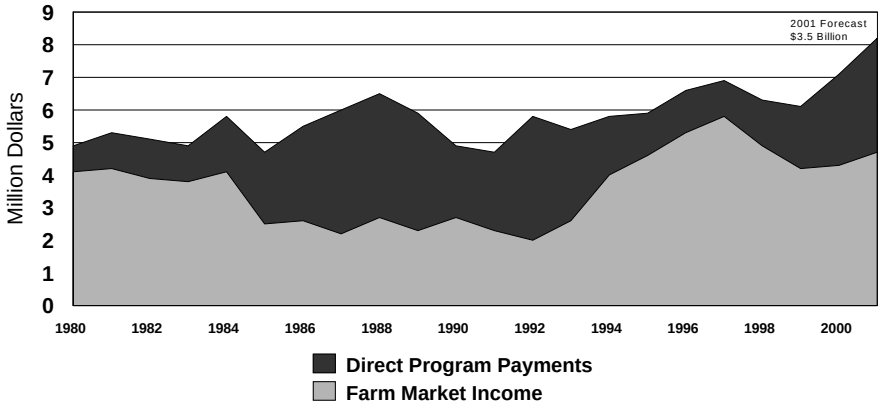
As a result of these programs under the federal/provincial Safety Net Agreement Framework, federal and provincial government expenditures on safety net programs rose to $2.6 billion in 2001 from $1.1 billion in 1997.

Other Agricultural Policy Changes

Another important policy change that impacted the structure of the western grain sector in particular was the termination of the Crow Rate transportation subsidy in 1995. This subsidy, worth $650 million in 1994/95, had been in place since the late 1890s when the Canadian Pacific Railway agreed to reduce freight rates on "settlers' effects and grain and flour, in return for a federal subsidy and significant land grants to build a rail line through the Crow's Nest Pass (Skogstad, 1987). The subsidy was important for encouraging the development of grain and oilseed production on the Prairies since rail costs would have been higher without it. Upon its termination, prairie producers were granted a one-time Western Grain Transition Payment of $1.6 billion to compensate for the expected impact on land values. As a result of its termination, the cost of transporting grains off the prairies increased, particularly from eastern Saskatchewan and western Manitoba. This resulted in significant restructuring away from grains towards more livestock production, particularly hog production in Manitoba, given that it made more sense to export grains in the form of livestock at higher transportation rates.

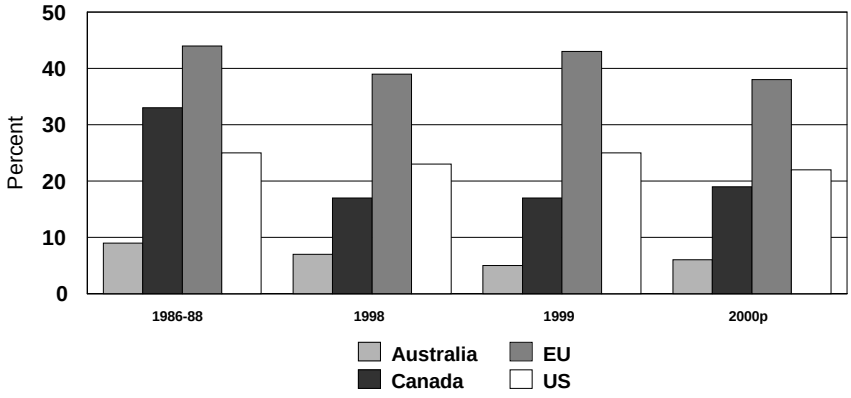
As a result of the introduction of the *Farm Income Protection Act* in 1991 and the evolution of the various agricultural support programs discussed above, along with program review, deficit reduction and the termination of the Crow Rate in 1995, direct support to agriculture declined between 1991 to 1997 (Figure 5). Three years of record high world grain prices from 1995 to 1997 eased the pain of program reductions for grain and oilseed farmers on the Prairies in particular. However, once grain and hog prices fell in 1998, continuing the long-run downward trend in commodity prices, real pressures arose to introduce new, more generous income support programs, and direct program payments increased again in 1999 and 2000.

Figure 5: Net Cash Income and Direct Program Payments, Canada, 1989 to 2001*.



* 2001 is forecast as of June 2001.
Source: Statistics Canada and Agriculture and Agri-Food Canada

Figure 6: Producer Subsidy Equivalents (PSEs) by Country, 1988-1989 to 2000*.



2000* is provisional
PSEs measure all types of support as a % of value of production
Source: OECD, Monitoring and Evaluation 2001

Agriculture Support Relative to Other Countries

Compared to many other countries, Canada provides less overall aggregate support to its farmers. Figure 6 shows the relative Producer Subsidy Equivalents (PSEs) for several countries in the Organization for Economic

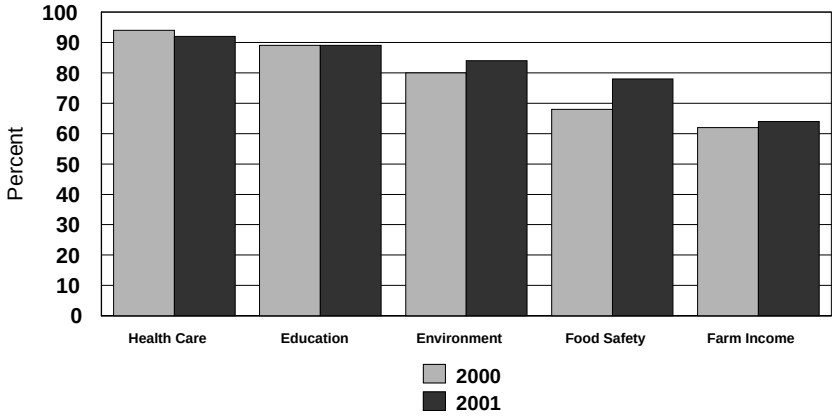
Cooperation and Development (OECD). PSEs measure both direct income support, as discussed above, and Market Price Support, such as that provided by import restrictions and domestic supply management regulations. Based on this information, Canada has reduced its levels of support from the average of 1986 to 1988, while countries such as the United States and the European Union have increased their support over this period. It is argued that because of this higher support, world prices for wheat, for example, are lower than they otherwise would be. Consequently, there is considerable pressure from Canadian farm lobby groups to raise the level of support in Canada as well.

TECHNOLOGICAL ADVANCES

The agriculture sector has made tremendous progress and considerable technological advances during the 1900s. It has gone from an industry that was basically subsistence farming, heavily reliant on family labour and horse power, to an industry using $300,000 combines and a fraction of the labour used even a generation ago. It is now on the leading edge of biotechnology and animal genetics, and butting a wall of resistance to these revolutionizing technological advances. Issues related to intellectual property rights and science ethics now play a important role in the industry and may shape further developments.

The technological advances in the post-war period related to mechanization and improvements in plant production techniques have contributed to historically unprecedented productivity growth. Productivity increased by just under 2 percent a year during the 1970s and over 2 percent a year during the 1980s and 1990s (Quarterly Agri-food Trade Highlights, 1999). Computer technology and the Internet, air seeders for zero-till production, precision farming with Geographic Positioning Systems (GPS) and new genetically modified crops (GMOs) will contribute to further improvements in agricultural productivity in the years ahead. New techniques are also being developed to make non-food uses of agricultural products such as biofuels (ethanol), nutraceuticals, construction materials made from biomass, and functional foods. These improvements will no doubt lead to further changes in the structure of the agriculture and agri-food sector.

Figure 7: Survey of Citizens' Concerns, 2000 and 2001.

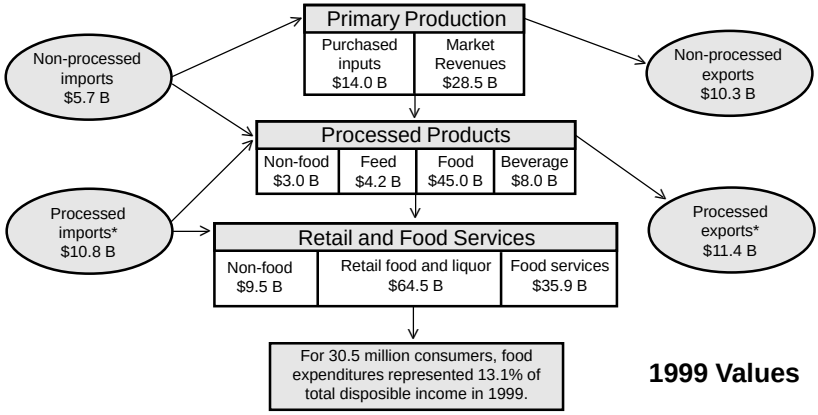


Source: Eckos, 2000, 2001

CONSUMER ATTITUDES

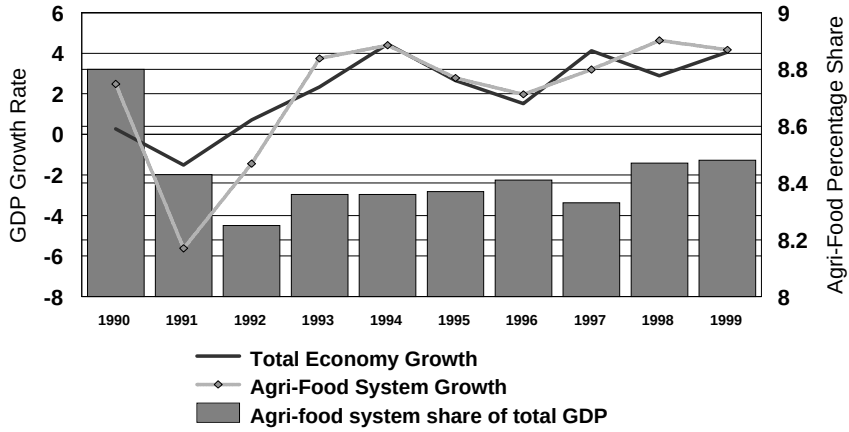
Over the 1990s and perhaps culminating in the WTO talks in Seattle in December 2000, we have seen the rise of "consumer sovereignty". Consumers speak loudly and their voices are being heard on several fronts affecting the agri-food sector. For example, they are demanding an increasingly safe food supply and are not particularly open to genetically modified crops. They want an environment that is clean and sustainable and water that is free of contaminants and safe to drink. Recent attitudinal surveys in Canada show that a large percent of consumers consider the environment (84 percent) and food safety (78 percent) a high priority issue (Figure 7). On the marketing front, consumers are demanding food products that are healthy and nutritious but at the same time convenient to prepare or ready to eat. Functional foods which include added health benefits and organically grown food products have seen a tremendous increase in popularity and market share. All these developments will affect the food products that are produced and consumed as well as marketed. These developments in turn will impact the structure of the agriculture and agri-food sector. The next section discusses this structure in some detail.

Figure 8: Agri-food System Overview, 1999.



*Processed imports/exports include a small component of non-food products consisting mainly of manufactured tobacco.
Source: AAFC, Portrait of the Agri-food Sector

Figure 9: Growth and Importance of the Agri-food Sector, Canada, 1990 to 1999.



Source: Statistics Canada, CANSIM Matrix 4677
Note: The agri-food sector includes the primary agriculture sector and related service industries, the food and beverage processing sector, the food and beverage distribution sector (wholesale and retail) and the food service sector.

THE STRUCTURE OF THE CANADIAN AGRI-FOOD SECTOR

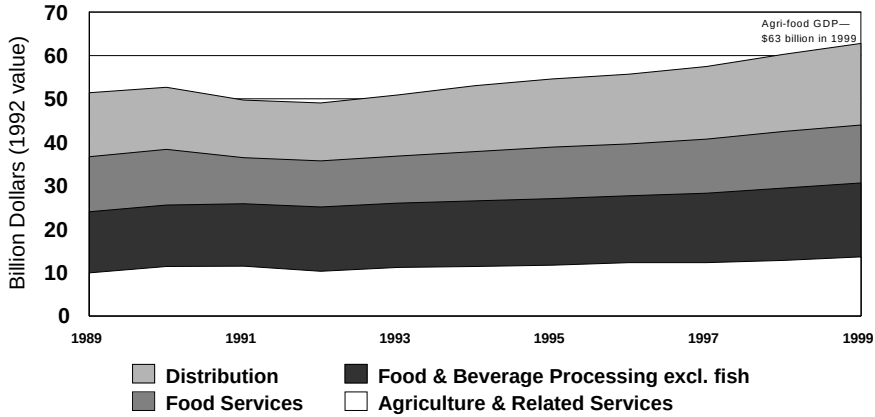
The agri-food sector is a dynamic 110 billion dollar industry, employing one in seven Canadians and making a significant contribution to Canada's trade balance and domestic economic growth and activity. Figure 8 shows the values of each of the various components of the agri-food sector from the farm input sector to the food service and retailing industries. As seen in Figure 8, the farm input sector, worth $14.0 billion in sales in 1999, was important for contributing to the primary agriculture sector's $28.5 billion in farm cash receipts. While $10.3 billion of this primary production was exported, the remaining $18.5 billion was further processed into food and beverage and non-food and feed products. After processed exports of $11.4 billion and imports of $10.8 billion, domestically-processed products and imports contributed to $64.5 billion worth of retail food and beverage sales, $9.5 billion worth of non-food sales and $35.9 billion food service and restaurant sales in 1999.

Importance to the Economy

The agri-food sector, with its various components (farm input, primary agriculture, food and beverage (and increasingly non-food) processing, food retailing and food service sectors) is an important contributor to the Canadian economy, employing one in seven Canadians and accounting for 8.5 percent of Canadian total Gross Domestic Product. From 1990 to 1999, the gross domestic product (GDP) of the agri-food sector increased about 4.0 percent a year, with most of the growth occurring after the 1991 recession (Figure 9). By 1999, total GDP of the agri-food sector stood at $63 billion in real terms (1992 dollars), with the primary agriculture sector contributing to 22 percent of this amount, the food and beverage processing sector, 28 percent, and the food retailing and distribution sector accounting for 50 percent of total agri-food GDP (Figure 10).

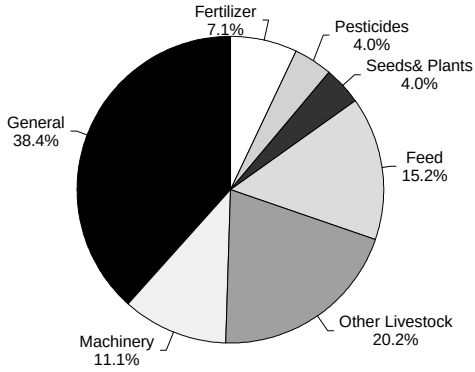
The agri-food sector is also an important contributor to Canada's merchandise trade balance. As mentioned above, Canadian agri-food exports increased substantially over the period 1990 to 1999 to just over $20 billion, to rise to almost 4 percent of world agri-food exports (Figure 4), a goal explicitly set by Agriculture and Agri-Food Canada and the Canadian Agri-food Marketing Council (CAMC) in 1997 (CAMC, 1998). An increasing share of these

Figure 10: Relative Importance of the Various Components of the Agri-food Sector, 1989 to 1999.



Source: Statistics Canada

Figure 11: Relative Importance of Farm Input Expenses, 1996.



* shares are based on the relative importance of operating expenses for the average farm in Canada in 1996
Source: Statistics Canada, Whole Farm Database

exports are consumer-oriented as opposed to bulk, thereby contributing to the value-added and hence the profitability of the food and beverage processing sector. In the following sections, the changes in structure that occurred in each of the components of the agri-food sector will be described in more detail in an

effort to better understand how the NAFTA may have impacted the structure of the agri-food sector over the 1990 to 1999 period.

Farm Input Sector

The farm input sector is composed of several important industries that for the most part are highly concentrated and made up of a small number of large international firms. The farm input sector includes inputs that are required to produce agricultural products - inputs such as feed, seed, fuel, fertilizer, pesticides, machinery and equipment, and labour that contribute to the operating expenses of the farm business. This sector was worth $14 billion in sales in 1999 (Figure 8). Prices for many of these inputs are determined in the global or North American market, with some adjustment to take account of regional market conditions. Much of the research and development takes place outside of Canada reducing the variety of products available in this country relative to others such as the United States.

Figure 11 shows the relative importance of farm input expenses for an average Canadian farm in 1999. General expenses make up the bulk of these costs at 39 percent of the total. These include expenses related to interest costs, custom machine work, and other miscellaneous expenses. However, the other important expenses on farm inputs include feed costs at 15 percent of the total, machinery costs at 11 percent, fertilizer (7 percent), pesticides (4 percent) and seeds and plants (4 percent). The relative importance of these expenses will of course vary by farm type. For example, grain and oilseed farms would allocate a greater share of costs to seeds, fertilizer and pesticides than a cattle farm, which would spend more on feed and the cost of animals. It is on grain and oilseed farms that the productivity improvements of the 1950s and 1960s took place, due to the reduction in labour costs and the increase in machinery and equipment expenses related to new technology.

Pesticides. The world pesticide industry reports sales of about $1.1 billion (U.S. $810 M) with Canadian sales accounting for approximately three percent of the world market. Pesticides are primarily used in the production of field crops, tree fruits and nuts and include herbicides, fungicides and chemical treatments. The industry is quite concentrated in Canada with a small number of large global firms producing for local markets. These firms with branches in

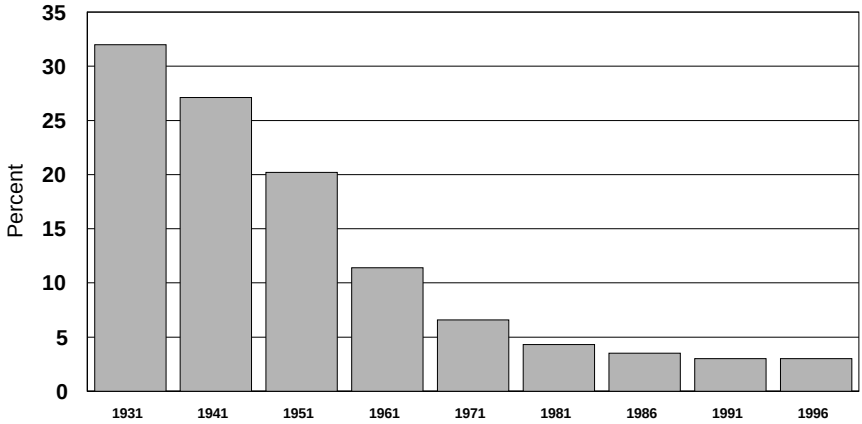
Canada gain regulatory approval by undertaking research based on local conditions. Prices are generally given but can vary based on what the market in a particular region will bear (McEwan and Deen, 1997).

Given the recent improvements in farming practices and the introduction of biotechnology in the area of pest-and herb-resistant plants, the pesticide industry is undergoing changes and this is having an impact on the types and costs of crops being grown. For example, the industry has responded by purchasing seed companies and developing seed products that work optimally with a specific pesticide (e.g. Roundup-ready canola). Canada has higher corporate tax rates and higher costs of registration relative to the United States, Japan and the Economic Union. This will no doubt hamper the development of an industry in Canada and we will continue to rely on multinationals for pesticide supplies.

Farm Machinery. In 1998, Canadian shipments of farm machinery were $2.6 billion with value-added of $1.3 billion. Most of this farm machinery was imported since Canada is a net importer of farm machinery, ($4.6 billion in 1998 compared with exports of $1.1 billion). Imports are large, high-priced items while exports are smaller, lower-priced items. The farm machinery industry in Canada is dominated by a small number of large global firms, with head offices in the United States (John Deere) and Europe(New Holland-Case). The local distributors often base the regional prices on what the market will bear. Some small, regional "short-line" producers are centered in Saskatchewan and Manitoba. Machinery such as tractors, balers, seeders and combines are distributed in this manner. With the increasingly sophisticated farm machinery available and required for no till-techniques, for example, the agriculture sector continues to become more capital intensive. This will continue to have implications for the size and efficiency of the average Canada farm.

Fertilizer. The value of shipments of fertilizer in 1999 was $4 billion. Of this amount, $388 million was imported. However, despite being a small user on world fertilizer markets (2 percent share only), Canada is a net exporter of fertilizers due to its 40 percent share of the global potash trade. The Potash Corporation of Saskatchewan is a global participant and an industry price set-

Figure 12: Share of the Canadian Population Living on Farms, 1931 to 1996.



Source: Statistics Canada, Census of Agriculture

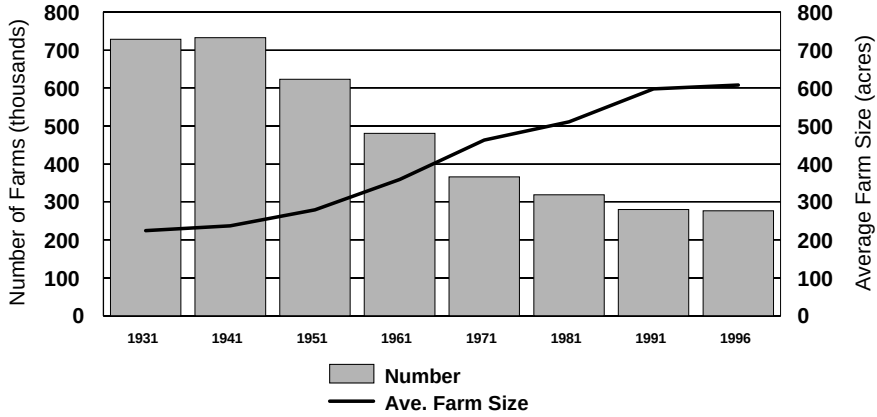
ter. Canadian producers have increased their capacity over the 1990s thereby maintaining a high supply. The open border with the United States allows prices to be set in the continental rather than the local market. With the consolidation of fertilizer companies that is currently taking place, there is a fear that prices will rise as a result (Korol and Rattray, 2000).

Fuel. Canadian farmers require fuel to apply pesticides and fertilizers, to operate all their farm machinery, and to heat their barns and buildings. The fuel industry is dominated by a shrinking number of global firms. Canada is a small user in the global fuel market and is a net exporter of fuel and petroleum products. Prices for farmers vary by province, depending on regional availability and fuel tax rebates and other tax treatments (Canadian Agricultural Energy End-Use Association, 1998).

Primary Agriculture Sector

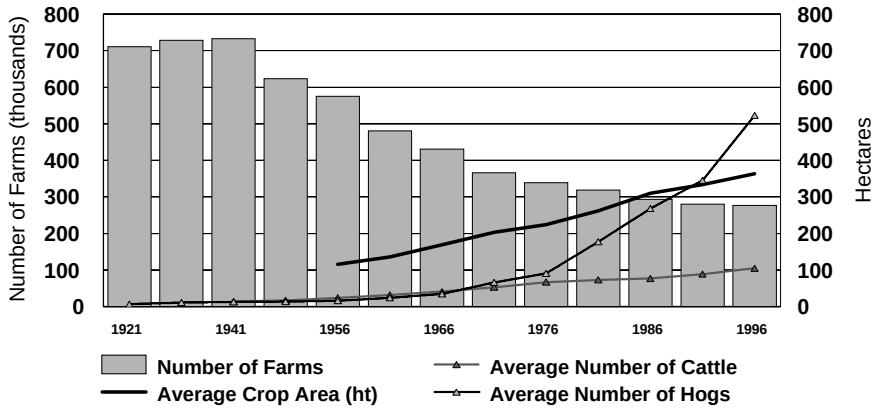
There have been significant changes in the structure of primary agriculture over the past fifty years. While one third of the population lived on farms in 1931 when Canadian society was still fairly agrarian, this share declined to 5 percent in 1981 and just 3 percent by 1996 (Figure 12). This decline

Figure 13: Number of Census Farms and Average Farm Size in Canada, 1931 to 1996.



Source: Statistics Canada, Census of Agriculture

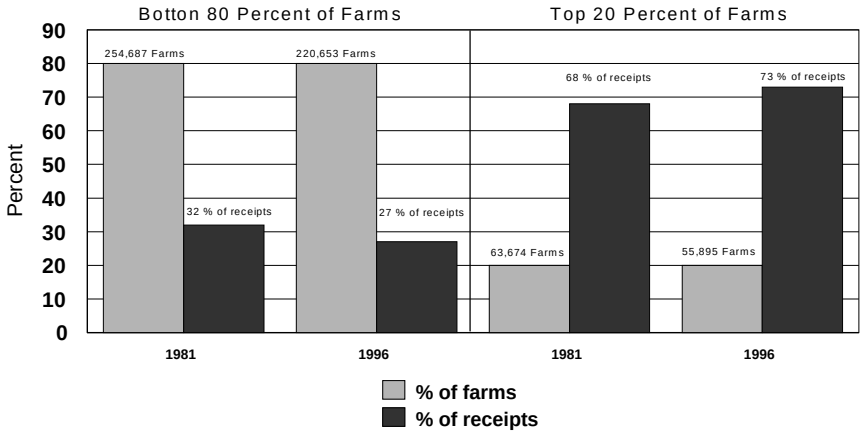
Figure 14: Number of Farms in Canada and Average Crop Area and Herd Size, 1921 to 1996.



*Averages are calculated on per reporting basis for crop area and herd size.
Source: Statistics Canada, Census of Agriculture

occurred primarily because of the decrease in the number of farms from over 700,000 in 1931 to 300,000 in 1981 and 276,000 in 1996 (Figure 13). At the same time, farms have become larger and more efficient as a result of new technologies and the dramatic increases in productivity that has taken place

Figure 15: Concentration of Production, Canada, 1981 and 1996.



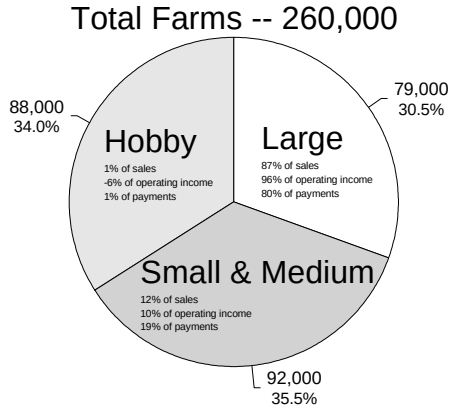
Source: Statistics Canada, Census of Agriculture, 1981 and 1996

since the 1950s (Jones, Freshwater and Fiarchuk, 1995). Many farms became more specialized and more efficient as a result. For example, the average crop area per farm has increased from 100 hectares in 1956 to over 300 in 1996, while the average hog farm has an average herd size of over 500 head, up from under 100 in 1976 (Figure 14).

Canadian agriculture has become increasingly concentrated and polarized with the top 20 percent of farms producing almost 80 percent of production (the 20-80 rule) (Figure 15). This compares with 1981 when the top 20 percent of farms accounted for 68 percent of production. This trend is expected to continue into the future as farms adjust and become more efficient in order to compete in the increasingly competitive globalized world markets. New technology and marketing arrangements are also making this trend towards larger enterprises feasible.

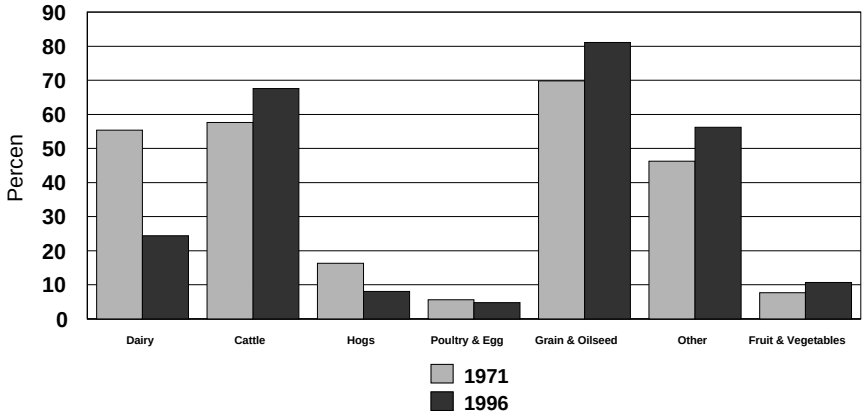
Another way to look at the distribution of farms relative to their contribution to agriculture production is by breaking down farms into three revenue

Figure 16: Distribution of Farms, Production and Program Payments, 1999.



Source: Farm Financial Survey, 1999 AAFC Estimates

Figure 17: Change in Distribution of Farms by Farm Type, Canada, 1971 and 1996.



Source: Statistics Canada, Census of Agriculture

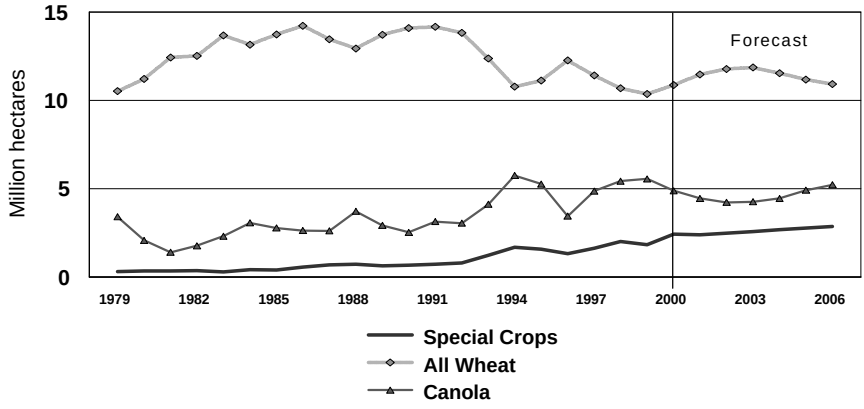
classes. The smallest farms, with gross farm revenues under $10,000, are called hobby farms, and represented 30 percent of farms in 1999. These farms accounted for only 1 percent of agricultural production and 2 percent of net operating income (Figure 16). They received only 1 percent of direct program pay-

ments. Small and medium-sized farms, with revenues between $10,000 and $100,000, represented 35 percent of farms while accounting for only 12 percent of agricultural production. These farms received 19 percent of direct program payments. Large farms, on the other hand, with revenues of $100,000 and over, representing the top 31 percent of farms, accounted for 87 percent of production and received 80 percent of the program payments. These numbers further reinforce the concentration numbers above and show that a relatively small percentage of farms produce the bulk of agricultural production and receive the majority of net operating income and direct program payments in Canada.

Canada is a large country with varying landscapes and as a result, there are significant regional differences in farm types. For example, British Columbia has a higher number of livestock and fruit and vegetable farms. The prairie region produces primarily grains, oilseeds and livestock while the well-populated central part of Canada (Ontario and Quebec) is an area of more mixed farming, particularly in the southern parts of the region. Grains and oilseeds as well as poultry, livestock, and fruit and vegetables are important commodities produced in this region. The Atlantic provinces are known for their potatoes, but also produce dairy and other field crops.

Over time, there has been little change in the type of farms in Canada. Figure 17 shows that between 1971 and 1996, there has been a shift away from dairy and hog farms to an increasing number of cattle, grain and oilseed, fruit and vegetable and other farm types. While Census data are not yet available for 2001, there will no doubt be further changes in the distribution by farm type, size and region from 1996 to 2001 due to recent policy changes and pressures from increased globalization and lower commodity prices. For example, the elimination of the Crow Rate transportation subsidy in 1995 resulted in the expansion of the livestock industry in Manitoba, where transportation rates had increased substantially and made transporting grains in the form of value-added livestock more economical. On the other hand, the termination of feed freight subsidies to Eastern Canada had the opposite effect—one of discouraging livestock production. While hog production in Quebec continues to expand, urban population pressures on livestock producers in Ontario have resulted in a decline in the number of cattle operations in that province. Also on the Prairies,

Figure 18: Area Harvested in Various Crops, Canada, 1979 to 2007*.



*Forecast from 2001 to 2007 is based on AAFC, Medium Term Baseline forecast, October 2000
Source: Statistics Canada, June Crop Survey

the crop mix has changed from primarily traditionally wheat-based to special crops such as chick peas, white beans, lentils, canary seed and other non-traditional crops. Prairie producers, especially those in areas faced with the increase in transportation rates following the elimination of the Crow Rate Subsidy (in Eastern Saskatchewan and Western Manitoba), coupled with record low wheat prices since 1998, diversified out of wheat in an effort to diversify risks and improve their profitability from niche markets and higher value-added crops. This had an impact on the area harvested in various crops, as seen in Figure 18.

At the same time, major changes in marketing arrangements between hog producers and processors, such as production contracts and vertical integration, in combination with new technology and management systems, have resulted in the growth of larger, more efficient hog operations in those regions where hogs were traditionally raised. The average hog herd size in Canada has increased as a result, from 177 head in 1981 to 523 head in 1996. Similarly, increasingly intensive cattle operations (primarily feedlots) in Alberta, have also led to an increase in the average herd size for cattle operations, from 73 head in 1981 to 105 head in 1996. This intensification is having repercussions on the environment as rural and urban neighbours have increasingly expressed

their concerns over the impact these more intensive livestock operations (ILOs) have on nearby air and water quality. Some municipalities have even restricted the size of cattle and hog farms (Tyrchniewicz, Carter and Whitaker, 2000). Several provinces have introduced nutrient management legislation that will regulate large-scale livestock production and its impact on the environment.

An alternative method of considering the distribution of farms that accounts for the diverse needs and behaviour of farmers and their families is the "farm typology" (Niekamp and Zafiriou, 2000). This "farm typology," like that developed by the Economic Research Service (ERS) of the United States Department of Agriculture (ERS, 2000), takes account of such factors as the size, age, business intentions and life cycle that influence the behavior, potential and performance of farms and their operators. For example, some farm operators are close to retirement and in the process of downsizing or preparing for succession. Others are considering expanding and in the process of investing in new capital, and training and skills to become more profitable and efficient. Still others are operating a small farm where they live while working full-time in another profession, simply for lifestyle reasons. A description of the various typologies follows with a discussion of their relative importance (Table 1) and corresponding characteristics (Table 2).

Farms have been divided into four typologies or categories based on size or capacity, life cycle and/or business intentions. *Retirement farms* are those farms operated by farmers over age 60 and receiving pension income, or anyone over age 65 years of age with no second operator that is at least 20 years younger (to account for children in the process of taking over the farm). Farmers in this typology are expected to be downsizing, have significant assets and little debt, and are likely not investing in new technology and equipment. Retirement farms represented 16 percent of farms in Canada.

Lifestyle farms are relatively small farms (gross farm revenues under $50,000) where the main operator and/or family members also earn substantial off-farm income (over $50,000). These farms generally earn little from farming and are not in the process of expanding and/or investing in training and new skills. Lifestyle farms represented only 8 percent of farms in 1999 and accounted for only 1 percent of agricultural output.

Table 1: Distribution of Farms by Farm Typology, Canada, 1999.

Farm Typology	Number of Farms		Market Revenue	Program Payments
	(Actual Number)	(Percent of Total)	(Percent)	(Percent)
Retirement	27,928	16	6	8
Lifestyle	13,601	8	1	2
Low Income	18,885	11	3	4
Business Focussed:				
Small Farms	14,686	9	1	2
Medium Farms	21,632	13	5	7
Large Farms	62,952	37	42	52
Very Large Farms	10,521	6	39	23
Hutterite Colonies, etc.	514	0	2	2
Total	179,719	100	100	100

Source: Farm Financial Survey, 1999.

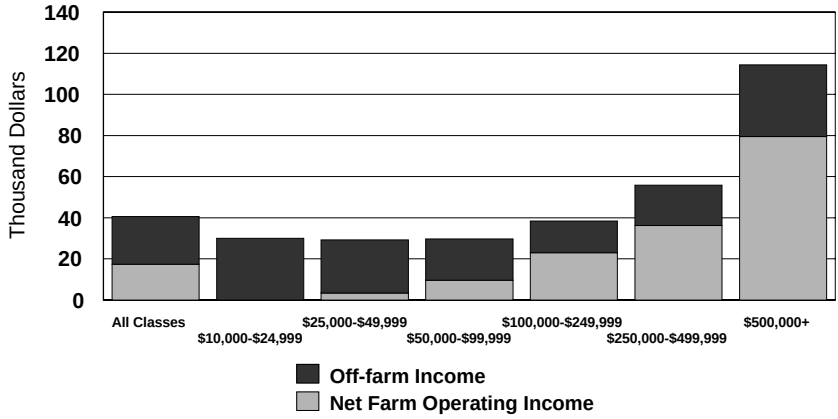
Low income farms account for farms with low family income (under $20,000 per family) which are also not retirement or lifestyle farms. Generally operators on this group of small farms (under $50,000 in revenues) earn little from farming or from off-farm sources. This may be because they are not close to employment centres where they might find off-farm jobs, they may operate only marginal land or may not have the appropriate skills to do well in farming or in off-farm employment. Generally, operators on these farms receive little from agricultural safety net programs (4 percent, Table 1) and do not have access to more general social safety nets (eg. Employment Insurance, Welfare) because they are too asset-rich. They are considered the rural poor. In 1999, 11 percent of farms were considered low income farms.

Business-focused farms include farms not in the other three typologies (i.e. retirement, low income or lifestyle). Operators on these farms may be more serious about farming but may have small, medium, large or very large farms. Generally they have higher operating margins than the other typologies, based on larger assets and higher debt. They invest in their farms and are generally interested in upgrading their skills and knowledge. They receive the bulk of program payments (86 percent) and account for the largest share of agricultural production. They represented 65 percent of farms in Canada in 1999 and accounted for 90 percent of agricultural sales. The typology has proven useful in

Table 2: Characteristics of Farms by Farm Typology, Canada, 1999.

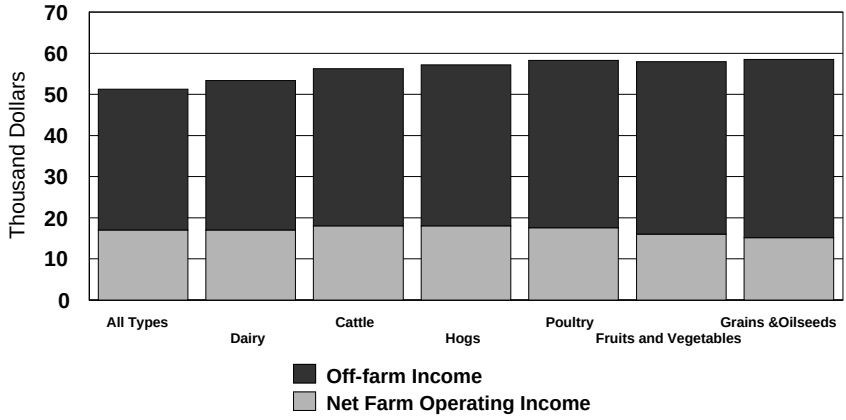
				------ Business Focus ------			
	Retirement	***Lifestyle***	***Low Income***	***Small***	***Medium***	***Large***	***Very Large***
Farm Market Income	8,530	(2,920)	(5,640)	4,600	12,340	28,690	106,880
Farm Wages	2,120	840	900	930	3,040	11,580	46,240
Program Payments	3,490	1,390	2,510	1,850	4,040	9,350	21,090
Total Farm Income	14,140	(690)	(2,240)	7,380	19,410	49,620	174,210
Employment Income	3,170	73,350	5,340	21,640	25,770	12,860	9,990
Pension Income	15,410	3,540	1,180	2,710	1,760	1,010	1,200
Investment Income	3,620	2,950	480	1,330	1,660	1,260	3,970
Other Income	2,630	5,960	900	2,150	2,920	3,280	14,860
Total Off-Farm Income	24,830	85,800	7,900	27,830	32,110	18,410	30,030
Total Family Income	38,960	85,110	5,670	35,210	51,530	68,030	204,240

Figure 19: Relative Importance of Off-farm Income for Farm Operators, by Farm Size, Canada, 1993 to 1999.



Source: Statistics Canada, Whole Farm Database

Figure 20: Relative Importance of Off-farm Income for Farm Operators, by Farm Type, Canada, 1993 to 1999.



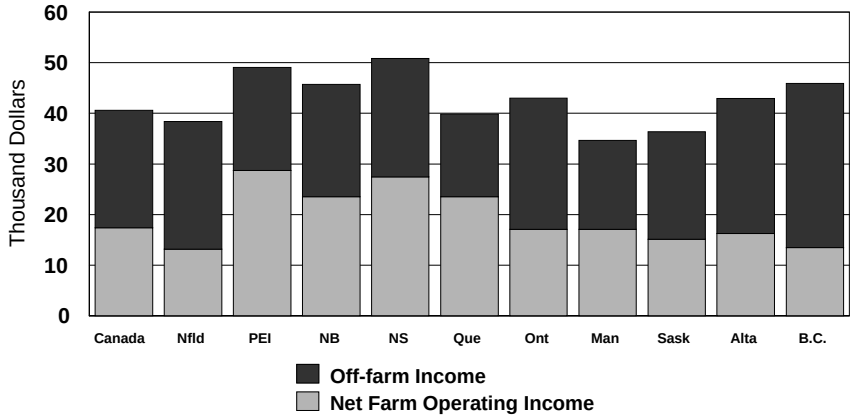
Source: Statistics Canada, Whole Farm Database

analyzing the diverse needs of the agricultural sector, and hence in identifying the policy mix that is necessary to address these diverse needs.

While hobby and lifestyle farms are the most dependent on off-farm income as a source of family income, small to medium farms and large farms also rely on off-farm income as all farm operators report an increasing number of hours spent in off-farm work. These increases can perhaps best be explained by the growth in labour productivity arising from the introduction of new technologies combined with off-farm employment opportunities (and higher wages) in nearby urban centers. In many regions of Canada, the urban centers continue to expand under population pressure. Figure 19 shows the importance of off-farm income for farm operators by farm size in 1999, while Figure 20 and Figure 21 show the same figures for farm type and region. Operators on small farms, for example, are much more reliant on off-farm income than are operators on large farms. By farm type, those operating dairy farms tend to spend more time on the farm than do cattle farm operators, for example. This is a function of the labour requirements of the various farm types: dairy farming is more labour-intensive than cattle farming. Finally, in regions where farms are closer to cities and towns, operators tend to report more off-farm income. British Columbia and Ontario are two such regions, where a large percentage of operators report more off-farm income. In Quebec, on the other hand, a smaller share of operator income comes from off-farm sources (Figure 21).

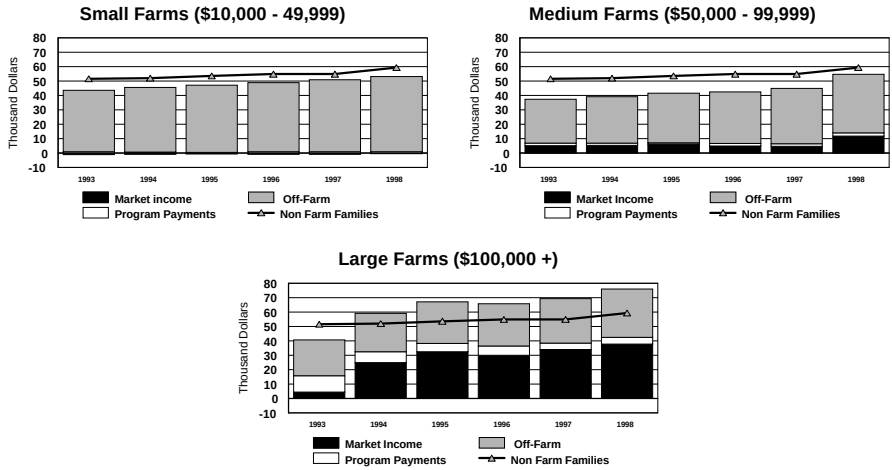
Figure 22 shows the relative importance of (farm) market income, program payments and off-farm income for the average farm family by farm size from 1991 to 1998 and compares total farm family income to that of non-farm families. Increasingly, farm family income has reached parity with non-farm family income. By farm size, however, it is clear that families on small farms report family income comparable to that of non-farm families because of their large sources of off-farm income. Families on large farms, on the other hand, report family income that exceeds that of non-farm families because of their high net farm income. Only families on medium-sized farms report income below non-farm families. The increasing comparability of farm family and non-farm family income has perhaps resulted from the changes in the farm sector that have led to increased concentration and the tendency to larger farms as well as the increasing importance of off-farm income for operators on smaller farms.

Figure 21: Relative Importance of Off-farm Income for Farm Operators, by Region, Canada, 1993 to 1999.



Source: Statistics Canada, Whole Farm Database

Figure 22: Total Farm Family Income and its Components Relative to All Canadians' Family Income, by Farm Size, 1991 to 1998.



Source: Statistics Canada, Whole Farm Database and Small Area Administration Data.

In summary, the primary agriculture sector has undergone significant structural change over the past fifty years, in particular to fewer farms and more concentrated production, and greater reliance on off-farm income. The

sector continues to adjust to the changing market realities in the face of developments in trade policy, such as those arising from the NAFTA and the WTO, technological change, consumers' perceptions and population growth and pressures. Similarly, structural changes have been occurring in the food and beverage processing, distribution and retailing and food service sectors, and these will be discussed briefly below.

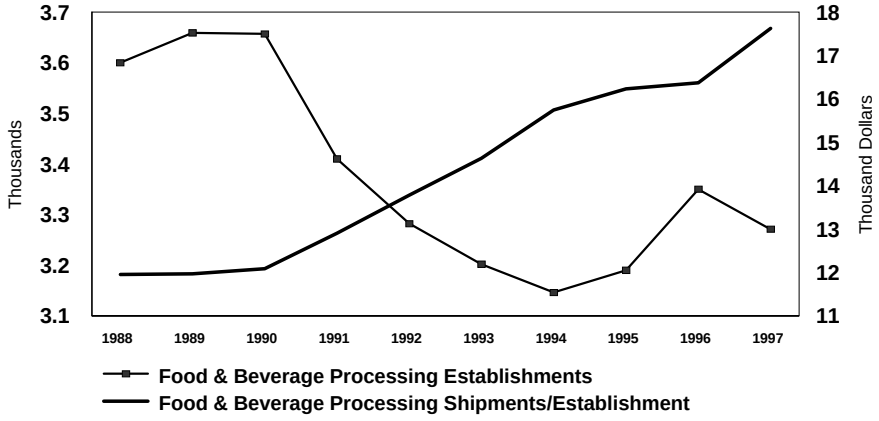
Food Processing, Distribution and Retail Sectors

The food and beverage processing, food distribution and retailing sectors, much like the primary sector, has experienced significant structural change over the 1990s in response to competition and cost pressures arising from globalization. Specifically, consolidation and concentration has occurred in each of these sectors, as indicated by a decrease in the absolute number of firms and an increase in average sales per firm.

The continuing trend towards more open trade has led to increased opportunities and competition for *food and beverage processors*. With open borders, processors have had the opportunity to expand their business through increased exports. However, freer trade also exposed Canadian processors to more foreign competition. As a result, Canadian processors have been driven to increase efficiency in order to compete against foreign imports, and to increase capacity in order to supply larger foreign markets. The quickest way to attain both has been through consolidation where processors could instantly increase capacity, and gain synergies that allowed for increased efficiency. A move toward more vertical integration with producers in pork and cattle markets, for example, and increased contracting, have also helped the sector gain efficiencies. The result has been increased consolidation, as shown in Figure 23 and rising operating margins as shown in Figure 24.

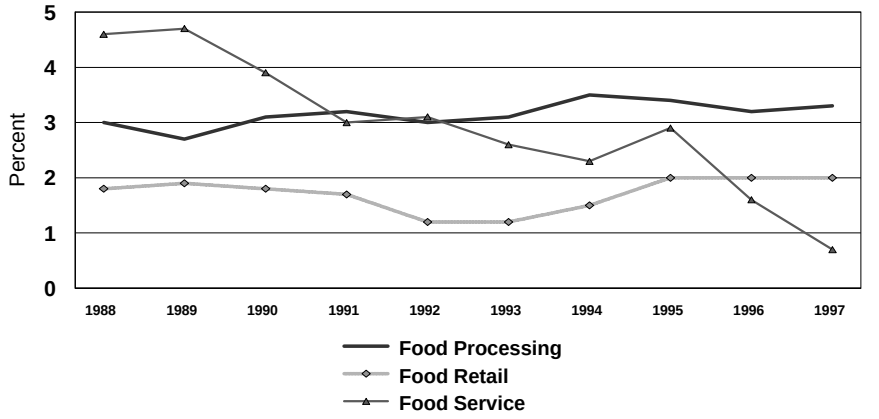
The NAFTA played an important role in shaping the current structure of the food processing sector. In addition to increasing competition and expanding markets for Canadian processors, NAFTA led to the creation of continental markets for products like beef. As a result, existing processors became more specialized. Over time, and particularly since NAFTA, Canadian exports of value-added or consumer oriented food and beverage processing exports have expanded rapidly (Figure 4), benefitting the Canadian food and beverage

Figure 23: Number and Average Shipments for Food and Beverage Processing Establishments, Canada, 1988 to 1998.



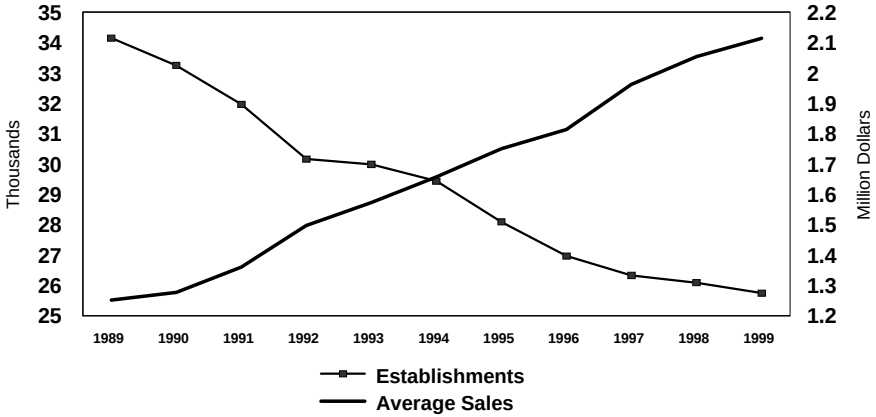
Source: Statistics Canada, Census of Manufacturers

Figure 24: Operating Margins for Food and Beverage Processing, Food Retailing and Food Service, Canada, 1988 to 1998.



Source: Statistics Canada, Census of Manufacturing

Figure 25: Number and Average Sales for Food Retail Establishments, Canada, 1989 to 1999.



Source: Statistics Canada

processing industry and contributing positively to Canada's merchandise trade balance.

Food retailing is a mature sector with low profitability and high levels of concentration and competition. Real spending in food stores grew just 2 percent a year between 1989 and 1998 (Little and Bennett ,2000). In the 1980s and early 1990s, consolidation occurred as large players purchased small players in an effort to reduce costs and expand sales. In the latter half of the 1990s, large food retailers started to consolidate among themselves (e.g. Loblaw and Provigo), leading to a decline in the number of enterprises while average sales increased (Figure 25). Before the latest round of consolidation, the Canadian market was regionally-based, with large regional players. The latest round of consolidation was meant to both increase efficiency and expand the chains nationally to meet increased competition from two national chains, Walmart and Costco, which have been expanding their food departments to compete in food retailing[1] . This new round of consolidation has led to fears of retailers exercising market power. Profitability has increased in the retailing segment mainly

[1] According to an article in the *Canadian Grocer*, Wal-Mart and Costco quietly and quickly obtained 7 percent of the Canadian grocery market, and figures that they will control 10 percent by 2005.

through increased efficiencies and movement into higher value-added and non-food products (Figure 24). With only moderate growth expected in the Canadian population, retailers will further reorient themselves towards increased value-added food items and non-food services to increase sales and profit margins.

The food service sector is different from the other segments of the agri-food chain in that it is more affected by changes in general economic conditions than the other segments. Whereas the general quantity of food purchased by households is fairly constant over time, the amount consumers are willing to allocate to eating out varies greatly. This is in part due to the fact that as disposable incomes rise, people generally place a higher value on their leisure time. The trend toward dual income families has also increased the demand for time-saving restaurant meals. With less time and more income, consumers will substitute purchased groceries with eating out. However, because of the greater income elasticity of demand for food away from home, this process works in reverse during an economic downturn.

The food service industry was hit with a one-two punch in the late 1980s and early 1990s. First, the Canadian federal government introduced a value-added tax (Goods and Services Tax) in 1989 which was applied to food in restaurants, but not food purchased from grocery stores. This effectively made eating away from home relatively more expensive[2]. Second, in 1991, a severe recession lowered disposable incomes, and led to a decrease in spending on food away from home.

During the 1980s and 1990s, the food service segment, like the food and beverage processing sector, went through a period of consolidation, resulting in the top 10 Canadian food service companies controlling all the major fast food chains, and some of the fine dining chains (Globe & Mail, 2001). Over this period, the number of establishments increased from 16.5 per 10,000 people in 1989 to 20.7 per 10,000 people in 1998 and the average sales of food-service

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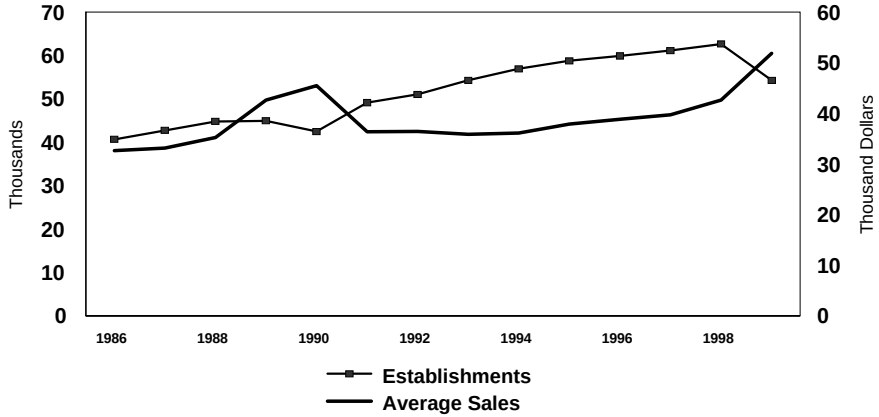
[2] According to the study by Little and Bennet (2000), the nominal price of food from stores increased 2.3 percent while the nominal price of a restaurant meal increased 10.8 percent after the introduction of the Goods and Services Tax (GST) in 1989.

Figure 26: Number and Average Sales for Food Service Establishments, Canada, 1986 to 1997.



Source: Statistics Canada

* Due to NAICS Conversion the 1998 and 1999 figures are not comparable to the figures in preceeding years. Statistics Canada does not plan to back cast this series to make it NAICS comparable.

establishments increased only moderately (Figure 26). This was due to increased competition both from within the food service segment, and from the processing and retailing segments. Over the 1990s, in an effort to increase their profit margins, food processors started to introduce ready-to-eat, healthy meals to compete against restaurants. Concurrently, the major retail chains (Walmart, Costco) introduced their own delis, cafés, and eat-in sections to try to retain more of the consumer food dollar. Increased competition and rising labour costs have driven the profitability of food service firms (Figure 25) down from 4.5 percent in 1988 to under 1 percent in 1997. The low returns and high competition in the food services sector may spark another round of consolidation. Recent news that CARA foods increased its control of Second Cup coffee (Globe & Mail, 2001) may be a sign that a new round of consolidation has started.

SUMMARY

The agri-food sector has undergone significant structural change since the early 1980s. The number of farms continues to fall as farmers become more productive in the face of increasingly sophisticated technology. The food and beverage processing, retail and food service sectors also continue to become more efficient and restructure in the face of competition in North American markets. Factors related to the introduction of new technology and marketing arrangements have played a role in conjunction with changing consumer tastes, preferences and concerns. However, perhaps the most important factor that has influenced structure and will continue to shape its path is the change on the trade policy front and the increasingly globalized nature of trade. The late 1980s and early 1990s saw the introduction of CUSTA, NAFTA and the WTO Agreement. Canada's agri-food sector has had to become more efficient and open to trade. While Canada has traditionally specialized in bulk exports, our trade has become increasingly consumer-oriented and this has benefitted the sector by raising value-added. Recent trade developments, including NAFTA have therefore helped Canada position itself to become a strong player on the world trading front and further structural change is expected in the years ahead.

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Section 2

Farm Structure Under Free Trade

The objective of this section is to analyze how farming would change under full free trade.

STRUCTURE OF FARMING UNDER FREER TRADE AMONG NAFTA COUNTRIES

Luther Tweeten, Richard Gray, and Salomon Salcedo

INTRODUCTION

Liberalization of markets under the North American Free Trade Agreement (NAFTA) has progressed unevenly. Major opportunities remain to open trade in agricultural products among member countries of NAFTA. Progress in negotiations depends on political as well as other factors, including how freer trade would affect farm structure in Canada, Mexico, and the United States. The objectives of this paper are to analyze:

- economic forces causing changes in agriculture in NAFTA countries;
- the structure, composition, and location of farming with freer trade among NAFTA countries;
- trade dispute tensions caused by freer trade and attending changes in the structure of agriculture; and
- actions governments and the private sector would take to cushion adjustments and ease the transition to freer trade.

ECONOMIC FORCES CAUSING STRUCTURAL CHANGE

Principal forces causing structural change include:

- knowledge creation and technology;

Agriculture is now a post-industrial economy in its dependence on knowledge, information technology, and service industries. Successful farm operators increasingly spend more time in the office at the computer and spend less time in the field, barn, and shop (Tweeten and Zulauf, 1998). Labor-saving technology is freeing labor from producing food to producing goods and services more favored by consumers as their income expands.

- economic growth;

Economic growth is a product of knowledge apparent in human, material, and technological capital growth. Such growth increases the price of labor relative to capital, causing farm operations to displace labor with larger and more efficient machines of all types. Economic growth also causes consumers to want and afford a wider variety of foods. The impact is to foster more trade as a means to acquire food, and innovative forms of vertical coordination to facilitate information flows up and down the food chain.

Farms are growing fewer and larger mainly because farm operators are seeking economies of size to reduce production and marketing costs. Economies of size are mainly a function of technology and information systems. New institutions such as production contracts reduce transaction costs and more closely coordinate farm input supply and precision food production and processing to meet the "designer" food needs of ever more affluent consumers.

An assessment of how farm structure would develop in a free trade environment requires recognition that under any trade regime farm products are not homogeneous, that agribusiness and farm sectors are not perfectly competitive, and product does not flow from a single location or to a single location in North America. This means that distinct regional markets will continue to exist even in a freer agriculture trade environment. This is evident in other sectors; for example, economists have found "home consumption bias" or "border effects" to be very large in virtually all sectors of the economy despite close to free trade conditions (Nitsch, 2000; Helliwell, 1996). For agricultural inputs and outputs, Furtan and van Melle (2000) show that the Canada-U.S. border is still very apparent despite the absence of tariffs and quotas for many commodities. Understanding the form of these departures from the single market is essential to

understanding the existing farm structure as well as the potential farm structure within a free trade environment.

Farm structure, or the organization of production units, is heavily influenced by the size of the farm firm minimum cost unit, which can differ considerably by sector. Where this minimum cost per unit of output is reached at a size with less than two employees, an owner operator "family farm" structure will prevail. Where the minimum cost is at a size that involves many employees, the farm structure could include external corporate ownership. Both of these farm structures will be generally competitive unless at minimum cost a farm can supply most or all of the market. In this case, a few farms will exist within the sector and each farm will possess some market power, allowing it to price above marginal cost. In cases where transaction (coordination) costs are large, a simple assessment of the cost of production may be misleading in determining the competitiveness of a region. The transactions cost literature suggests that the economic linkages between farmers and processors, or between farm input suppliers and farmers, will be influenced by the structure of the upstream and downstream industries, and, importantly, the institutions that exist within a region to govern these relationships. The literature also suggests that those regions having institutions with the lowest transaction costs will produce the product and perhaps dominate other regions with higher transaction costs.

The various combinations of processor/farmer production technologies, and transport costs of raw and processed products versus production economies of scale will result in an array of different industry structures and trade patterns. When the transportation costs are high relative to the economies of size downstream, the processors will locate close to the source of raw product. This will result in processors locating throughout the region of production. Here trade will tend to be in processed product, rather than in raw agricultural product. Livestock processing is an example of this type of structure. When the cost of transporting the final product is high relative to transporting the raw product, then processing will tend to locate close to the final market. Here the processors will tend to locate near metropolitan areas with little trade in processed product between these areas. Bakeries and to some extent flour milling are examples of this type of cost structure. Finally, some raw and processed products will be expensive to transport relative to the economies of size in

processing. This used to be the case in fresh milk where production and processing tended to take place near large urban areas.

In regional pockets of production and processing where there is potential market power, arrangements other than spot markets for agricultural products may emerge. In this situation, the regions able to create institutional arrangements to overcome the resulting problems will tend to produce and process the product. For example, producers able to organize a cooperative to process sugar beets may have an advantage over other potentially lower cost producers who do not have this organizational ability. Similarly, a willingness of North Carolina's farmers to accept hog production contracts may have allowed that region to grow at the expense of other, potentially lower-cost, regions.

Technology, economies of size, and environmental regulations will interact under freer trade to favor livestock and poultry feeding in regions characterized by low labor costs and low rainfall. Such areas include the plains, mountain, and desert areas of Canada, Mexico, and the United States. Relatively few but very large cattle feeding and meat processing "hubs" will be tied by "spokes" of transportation and communication to sometimes distant farm grain and soybean producing areas and urban food consumption areas. Western Mexico will be one such hub, importing feed by unit train from cash-grain farming regions and exporting case-ready meat to urban centers not only in Mexico but also in the United States, and perhaps in Canada.

STRUCTURE, COMPOSITION, AND LOCATION OF PRIMARY AGRICULTURAL PRODUCTION IN NAFTA COUNTRIES WITH FREER TRADE

This analysis of the impact of freer trade among NAFTA countries presumes that: (1) freer trade will especially affect farm structure through commodity prices and receipts, and (2) domestic commodity programs as well as trade will be liberalized. Thus the impact on farming structure (size, number, type, and organization of farms and agribusinesses) will depend, among other things, on the degree to which local agriculture will be protected from global and regional markets and on the importance of agricultural trade in each country of NAFTA. According

to estimates of the Organization for Economic Cooperation and Development (OECD), a major shift occurred in support of agricultural producer receipts among NAFTA countries between 1982-92 and 1999. While Mexico's producer subsidy equivalent (PSE, or proportion of farm receipts from the public sector) remained at approximately one-fifth, Canada's PSE fell from 35 percent in 1982-92 to 20 percent in 1999. While Canada's PSE was being cut, the U.S. PSE rose slightly, going from 23 percent to 24 percent in the same period.

The form of programs contributing to the PSE has a major impact on domestic resources and trade as apparent for the United States in Table 1. Massive direct payments increased U.S. farm output only 0.15 to 0.25 percent in the 1998-2000 period. Far more modest-size marketing loan deficiency payments coupled to production raised U.S. farm output by 0.68 to 1.38 percent. Crop and revenue insurance subsidies accounting for one- half of the approximately $3 billion in annual crop insurance outlays in recent years encouraged production of higher-yield, higher-risk crops, and retention of marginal cropland that would have gone to grass and trees in the absence of subsidies. The result was to add as many as 25 million acres to crop production and to add 0.28 to 4.10 percent to U.S. farm output (Table 1).

Results in Table 1 suggest important implications for farm structure under a liberalized NAFTA:

- output-increasing tendencies of farm commodity programs not only distort trade, they also offset some and perhaps most of the intended economic benefits to farmers;

According to Table 1, coupled public programs increased output, depressed U.S. farm prices, and possibly reduced receipts by $18 to $25 billion, enough to offset benefits of direct payments to U.S. farmers in recent years. Thus an end to decoupled programs under free trade might have only modest impact on farm economic welfare and farm structure.

- direct payments (production flexibility contract, AMTA, or transition payments) only modestly affect output.

Hence "decoupled" payments might be used to cushion farm income and structured adjustments in the transition to freer trade. Member countries of NAFTA

Table 1: Production of farm output above competitive market levels induced by the 1996 farm bill, U.S., 1998-2000.

Program feature	Contribution to farm output	
	Low	*High*
	(Percent of farm output)	
Direct payments	0.15	0.25
Marketing loans and deficiency payments	0.68	1.38
Insurance subsidies	0.28	4.10
Total, all sources	1.11	5.73
Loss in farm receipts ($ billion)		
Short run (E=-0.3)	4.93	25.46
Intermediate run (E=-0.6)	1.42	18.45
Long run	0.00	0.00

Source: Estimates from Westcott and Young (2000), Burfisher et al.(1998), and Skees (2000) as reported in Tweeten (2001).

differ greatly in ability to finance payments, however. Despite measures to cushion adjustments, lower farm prices and incomes attending free trade and less generous commodity programs will bring structural changes to farming. In general, lower prices and interregional competition create pressure for farm consolidation to achieve size economies, and for organizational changes such as contract production and leasing to shift risk and to serve capital and management needs of a competitive agriculture.

Impacts on farm commodity and resource structure of more open trade depends on the level and mix of affected trade. NAFTA was formed partly because Canada, Mexico, and the United States are in close proximity, and close neighbors trade heavily with one another, *ceteris paribus*. Thus the three NAFTA partners trade especially with each other. Also, a small economy tends to trade relatively more with other economies, *ceteris paribus*. Of agricultural trade in 1995, 27 percent of U.S. trade, 74 percent of Canadian trade, and 79 percent of Mexican trade was with NAFTA partners (Gehlhar, 1998, p.36). Hence the United States is expected to be influenced relatively less by removing trade barriers than are its partners in NAFTA[1]. Table 2 shows levels of U.S.

[1] The impact of more open trade in NAFTA depends partly on current trade balances and barriers. Although the United States is a major exporter to the world as a whole, the United States exported only 84 percent as much as it imported of food and agricultural items from NAFTA partners in 1995 (Gehlhar, 1998,p.3).

Table 2: NAFTA Partners' Level and Share of United States' Farm Exports.

Destination Country	FY 1994		FY 2000	
	Value ($Bil.)	*Share (%)*	*Value ($Bil.)*	*Share (%)*
Canada	5.3	12.1	7.5	14.8
Mexico	4.1	9.5	6.3	12.4
U.S. subtotal	9.4	21.6	13.8	27.2
U.S. total	43.5	100.0	50.9	100.0

Source: U.S. Department of Agriculture, November 1996, p. 48 and December 2000, p. 49.

Table 3: Changes in Farm Exports, Imports, Output, and Welfare Due to NAFTA.

Country	Exports	Imports	Output	Welfare
	(Percent change from base)			*($ million)*
Canada	1.5	0.1	-0.4	500
Mexico	23.7	10.4	-1.8	299
United States	1.3	4.7	0.1	464

Source: Burfisher, et al. (1998, pp. 72, 73)

farm exports to NAFTA partners for 1994 (when NAFTA was formed, although it was preceded by the CUSTA in 1989), and for year 2000. The value (and share) of U.S. farm exports going to NAFTA partners rose from $9.4 billion (21.6 percent) in FY 1994 to $13.8 Billion (27.2 percent) in FY 2000. The rising U.S. export share to NAFTA has come especially at the expense of Europe and Asia.

The rise in U.S. farm export share to NAFTA is somewhat misleading as an indicator of revenue or job creation, however. The reason is that the United States and Canada are in approximate agricultural trade balance depending partly on whose trade data are used (Tweeten et al., March 1997). An equal increase in farm exports and imports is likely to create better jobs and add to real national income, but it probably creates few net new jobs. Thus one "cost" of more open trade is job shifts, which for disadvantaged workers can be traumatic although overall job quality and remuneration rises on average. The following pages explore what sectors and resources in agriculture are favored and disfavored by freer trade.

Limitations to expanding U.S. trade with NAFTA partners are apparent. With nearly equal farm trade to and from Canada, Canada is consuming nearly 10 times as much U.S. farm product per capita as U.S. consumers are of Canadian farm products. Furthermore, because the United States and Canada are affluent and mature economies, food demand and hence food trade will typically expand slowly, other things equal. In contrast, Mexico has more potential to expand food consumption as income and population expand. Mexico's consumers will shift toward higher-value products such as meat requiring considerably more resources to produce than do current consumption items. With Mexico's limited supply of quality land and water, the country will import more food and feed paid for by manufactured exports as economic growth progresses.

Freer trade will speed that process as evident from the impact of NAFTA to date. Tweeten et al. (March, 1997) estimated that CUSTA/NAFTA added $1.4 billion to U.S. agricultural exports to Canada and $1.9 billion to Canadian agricultural exports to the United States by year 1995 over 1989 exports. Burfisher, Robinson, and Thierfelder (November 1997, p.11), using a computable general equilibrium (CGE) model, estimated that the NAFTA agreements added $258 million of the $582 million additional agricultural exports to NAFTA partners. The Tweeten et al. and Burfisher et al. estimates are not strictly comparable because of different methodology, commodity coverage, and time period, but both estimates indicated that NAFTA created trade, and that trade creation benefits probably exceeded trade diversion losses.

Past trade trends are prologue to trends under future NAFTA liberalization. That freer trade under NAFTA will be felt most by NAFTA countries relatively most dependent on trade with its NAFTA neighbors is apparent from numbers in Table 3. The NAFTA has most heavily influenced Mexico whose exports were expanded 33.7 percent while imports expanded 10.4 percent (Table 3). Because water availability limits Mexico's ability to compete in corn, oilseeds, and selected other crop and livestock production, overall agricultural output was estimated to decline 1.8 percent. Despite this (modest) decline, welfare (national income or deadweight gain) was calculated to increase $299 million by Burfisher et al. (p. 72).

Table 4: Changes in Factor Employment Due to NAFTA.

Country	Resource			International agriculture
	Land	*Labor*	*Capital*	***terms of trade***
	(Percent change)			
Canada	0.6	0.9	1.4	0.9
Mexico	5.1	4.6	3.2	-0.9
United States	0.2	0.2	0.1	2.1

Source: Burfisher, et al. (1998, pp. 70, 72; assumes new farm programs)

Agricultural resource use changes from NAFTA as shown in Table 4 were greatest in Canada and Mexico because they depend more heavily than does the United States on trade. By ending trade distortions such as import duties in its farm and food economy, Mexico was able to increase land, labor, and capital use by 3.2 to 5.1 percent and realize an increase in real national income despite a slight drop in prices for what they sold relative to what they bought in international markets (Table 4). Canada's resources expanded less than Mexico's but more than the United States' (Table 4). Because it began with relatively low trade barriers when NAFTA began in 1994, the United States was able to improve its terms of trade with liberalization but its land, labor, and capital resources expanded less than did those of its two NAFTA partners (Table 4).

REMOVING REMAINING TRADE BARRIERS

Neither NAFTA, nor CUSTA preceding it, is a genuine free trade agreement. Each allows for continued government interventions in some farm markets, notably for dairy and poultry (including eggs) in Canada and sugar, peanuts, and tobacco in the United States. Because NAFTA partners compete little in peanuts and tobacco, the concerns especially are with dairy, poultry and eggs in Canada, and sugar in the United States. Other trade irritants have been troublesome from time to time.

An example is wheat export subsidies. The U.S. Export Enhancement Program (EEP) raised U.S. wheat prices relative to world wheat prices. With Canada receiving world wheat prices, the result was higher-U.S.-relative-to-Canadian wheat prices and a surge in Canadian exports to the United States in 1993-94. Such exports undermined the EEP and resulted in a Canadian-U.S.

Joint Commission on grains to coordinate cross-border trade, domestic programs, and export programs of the two countries. (Burfisher et al., November 1997, p. 74). Tensions continued, and in 1998 the two countries established a pilot program monitored by the Canadian Grain Commission to help U.S. wheat enter Canada. Frictions between Canada and the United States over wheat markets will remain for several reasons. One is that free trade in commodities in which free trade partners are competitive tends to render supports coupled to production and prices unworkable because imports undermine such coupled programs. Second, forces such as exchange rate and weather risks originating outside of farm commodity markets heavily influence farm markets, causing cross-border frictions[2]. The frictions from the above factors are intensified because wheat in Canada and the United States has the backing of powerful political forces. Hence even minor trade problems can turn into institutional confrontations.

Another unresolved issue is sugar trade especially between Mexico and the United States. Although the United States has retained controls over sugar imports from Canada and Mexico, NAFTA controls over Mexico sugar exports will be phased out after year 2008 (Burfisher et al., November 1997, p. 74). The NAFTA agreement prevents Mexico from substituting high fructose corn syrup (HFCS) sweeteners for sugar in its domestic market, but Mexico has found that provision difficult to enforce. The United States fears that Mexico will import HFCS while exporting its domestic sugar production to the United States where such imports undermine the U.S. sugar price support program. In turn, Mexico fears that it will not be allowed to export domestic sugar production to the United States although sugar is one of the farm crop products (along with fruits and vegetables) it can export at a profit to the United States. How this issue will finally be resolved remains unclear.

Some progress has been made on resolving a few thorny issues. Many divergent farm product standards and regulations have been harmonized. Resolution of sanitary and phytosanitary disputes in citrus has helped to open fresh

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[2] Perhaps it is time to seriously consider an institutional reform, creating a NAFTA dollar to remove exchange rate risk that causes unpredictable shifts in comparative advantage across NAFTA borders.

Table 5: Government Payments as a Proportion of Net Farm Income and Total Personal Income by Region, U.S., 1995-98.

Region	Net Farm *Income*	Personal Income, *All Persons*
	(Percent)	
Northeast	6.34	0.008
Lake States	34.03	0.167
Corn Belt	27.62	0.231
Northern Plains	33.98	1.375
Appalachia	5.46	0.049
Southeast	4.78	0.037
Delta	23.24	0.394
Southern Plains	27.01	0.187
Mountain	22.29	0.191
Pacific	7.02	0.046
United States	18.29	0.125

Source: Moss (2001). Includes AMTA, loan deficiency, and disaster payments.

markets in Mexico to U.S. citrus, and opened some U.S. markets to live hog and avocado exports from Mexico. Because of favorable labor costs and environmental laws, Mexico could be in a position to feed U.S. produced coarse grains and soybean meal to poultry, hogs, and beef cattle, which in turn could be processed locally into case-ready products for export to the U.S.

INDIVIDUAL COUNTRY ADJUSTMENTS

We now turn from this overview to adjustment impacts of freer trade under NAFTA for member countries.

United States

Direct payments have been the principal income support for U.S. agriculture in recent years and their phase out would be sorely felt by grain and cotton producers. Government payments have been a sizable portion of farm income in the Lake States, Corn Belt, Northern Plains, Delta, Southern Plains, and Mountain regions (Table 5). The impact of loss of transfers that could attend freer trade is less onerous when direct payments are expressed as a proportion of personal income of all people in each region. Greatest losses would

Table 6: Estimated Annual Welfare Impacts of Freer Trade Under NAFTA for Canada and the United States, 1997.

Commodity:	Country	
	Canada	*United States*
	($ million)	
Dairy		
Annual benefits to:		
Consumers	720	-437
Producers	-636	442
Nation	84	5
Eggs		
Annual benefits to:		
Consumers	174	-52
Producers	-141	53
Nation	19[a]	1
Sugar		
Annual benefits to:		
Consumers	-77	1,450
Producers	10	-1,200
Nation	-67	250
Total (above only)		
Annual benefits to:		
Consumers	817	961
Producers	-767	-705
Nation	36[a]	256

Source: Tweeten, Sharples, and Evers-Smith, pp. 7-10.
[a]Subtracts production quotas rent value

be in the Northern Plains and Delta regions where payments were 1.4 percent and 0.4 percent respectively of personal income in 1995-98 (Table 5).

The Southeast would be a greater loser from commodity program and trade liberalization than indicated by Table 5. The focus on payments (expanded massively under the 1996 farm bill and subsequent “emergency” legislation) masks the importance of sugar, peanut, and tobacco programs, which were not reformed and do not rely on payments. A relatively few U.S. farmers produce cane sugar, and each would face major adjustments with termination of the sugar program (see Table 6).

U.S. producers would be losers ($1.2 billion annually) from termination of the U.S. sugar program. The seemingly incongruent conclusion that Canada would lose from termination of the U.S. sugar program is explained by the fact that world prices (paid by Canadians) for sugar would rise. Because Canada is a major net importer of sugar, losses to Canadian consumers from higher world sugar prices more than offset gains to the few Canadian producers. Hence, deadweight losses accrue to Canada from sugar market liberalization in the United States.

Numbers in Table 6 hide the trend to more equal prices for dairy and poultry products in the United States and Canada since 1997. In part, that movement is the product of a declining Canadian dollar relative to the U.S. dollar. Competitiveness is influenced by production costs as well, and data in Table 7 indicate an advantage for U.S. dairy producers. Costs per liter of milk in the West are lower in California than in Alberta, and in the East are lower in New York than in Quebec.

Canadian producers would lose and U.S. producers would gain from termination of the Canadian dairy quota system. Overall, consumers gain more than producers lose in Canada and the United States from liberalization of dairy, egg, and sugar markets. Less rent seeking (lobbying, etc.) and administrative costs with liberalization could raise the national gains from liberalization well above the totals shown in Table 6.

Mexico's National Agricultural Insurance System paid up to 30 percent of insurance premiums for its farmers but Canadian Prairie provinces and the central government paid nearly 70 percent of crop premiums and the U.S. government paid up to 60 percent of crop insurance cost for its producers in year 2000 (Knutson et al., 2001) . An end to resource and trade distorting crop insurance subsidies would especially target the U.S. Southeast and Plains states (Table 8). Costs average nearly double premiums for crop insurance from 1981 to 1999. Loss ratios were especially high in Arkansas, Texas, and Georgia, and these and other Southeast states would especially feel the consequences of ending subsidies.

Table 7: Cost of Milk Production.

State or province	(C$/liter)
West	
Alberta	0.37
British Columbia	0.48
Washington	0.35
California	0.29
East	
Quebec	0.42
Ontario	0.45
New York	0.37
Minnesota	0.32

Source: Jeffrey (1992)

Table 8: Ratio of crop insurance indemnities to premiums, 1981-1989.

State	(Loss ratio)
Arkansas	2.97
Texas	2.72
Gerogia	2.68
N. Carolina	2.40
N. Dakota	2.16
Florida	2.12
United States	1.88

Source: Makki (2000)

The paper by Zahniser et al. (February 2001) presented at this workshop provides data helping to identify farms most likely to be disadvantaged by less commodity program and trade interventions. U.S. farms with sales of less than $100,000 receive most of their income from off-farm sources. These small farms, which account for most U.S. farms, are helped little by farm programs. Most such farms would hardly miss commodity programs.

Farms with annual sales of over $250,000 are highly efficient, have incomes and wealth in multiples of those of non-farmers, and receive most of their income from crop and livestock receipts rather than from government. Land prices would fall with termination of programs, threatening the solvency of some highly leveraged farmers in this class. Larger farms accounting for two-thirds of farm output can afford risk management strategies for survival,

and would fare well on average without programs after coping with a difficult period of adjustment to lower land prices.

In 1998, 4 percent of all farms were judged to be financially vulnerable with negative cash flow from farming and debt-asset ratios exceeding 40 percent. Many of these 80,000 farms would fail without commodity programs, but most are likely to retire, expand size, or obtain more off-farm employment to survive with or without taxpayer support. Financial vulnerability after accounting for off-farm income is especially high among mid-size farms with annual crop and livestock sales of $100,000 - $250,000, the farming-dependent 171,469 farms accounting for 8.3 percent of farms and 17.1 percent of farm sales in 1998. They depend heavily on government programs (71 percent received payments versus 36 percent of all farmers in 1998), are too large to earn much off-farm income, and too small on average to be efficient producers. These vulnerable farms could be helped at relatively low cost to taxpayers through targeted credit, direct payment, and adjustment assistance programs.

Canada

The impacts of freer trade on farm structure in most sectors in Canada would be very similar to those in the United States. As in the United Sates, Canadian farm families on average receive the majority of their income from off-farm sources. While larger farms still receive the majority of income from farming, that share is falling over time. Canada has large numbers of small farms, but their share of farm output will continue to fall in part because their propensity to invest is only 2 percent out of long-term assets (sales $10,000-$24,999) compared to 7 percent out of long-term assets on large farms with sales of over $500,000 (Canadian dollars, Statistics Canada, Farm Financial Survey 1998). The low rate of investment on small farms suggests that these farms will continue to be small and have no real prospect for generating significant farm family income in the future.

Agricultural support in Canada has a significant provincial government component. As such, the level of support varies across Canada. In general, the safety net programs in Quebec and Ontario provide greater support for their grains, oilseeds, and red meat sectors than do those in Western Canada. Second, the level and form of support varies considerably across commodities. In

Canada, the red meat sector (beef and hogs) has operated with little support for the past 15 years (except in Quebec). The grains and oilseed sector on the prairies has experienced a significant reduction in subsidies. In 1986, the PSE peaked at over 60 percent for wheat[3]. Prairie grain farmers now receive minimal support in the form of crop insurance, the NISA (Net Income Stabilization Act) program allowing farmers to set aside 2 percent of gross sales matched by government contributions and interest subsidies in favorable economic times for use in later unfavorable times, and AIDA (Agricultural Income Disaster Assistance Program[4]). Current programs have provided a wheat producer subsidy equivalent (PSE) of 10-12 percent in the past few years.

The poultry and dairy sectors operate supply management schemes. Farmers of a commercial size are required to have a quota to produce poultry, eggs, and milk. Beyond a minimal level of imports, the domestic industry is protected from foreign competition with prohibitively high import tariffs. For these sectors, there is currently little difference between Canadian and U.S. prices and at times the U.S. prices have exceeded Canadian prices. Given that the U.S. price is the reference price for poultry, this implies the Canadian sector is relatively competitive with the U.S. industry. In dairy, however, the U.S. industry is also protected, suggesting that prices in both countries could fall considerably in a free trade scenario extending beyond the three countries in NAFTA. Based on landed product prices from New Zealand, the PSE in this sector is close to 50 percent. The horticultural sectors in the United States and Canada operate with very modest support, but with some eligibility in Canada for NISA and crop insurance.

Overall, governments have vastly reduced economic support for the agricultural sector in Canada. The transition to free trade in most cases will be an acceleration of trends currently apparent in each sector within agriculture. If the United States removed all support for grains and oilseed producers, producers of these commodities in Canada would be slightly better off than they are now. In Western Canada these better conditions would slow the current trend

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[3] Surpluses accumulated in several insurance funds in Canada, hence the effective government subsidy was below 60 percent.

[4] AIDA was extended for three years and converted to the Canadian Farm Income Program (CFIP) in 2000.

toward diversification in crops, and the shift to livestock production. Hard spring wheat production would continue to be an important crop in the drier regions. The elimination of the Canadian Wheat Board, combined with the deregulation of grain transportation, would result in a greater although sporadic flow of wheat into the United States domestic market. Given the historic pattern of grain disputes, Canadian shipments of grain during low price periods would still cause trade friction. The prospect of antidumping suits based on cost of production would likely continue to be a threat to obstruct trade within the existing trade agreements. The only way to eliminate this threat would be to eliminate this protectionist provision within trade agreements.

The hog industry in Western Canada would continue to expand under freer trade. The hog industry, particularly in Western Canada, has operated with very little support for a number of years. The reduction in grain transportation subsidies in 1996 resulted in significant growth in hog feeding. The pork-processing sector in Western Canada has also recently expanded and is now owned by the same multinational corporations that operate in the United States. The net result has been a decrease in hog exports from Canada with some hogs produced in North Dakota now being processed in Manitoba. A free trade scenario would see continued growth in this sector in Western Canada. The trade in live hogs will be governed by the processing capacity relative to the growth in hog production. The safety net program for hog production in Quebec has allowed many smaller farmers to remain in production. In a free trade environment, many of these producers would exit the industry. Given that environmental regulations will make building permits difficult to secure for larger operations, hog production could decline somewhat in Quebec.

Some transition of Canadian grain farms into beef will create more mixed grain/beef operations in the next decade. If the elimination of the farm payments in the United States resulted in growth in the U.S. beef herd and somewhat higher grain prices, then lower calf prices and slower growth in cow-calf production could prevail in Western Canada. In Eastern Canada the effect on the cow-calf sector is very unclear because much depends on the dairy sector. If there were significant reduction in the large dairy sector, pasture and forage production could shift to beef production. Cattle feeding in Western Canada has expanded significantly in the past decade. Feedlots cur-

rently operate very much in a free trade environment. Both the feeding sector and the processing sector likely will continue to expand as the cowherd grows. The expansion of the Canadian industry will almost certainly continue to be a trade irritant for the U.S. beef industry. With freer trade, real or alleged dumping below the cost of production would be a credible threat for trade action.

The poultry and egg price difference between Canada and the United States is now very modest and, at times, reverses. Despite nearly price parity, Canadian quota values remain large. Thus, although the Canadian industry would not undergo a major price change in a free trade environment, the industry would undergo a major restructuring at the farm level, the processing level, and at the regional level. Quotas have tended to keep enterprise size somewhat uniform among farms. In the absence of supply management, new producers would tend to construct and operate with much larger units. There would be little incentive to consolidate smaller units; rather these units would continue to operate until they are fully depreciated. The current poultry and egg supply management system is governed by provincial agencies and is close to self-sufficiency in each province in Canada. In the absence of supply management, new regional and international markets would develop. If this industry follows the hog industry, this expansion would likely occur in Manitoba or Saskatchewan. The implication for trade is very unclear in this industry. Much depends on how regional markets develop.

Anticipating implications of free trade for the Canadian dairy sector is the most interesting and challenging. Although it has similarities to the supply managed poultry sector, dairy differs in several important respects. First of all, with international free trade the industry would have to compete with much lower priced New Zealand exports. Second, dairy production relies on forage acres as a production base, and must have sufficient acres to spread manure. Third, the U.S. industry would undergo a major structural change at the same time. Finally, the substantial transport costs, particularly for fluid milk, suggest the development of smaller regional milk sheds. Much lower prices would induce larger production units, displacing mid-size dairy farms. At some scale the production units would be beyond a traditional family farm and may be corporately financed and operated. As in the United States, large dairies producing for cured milk products are likely to locate in less populated areas near

Table 9: Main Agricultural Products (annual value of production, 1997-99).

	Million U.S.$	Percent		Million U.S.$	Percent
Cattle	3,407	13.2	Peppers	708	2.7
Poultry	3,313	12.9	Sorghum	683	2.7
Corn	2,914	11.3	Alfalfa	602	2.3
Milk	2,648	10.3	Potatoes	456	1.8
Hogs	1,571	6.1	Avocados	456	1.8
Sugarcane	1,169	4.5	Wheat	414	1.6
Tomatoes	905	3.5	Mangos	299	1.2
Grass	785	3.0	Bananas	290	1.1
Coffee	770	3.0	Oranges	248	1.0
Dry beans	698	2.7	Onions	236	0.9
			Subtotal	22,572	87.7
			Total	25,747	100.0

Source: Secretaria de Agricultura.

low-cost forage and concentrate supplies, while dairies for fluid milk use are likely to locate in the East nearer population centers. An alternative scenario is for the sector to operate much as it does today, producers working with existing processors maintain something like the status quo, with lower rents for producers. Trade in dairy products would increase.

Mexico

Grains and oilseeds, with 14.6 million hectares, account for 71 percent of arable land. Of this, oilseeds only represent 2 percent. The surface area devoted to these crops has remained fairly constant over the past 20 years. Land planted with forage, fruits, and vegetables, on the other hand, has increased considerably over the same period of time; however, their share of total agricultural cropland is still small (2 percent for vegetables and 4 percent for fruits). Mexican agriculture had annual sales averaging U.S. $25.7 billion in 1997-99. Cattle, poultry, corn, and milk account for almost half the total value of production. The 20 products shown in Table 9 account for 87.7 percent of the value of Mexican agriculture.

The composition of Mexican agriculture is not likely to show dramatic changes in the next 20 years. Conventional wisdom holds that Mexico's agricultural potential lies with expanding production of fruits and vegetables, and

that an important production shift is expected from grains to fruits and vegetables with freer trade. This trend has not been observed in the past and is not likely to take place in the future. With a mere 6 percent of total arable land devoted to the production of fruits and vegetables, Mexico already amply supplies its domestic market and exports significant quantities to the U.S. market. A doubling in fruit and vegetable production would quite likely severely depress prices because the demand for these products in both the domestic and foreign markets seems to be well met with current supply sources. The United States already imposes very low import tariffs on Mexican fruits and vegetables; thus, substantially higher exports due to trade liberalization are not expected. Furthermore, agronomic, water, and weather conditions represent a constraint for switching grain land to fruit and vegetable production (14.6 million hectares, 71 percent of arable land, currently engaged in grain production could hardly be employed for other purposes). Finally, the impact on the Mexican and U.S. vegetable markets of increased investment in U.S. greenhouses for vegetable production is yet to be determined. In any event, it represents an important risk for Mexican vegetable exports to the United States.

With freer trade, grain production likely will maintain current or even slightly higher levels. It is often argued that Mexico lacks comparative advantage in the production of grains. However, grains are produced under a wide range of production systems, locations, and agronomic and weather conditions; thus, it is inappropriate to generalize the concept of comparative advantage when referring to Mexican grain production. In fact, some competitiveness studies of Mexican agriculture using the Policy Analysis Matrix methodology indicate comparative advantage for grain production in several Mexican regions (Salcedo, 1989 and 1993; Colegio de Posgraduados, 1992).

Over the past ten years, important technological innovations have been adopted in grain production in Mexico. For instance, in the La Barca region in the state of Jalisco, farmers have been able to attain corn yields as high as 15 tons/ha under rainfed conditions. In the state of Sinaloa, high yielding seeds, precision seeders, and low or no-tillage practices have increased farmers' competitiveness. New technologies in grain production also will continue to be adopted in other regions of Mexico. However, 46 percent of all corn farms still produce for self-consumption. On those farms, decisions are not sensitive to

price incentives. Such farms will maintain current levels of corn production despite changing economic incentives under free trade. Mexican corn production is primarily white varieties, which are preferred by consumers due to their taste and consistency in tortilla making. Corn imports, on the other hand, are yellow varieties having poor qualities for tortilla making. As income increases, consumers will be willing to pay a premium for white corn, thereby fostering domestic production.

Mexican grain processors, like processors elsewhere, are establishing closer relationships with farmers to guarantee a certain domestic supply of a specific quality of grain. Processors have provided farmers with new technologies, credit, and a fixed price for their crops. These initiatives have had mixed results, and they are likely to be fine-tuned for success in the future.

Perhaps the most conclusive evidence for expecting Mexico to produce current or slightly higher levels of grains in the next 10-20 years is that, over the past five years, under highly adverse conditions (an overvalued peso, high interest rates, near record low international prices, quite low import tariffs including a zero import duty in the case of sorghum, high input costs especially for diesel and agrochemicals, and record low domestic subsidies) grain production has actually increased over levels of the 1980s and early 1990s. Grain production in the future, however, will probably take place in a different farm structure, as explained below.

With respect to future livestock production, it is worth noting that trade policy in the past decade has varied from highly protectionist (poultry) to free trade (cattle and beef). Thus, in the case of cattle and hogs, perhaps current or slightly higher levels of production are likely to be observed in the future. Some of the broiler, hog, and cattle production will be offered for export especially to the United States under freer trade. A huge potential has not yet been exploited for cattle and milk production in the Mexican tropics. If investors were to take advantage of this potential, cattle and milk production could show even more impressive growth. In the case of poultry, a sector that has been highly protected from imports, over the past 20-30 years commercial companies have vertically integrated and have consolidated. Poultry has actually been the fastest growing subsector in agriculture (over 7 percent growth per year in the past

15 years). The current firm consolidation trend will facilitate continued growth in the future. In summary, the present composition of agricultural production and land use in Mexico is not likely to change in the next 10-20 years with freer trade.

Mexico has over twice as many farms as the United States, but differing definitions of farms precludes precise comparisons across countries. The 1990 Agricultural Census of Mexico reported 3.8 million crop farms, 1.3 million cattle ranches, 1.3 million hog farms, and 2.3 million poultry production units. Minifundia (small farms) are prevalent in Mexican agriculture; the average farm size is only 8.1 hectares. Sixty percent of all farms possess 5.1 percent of arable land, and their average size is only 0.7 hectares. The average size of farm is only 18.5 head for cattle farms, and 6.4 head for hog farms.

To interpret these numbers, it is important to note that the 1990 Agricultural Census classified as farms even those rural households with only a couple of backyard cows or hogs. Census data in Mexico are not reliable because respondents under-report farm size. Even though the 1992 Agrarian Law maintained earlier farm size ceilings, farmers have found ways to operate larger sized farms, either by renting additional land or by making several relatives or friends the legal owners of the farms. The size of some grain farms in the North and Northwest is several hundred hectares, and some farms are as large as 5,000 hectares.

It is interesting to see that, unlike the observed trend towards fewer farms in the United States, census data in Mexico reported an increase of 763,099 farms from 1980 to 1990. Although there are no official data with respect to what has happened over the last decade to the number of farms and farm size, direct observation, field studies, and interviews with representatives of several farmers organizations support the hypothesis that farm numbers have decreased and farm size has increased.

In the BajNosp region (the main pork production area), farmers estimate that the number of hog farms has declined 70 percent over the past 20 years. Some ejidos in Northern Mexico (Chihuahua, Tamaulipas) that used to produce cotton, sorghum, and corn are now renting up to 90 percent of their

agricultural land (compared to 10 percent 20 years ago). Also, some ejidatarios from Northern and Central Mexico have permanently abandoned their land and have migrated either to urban areas or to the United States.

Number of farms has also declined in the poultry and dairy sectors (since the 1970s), and in the cattle sector (especially during the 1980s, when import tariffs for meat were eliminated). The financial stress brought about by the 1995 peso crisis in the Mexican economy, coupled with agricultural policy reform initiated since the late 1980s, which rapidly opened the agricultural sector to foreign competition and drastically reduced subsidies, forced many farmers out of business.

In the next 10-20 years, the trend towards fewer and larger farms observed in the 1990s will continue in the livestock and grain sectors. These trends will be speeded by freer trade. Given current low government subsidies, achieving economies of scale becomes crucial for Mexican farmers to compete with grain imports. Larger farms will have access to credit necessary to introduce technological innovations for becoming more competitive. Commercial banks are not interested in lending to small farmers, since banks are just overcoming the huge problem of past-due portfolio they faced over the last five years. Also, banks face high administration costs in agricultural lending, and they regard farming as a highly risky business, especially due to the uncertainty of domestic agricultural policies. Even the government agricultural bank (Banrural) has reduced its credit programs and faces a large past-due portfolio. Still, as mentioned earlier, many small farms whose production is for self-consumption will quite likely remain "in business." For many middle-sized farms, future financial viability is at high risk. Some of these farms, with proper non-distorting policies, could remain operating in the next 10-20 years. These policies mainly include technology transfer, access to credit for production and land buying, development of farmers organizations, providing market information, and investing in production and marketing infrastructure. Other middle-sized farms, however, because of agronomic and weather restraints and lack of economies of scale, will be forced out of the market.

A final fact that points towards fewer and larger farms in the future is the current age of most farmers, which probably ranges between 50 and 60

years. In the next 20 years these people will stop farming, and their sons and daughters are not likely to take up farming. Farmers offsprings lack a farming culture: they have gone to school in urban areas, have pursued non-agricultural careers, and are not interested in becoming farmers. An additional factor reducing the number of farms in the hog sector is the possible implementation of strict sanitary regulations in those states where foot and mouth disease is still present. The enforcement of strict regulations would probably force a large number of rural households to do without their backyard animals.

Weather, agronomic conditions, and water availability, rather than trade liberalization, will be the main factors that will determine the location of production in the next 20 years. Irrigation has played a major role in Mexican agriculture over the past five decades, and it will be even more important in the future as Mexico faces increased water shortages and water contamination. Mexico ranks 6th in the world by largest number of irrigated hectares (around 6 million hectares or 20 percent of arable land). Most of the irrigation infrastructure was developed in the Northwest during the 1950s and 1960s. Some 60 percent of agricultural land in the Northwest is irrigated, compared to 9 percent in Central and Southern Mexico. Specialists expect that, in 2025, 30 percent of today's irrigated land in Mexico will face water problems, which would indicate a possible reduction in agricultural production in the Northwest and to a lesser extent in the BajNosp region. These regions also face salinization problems, which already affect around 300,000 hectares. Increased salinization will impede agricultural production on some farms.

It is worth noting, however, that current irrigation systems are quite inefficient, and 50 percent of the water is actually wasted. Thus, irrigation efficiency could be greatly improved, and salinization could be overcome through parcel drainage, but this calls for substantial investment which neither the government nor farmers may be able or willing to make. In the case of vegetables, however, the increasing trend toward the use of greenhouses reduces the importance of natural conditions in determining the location of production.

Factors such as cheaper labor costs could become more important. de Janvry (1996, p. 2) contends that dislocations of labor from NAFTA between the United States and Mexico were less than anticipated in part because Mexico

had substantially reduced trade barriers when it joined the General Agreement on Tariffs and Trade (GATT) in 1986 and reduced its import duties unilaterally to 10 percent from the prior 25 percent average. Although experts had predicted massive depopulation of ejidos as Mexican corn prices dropped and imports from the United States displaced domestic production, de Janvry (p. 5) contended displacement was modest. A reason is that relatively few people from the ejido depended on corn sales for their livelihood. In the longer run with more open trade, job creation in manufacturing and other industries is likely to more than offset employment loss in ejidos caused by NAFTA. Thus more open trade generating off-farm jobs could reduce migration of workers from Mexico to the United States.

TRADE DISPUTE TENSIONS

Trade disputes arising from a change in the structure of agriculture per se are likely to be rare. Countries will, however, continue to respond to real and perceived unfair trade practices. Governments will often champion the protectionist measures proposed by politically powerful groups that, under freer trade, will see their incomes decline. Trade conflicts in a free trade environment are likely to be especially frequent over anti-dumping cases brought when commodity prices are low. As long as access to antidumping (AD) and countervailing duty (CVD) trade action exists within trade agreements, then a free trade environment cannot exist.

NAFTA offers what de Janvry (1996, p. 7) refers to as "equitable and expeditious" dispute settlement. Numerous, even bewildering, trade dispute settlement procedures are available. Each country has its own AD and CVD laws. National AD duties may be imposed if imports are being sold below "fair value" and causing or threatening to cause material injury to a domestic industry (USDA, August 1999, p. 21). CVD duties may be imposed on imported goods to offset subsidies provided to producers or exporters and causing material injury to a domestic industry. Lack of uniform rules among countries and arbitrary judgments of terms such as "fair value," "subsidies," "cost of production," and "injury" cause frictions. Most NAFTA trade disputes have been settled at early stages by negotiations among affected parties. Institutional capacity of the three NAFTA countries has been strengthened for intergovernment nego-

tiations, interindustry negotiations, and technical assistance. The U.S.-Mexico agreement on tomatoes, for example, a response to U.S. AD action, was ultimately settled through an intergovernment agreement between Mexico and the United States to set temporary minimum prices on Mexican tomatoes exported to U.S. markets. More open trade under NAFTA undoubtedly will create new frictions and hence new challenges for dispute settlement procedures. A potentially divisive issue is sanitary and phytosanitary (SPS) standards. Some progress has been made through the NAFTA Committee on Sanitary and Phytosanitary (SPS) measures (USDA, August 1999, p.23).

Cattle and hog trade between Canada and the United States is relatively free, and two-way trade between the two countries in poultry and poultry products has increased markedly. But SPS (Newcastle disease) concerns sharply curtailed Mexican exports of poultry to the United States. Following negotiations, arrangements have been made to produce and export to the United States poultry and poultry products and swine from selected regions in Mexico.

Concerns regarding growth hormones, antibiotics, genetically modified foods, diseases, organic foods, and synthetic chemicals could intensify with greater trade among NAFTA countries. Canadian dairy and poultry and eggs producers and American sugar producers are likely to use means available to slow or even stop trade. In this effort, they will receive support from numerous non-governmental, environmental, labor, and social organizations (NGOs) as evident in protests against the World Bank, International Monetary Fund, and the World Trade Organization at Seattle in late 1999 and Prague in year 2000. Thus adequacy of rules and dispute settlement procedures are of worldwide importance and are not restricted to NAFTA.

GOVERNMENT AND PRIVATE SECTOR ACTIONS TO REDUCE TRADE TENSIONS AND THEIR CONSEQUENCES, AND TO EASE TRANSITION TO FREER TRADE

Probably the most important issue to reduce trade disputes and to ease the transition toward complete trade liberalization is putting into place similar non-trade-distorting agricultural policy instruments in the three countries. However, disparate priorities and political concerns, the absence of reliable indica-

tors for Mexican agriculture, and budgetary constraints may impede efforts to establish a truly common North American agricultural policy. Nonetheless, even if viewed as a long-term goal, each government can begin to adopt policies that move toward such a commitment.

Governments can do much to reduce trade tensions. Decoupled direct payments can help producers adjust to more open markets. Such payments can facilitate transition from protected to open markets while having only a very small impact on output and trade (Westcott and Young, 2000). Governments can play a role in reducing the social cost of the transition toward freer trade. The United States at times has been too quick to apply CVD and antidumping measures. The situation is different for Mexico, where the government needs to develop its ability to appraise and respond to unfair trading practices. However, there will be less reason to protect against dumping in Mexico if the United States reduces loan price supports and crop insurance subsidies that cause overproduction and prices in world trade below that of a competitive market. And all countries need to forego export subsidies, such as the U.S. EEP, if trade frictions are to be reduced among NAFTA partners as well as other countries. Consumers and taxpayers as well as producers could be considered in antidumping and countervailing duty cases. Similarly, consumer as well as producer interests could be represented on trade grievance and mediation panels. Procedures for calculating what is "dumping" need to be clarified.

Another problem in Mexico is that regional agricultural markets are not well developed. Several inefficiencies still exist (inadequate storage and transportation infrastructure, monopolistic power, lack of information, excess influence of middlemen, ineffective price transmission, etc.). Also in Mexico, macroeconomic stability (bringing inflation and interest rates in line with those prevailing in the United States and Canada), and a competitive exchange rate are essential in easing the transition toward freer trade.

More science and education is needed to address SPS issues not only in NAFTA but in other countries as well. Restrictions on trade for SPS reasons can often be traced to unwarranted fears of consumers "educated" by special interest groups to protect domestic producers. A public educated regarding SPS from a strong base of sound science coupled with regulatory procedures to

identify real threats to food safety can improve public trust and chances for making competent regulatory decisions.

Even with the above measures, some farmers will be forced out of agriculture under freer trade. Because time is required for the non-farm economy to absorb released labor, a transition program, including basic education, job training, and investment in rural development projects, can ease adjustments. In the United States, the Transitional Adjustment Assistance (TAA) program established in 1993 could be expanded (USDA, August 1999, p. 39). The TAA program provides job training, career counseling, and financial allowances to workers whose employment is diminished as a result of trade with Canada and Mexico. TAA has been of little help to farm workers, however. Of 1,794 certifications of groups of workers eligible for benefits to 1998, only 19 or 1 percent were in agriculture (USDA, August 1999, p. 39).

CONCLUSIONS

Freer trade under NAFTA could speed structural adjustments already underway. Farm types and areas most affected in the United States give insight into farms likely to be affected in other countries in the absence of adjustment assistance from the public sector:

- sugar, tobacco, and peanut farms;

These farms have been especially favored by safety net programs.

- Southeast and Plains states farmer;

Farmers in these states have especially benefited from price support and federal cost-sharing of crop revenue insurance programs. From 1981 to 1999, the ratio of losses (indemnity payments) to premiums paid by producers averaged 2.0 for the several states in the Southeast and Great Plains. Loss ratios have averaged over 2.0 for cotton, tobacco, peanuts, sorghum, and wheat and are much lower for corn and soybeans. Up to an estimated 25 million acres currently in crops would be grass, trees, or other non-crop uses without safety net payouts. Many of those acres are in the Southeast and Plains states. Agribusinesses also would experience a decline in economic activity in the Southeast and Plains states.

- mid-sized farms with sales of $100,000 to $250,000;

These farms would be especially hard-hit because many are too large to allow much off-farm work for the operator and spouse, but too small to achieve economies of size essential to compete with other farms. The 171,469 farms in that sales class classifying themselves as farmers in 1998 averaged only $10,149 of household income from crops and livestock. Without the $11,314 of government payments, they would be financially stressed indeed despite averaging a very substantial $669,458 of net worth. Some of that net worth in real estate would be lost as noted below.

- landowners.

Farmland prices would fall in the absence of a farm safety net. Landowners would lose but new entrants to farming would face lower entrance barriers and mortgage payments.

- livestock and poultry feeders;

Favorable commodity support loan rates and crop insurance assistance from government induced production of crops that in turn lowered crop prices and hence feed costs to feeders. Net economic benefits would accrue from an end to market and trade distortions. Thus net gainers could in principle compensate losers with decoupled payments and adjustment assistance so that everyone would be better off. The challenge is to provide equitable and efficient programs to provide such compensation.

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Iowa Farm Leader

Varel G.Bailey

Is NAFTA driving structural change? Or is structural change driving NAFTA?

- structural changes in agriculture are driven by consumers and enabled by information technology;
- with liberalization of trade either products and services move across borders, or people move, or production moves;
- policy attempts to protect segments of an industry, e.g., small farms, generally perpetuate or create uncompetitive farms, and result in production moving, (first intra-national, then international);
- policy attempts to protect segments of an industry in a global market environment are ineffective, very expensive and disruptive to trade.

There are four major drivers of structural change in agriculture today. Each one is as powerful as mechanization, hybridization, inorganic fertilizers and pesticides which came before. Those earlier forces occurred one at a time. These new forces are happening simultaneously—thus the avalanche of change:

- microelectronics and communications;
- genetic engineering;
- globalization; and
- consumer empowerment (most powerful), "Better, Faster, Cheaper! With each eating experience!"

Changes in the structure of agriculture are driven by consumer's recognition that consumer power can change:

- the environment e.g., Greening the World;
- worker conditions e.g., garment sweat shops;
- food safety e.g., BSE;
- animal husbandry e.g., cage size for layers;
- research and development e.g., biosecurity;
- industry structure e.g., Organic food and Star-link;

- international barriers, including
  - products (dolphin-safe tuna),
  - services (transportation),
  - capital (IMF and World Bank),
  - technology (the "terminator gene"),
  - immigration (smart or wealthy).

Multinational and transnational companies become the focus of animosity for activists:

- they are visible;
- presence in multiple markets provides firms with early warning of change; and
- huge capital reserves or multiple market positions are required to offset political and climatic risks, providing the appearance that these firms are market movers.

Antitrust policy and intervention:

- U.S. antitrust policy is consumer policy, not structural or competition policy. Aggressive anti-trust intervention will result in production moves off shore;
- the underlying issue is lack of ease of business entry and exit, and predatory restraint on innovation as demonstrated in the MicroSoft case.

Solutions for structure changes:

- recognition that a paradigm exists (two systems occur simultaneously, agricultural commodities and differentiated products);
  The rules have changed
  - conservation compliance with Government programs,
  - permits for confinement livestock operations,
  - licenses for hauling manure,
  - Canadian trucks on Interstate highways,
  - Mexican feeder cattle into U.S. feedlots;

  The players are changing
  - hog contracts: White Oaks, Brown, Carroll, Murphy,
  - Smithfield in four years,

- Cargill-Continential, IBP-Tyson, Case IH-New Holland,
- competitor joint ventures, and
- dot.coms;

The goals will change

- market access vs. spot price selling arrangements,
- rapid business entrance and exit,
- producer alliances, horizontally and vertically,
- access to cash register data and demographic cross-referencing,
- the "Consumer is King".

- policy option evaluation platform for public policy development;
- demand chain management technology development;
  - ag database platform; agriculture data dictionary,
  - data "information knowledge" management system engines for the producer level, and
  - production protocol development tools.

Solutions for trade policy problems:

- continuous negotiation platform – virtual or real disputes/policy secretariat;
- extend NAFTA to AFTA, an organization of all American democracies;
- time multinational negotiations to coincide with national elections;
- use AFTA as a politician's excuse for making necessary domestic policy changes;
- work for a world currency buffer system that eliminates speculative "runs" and, exposes domestic fiscal and monetary deficiencies; and
- find a place at the table for "multi-functional" advocates before they become isolation terrorists.

Grupo Maseca

Luis Rolón de-Lasse

Grupo Maseca is the largest producer of corn flour and tortilla in the world. My purpose here is to comment on the farm structure in Mexico.

First, in Mexico we have a different typology of farms by their size and net income than in the United States and Canada because our small farms have less than 5 hectares and represent up to 80 percent of the farmers nationwide. These farms include almost 4 million farmers, which means around 22 million people directly depending on those farmers, living in the rural area. These people are hardly sustained by their farm activity income, so they have to migrate to the nearest city or to the United States, and we think that this is going to be the main dispute issue between Mexico and the NAFTA partners. So the first thing we have to do is to stop this migration, for that is the better way to develop the farmers and their regions.

But how are we going to do that? The answer seems to be simple: We have to educate the farmer, so he can be able to take his own decisions to produce and be competitive in the new scenario, using all the available economic, human and natural resources, from their own stock and from the government.

The main issue that is going to be the first restriction for structural change in our country is *inside the human being*; let me put it this way. Mexico has all these marginal farmers, almost four million, with almost nothing but their land, and a huge human potential. But the potential is dormant; so we need a process to wake up this potential, change farmers attitudes and make things happen. For that we need an external agent, we call him promoter, and we have to teach him a method that is going to facilitate the farmers attitude change. For the success of this process, we have to introduce some key actions:

- the first is *confidence*, confidence among promoter, farmer and all the other actors of the supply or value chain;

- the second is *communication*, both ways, between farmer and promoter;
- the third is *reflection*, that the farmer understands his situation and is willing to change it;
- the fourth is to construct a project which ensures the farmer and the promoter are the major facilitators of the process;
- the fifth is evaluation and feed back of the whole process.

It has been argued that the problem in Mexico is caused by deficiencies in hard technology. But my point is that the main constraint is caused by the soft technologies; the problem and the solutions are inside the human being. If we don't get that point, financial and machinery resources are not going to save the situation, and the poverty in Mexico is going to be deeper. That means that migration will be the main controversial issue in the North America Free Trade Agreement.

Western Agri-Food Institute

Owen McAuley

The question we have been asked to address is what will agriculture and its associated industries look like with genuine free trade within the NAFTA region. Consolidation within agriculture has been proceeding in spite of inadequate freer trade rules and huge government subsidies intended to stabilize the farm sector.

The decline in numbers of farmers in Canada has been dramatic: they represented 33 percent of total population in 1931 and less than 2.5 percent today. Approximately 70 percent of beef processing in Canada is done by 2 firms; three companies control 70 percent of fertilizer output; and five companies dominate food retailing. The trend to more concentrated processing and sales in agricultural and food markets has been accelerating.

In the United States, forty percent of the farms have been lost in the last three decades, despite immense public support to farmers. Four firms dominate the food and the drug sectors. In the EU over the last decade, forty-two percent of farms have been lost despite government largess and free trade within the EU borders. In Europe five firms control 80 percent of fertilizer sales, 70 percent of agricultural chemical sales and, 90 percent of tractor sales.

The trend toward large specialized farms continues. Modern farms tend to be dependent on movement of their output across international borders. Unlike multinational corporations, most farms are individually owned and are unable to offset risk of border closures. As a result, having well-defined and effective rules on trade is essential as farms grow in size and specialization.

Common sense and economics say that agriculture will continue to consolidate as long as technology is cheaper than labour. Subsidies and free trade have not subdued this relationship, nor are they likely to. The trend may be slowed or postponed but it is almost certain to continue. The use of ‘green’

payments under international trade rules appears to be no more than a guise for shielding or mollifying the impacts of one country's industry at the expense of another's. This process will likely continue unless clear rules on "free trade" are established.

I see three distinct paths unfolding:

- commodity based, mass production farm units with standardized products capturing economies of scale. With truly free trade, competitive advantage should determine the most cost efficient regions and producers. This model of production would occur under conditions of thin margins and will require high level, sophisticated risk management;
- consumer driven, identity preserved products which will be delivered from medium sized farms using a high level of management. This production will be organized from the farm level upwards, and tends to exclude large farms because of limited volume requirements of the markets; and
- a "life science, top-down driven economy." The companies that control patents and technology will likely contract their requirements from farmers, providing an assured return but little payoff to the true entrepreneurs. This model implies considerable diversification in products and methods of production.

Just how the industry will eventually unfold will depend on a number of factors:

- how much influence the rural sector and farmers have on lawmakers;
- competition laws and their application to politically manage consolidation, and at the same time provide confidence to individuals that their entrepreneurship is afforded competitive terms of trade; and
- public concerns driven by scientific fact, perception, and by fear will play a very large part in the future structure of agriculture, with or without free trade.

In closing, I want to be clear that I am convinced that free trade will have little effect on the structure of the industry. However, competition laws will have a huge impact on structure of the industry. I suggest that there will be many debates about how these laws are to be written if free trade is realized.

Structure of Farming under Free Trade

Impacts of NAFTA. The impacts of free trade under NAFTA would be substantially different depending on whether farm subsidies were eliminated. That is, without a level playing field in terms of subsidies, the distortions would be large. (Editors note: it is difficult to envision "free trade" in a world where farm subsidies were significant. Free trade and subsidization should be incompatible in economic terms). In addition, the impacts of going to free trade will fall the heaviest on those farmers having the highest subsidy levels. There are early research results suggesting that structural change has been more rapid in Canada in terms of reduced farm numbers than in the US where high levels of subsidies have existed.

Political Influence of Farmers. There was substantial discussion of the issue of whether the political power of farmers has declined. A Canadian view was expressed that farmers' political power had declined under NAFTA. The political power of farmers in Mexico may also have declined, although, this is more difficult to determine because revealed power varies by sector and over time. In the case of the United States, it appears that the political power of farmers either has not changed or may have actually increased. The perspective was presented that as farm numbers decline they may be more sophisticated lobbyists and their political power may increase. This appears to be the case in the United States.

Producer Support for CWB. Producer support for the Canadian Wheat Board (CWB) has declined but it is still there, particularly among smaller and moderate size farmers who are risk averse and desire not to be bothered with marketing decisions. However, political support for the CWB could disappear in a period of 1-5 years depending on the outcome of elections to the Board of directors of the organization, or according to the trade negotiation stance taken by the federal government. A counteracting pressure for retaining the status quo is the continued trade action pressure by the United States which appears to be consolidation support for the CWB.

Attitudes of Farmers. There are farmers who want government to solve their problems and others who want to deal with problems themselves. The former results in increased government involvement in agriculture in terms of subsidies as well as more rules and regulations.

Trade Disputes. There was substantial discussion of the role of NAFTA as a source of trade disputes versus a contributor to resolution of disputes. It was noted that a trade dispute could be argued to be an effort to redress the perception of domestic policy injustice. The perception produces the need to blame someone, which may or may not be justified. Examples include hog disputes between the United States and Canada, wheat disputes between the United States and Canada, sugar disputes among the United States, Canada and Mexico; and the R-Calf cattle imports dispute between the United States and Canada.

There was general agreement that the United States anti-dumping framework makes no sense when applied to agricultural commodities because of the volatile nature of farm markets and prices. In addition, application of dumping rules does not consider conditions in the domestic market or the interrelation of cross-border prices. A comment was made that if dumping were defined as sales below cost, 80 percent of the time there would be dumping agriculture.

Section 3

Competition Under Free Trade

The objective of this section is to review level of competition now, and to analyze if full free trade would produce an effectively competitive industry.

CONCENTRATION AND MARKET POWER IN CANADIAN AGRIBUSINESS

James Rude and Murray Fulton

INTRODUCTION

A long-held belief in industrial economics is that extending the size of the market reduces concentration and diminishes the ability of firms to exercise market power. At its simplest, this proposition stems from the idea that larger markets will be able to support a greater numbers of firms, and that the presence of more firms leads to more competitive pricing. This belief has had particular application in the area of trade. Trade economists have a long history of assuming that open borders help discipline monopolistic type behavior in domestic markets (Bhagwati, 1965). For instance, in a country with import restrictions, a non-competitive industry will be able raise prices without fear of foreign competition. In small countries the problem may be made worse by the fact that the size of the domestic market is such that only a small number of firms operate, often at less than minimum efficient scale. Open borders, however, provide disciplines on the domestic firms' pricing behavior and increase the size of the market, both of which should serve to reduce concentration and decrease firms' abilities to exercise market power[1].

[1] Market power is the ability to establish a price that exceeds marginal cost. In general, we define competitive behavior as the absence of market power. See Sutton (1991) for examples of the literature on the connection between the extent of the market and market concentration.

Canada has a small, relatively open economy and for the most part its agricultural producers, processors, and input providers face world prices and do not exercise market power on world markets. In this context, trade liberalization was seen as a force in promoting competitive behavior. Indeed, the Canada/U.S. Trade Agreement (CUSTA) of 1989, and later adding Mexico in the North American Free Trade Agreement (NAFTA), was viewed as a way of expanding the market, achieving economies of scale and reducing concentration (Harris and Cox, 1983). The story outlined above is consistent with older theories of industrial organization that are structured around the Structure-Conduct-Performance paradigm (for example, Bain 1968). More recent theories of industrial organization, however, have stressed that increased market size is no longer seen as always guaranteeing less concentrated markets (Sutton 1991). As well, the positive relationship that has been assumed to exist between concentration and the exercise of market power has been increasingly questioned in the industrial economics literature.

The purpose of this study is to examine the issues of whether larger markets result in greater concentration and whether greater concentration results in a greater exercise of market power. The focus of the study is the Canadian agribusiness sector over the period 1983-96. Particular attention is paid to the signing of CUSTA, since for some agricultural industries this agreement signaled a significant expansion of the market.

The paper is structured as follows. The next section addresses the issue of market concentration in the Canadian agribusiness sector. The section begins with an examination of the link between market size and market concentration. This section then presents empirical data on concentration ratios in a number of agricultural sectors. The third section of the paper examines the link between market structure and market power, first from a conceptual perspective and then from an empirical perspective. The fourth and final section of the paper discusses the implications of these results and options for research with regard to the competitiveness in Canadian agriculture.

IS AGRIBUSINESS BECOMING MORE CONCENTRATED IN CANADA?

The first step in determining the concentration of an industry is to define the relevant market. As Stigler (1982) laments, economists have neglected market definition both in theory and empirical application. The usual approach is to define the limit of a market as a break in the chain of substitutes by considering cross elasticities of demand and supply. Legal definitions of relevant markets have emerged in the U.S. Department of Justice *Merger Guidelines*, and in a similar set of Canadian *Merger Guidelines*. These definitions attempt to measure the influence of potential substitutes on profitability to help delineate markets.

Most empirical studies of market concentration use data collected by national statistical agencies. In both Canada and the United States the basic system of categorizing the output of business establishments by industry or product line is the Standard Industrial Classifications (SIC)[2]. SIC definitions become progressively narrower with successive additions of numerical digits. For example, the Canadian food sector is defined by SIC 10, while meat and meat products (excluding poultry) is defined by SIC 1011. Publicly available data on industry concentration is typically limited to the four-digit level of aggregation.

Relevant markets do not necessarily follow a national four-digit SIC delineation and questions of relevant geographic markets and the appropriate degree of aggregation raise problems with national-based measures of concentration. For instance, when trade is important, the question arises of whether national definitions of concentration are relevant. Furthermore, four-digit SIC data do not distinguish between vertical components of an industry. For example, the primary processing of a product may become more concentrated at the same time that further processing is becoming more fragmented with niche markets.

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[2] For data prior to 1997 Industry Canada does attempt detailed concordance between U. S. and Canadian industrial classification systems. A new industrial classification system for North America, North American Industrial Classifications System (NAICS) was introduced in 2000 but to date very little historic data is supplied.

These data issues are important for the empirical examination of concentration and market power in the Canadian agri-food industry. The lack of data on relevant markets and on concentration measures that span international boundaries makes the drawing of conclusions about changing concentration and market power difficult (Palsson and Monteiro 2001).

Leaving the problem of defining the relevant market aside, what is the impact of increasing the size of the market on concentration? This question is particularly relevant when considering the impact of trade liberalization, since one of the major impacts of economic integration through trade liberalization is a larger market. At first blush, a larger market should result in less concentration, since the market should now be able to support more firms. Sutton (1991), however, cautions that increased market size may not always result in less concentrated markets. The reason lies in sunk costs, costs that cannot be recouped once they are incurred, even if production is halted. The presence of sunk costs means that for firms to be profitable, price needs to be raised above marginal cost, typically by reducing the amount of competition (i.e., the number of firms). Sutton shows that while an inverse relationship exists between market size and market concentration when sunk costs are exogenous to the firm, this relationship does not hold when sunk costs are endogenous. Sutton identifies two forms of endogenous sunk costs, advertising and research and development (R&D), that are likely to place a lower bound on the level of concentration as market size increases. Concentration has a lower bound because companies typically find it desirable to expand their advertising and R&D expenditures as market size increases. The result is higher sunk costs, which in turn means less competition in order to ensure that firms are profitable.

The evidence suggests that much of the Canadian agribusiness sector is in the exogenous sunk cost category, although there are exceptions, particularly for farm inputs. The food processing industry, at least in Canada, does not involve a significant degree of research and development. For example, between 1988 and 1993 R&D intensity (R&D expenditures/shipments) declined from 0.16 per cent to 0.12 per cent (Industry Canada, 1997). Although the food and beverage sector has low R&D intensity, advertising expenditures can be significant, especially in the beverage sector. R&D spending, however, is much more important in the farm-input sector. Research expenditures in the

agri-chemical and seed sectors represent a very significant sunk cost. For example McEwan and Deen (1997) state that it costs the pesticide industry from $US70 to $US100 million for the R&D necessary to bring a new compound to the global market. Research intensity is also significant for farm machinery development. For example, John Deere spends over $US1.5 million each working day on R&D (John Deere, 2001).

By expanding the market, trade liberalization can play a significant role in industry rationalization for other reasons. Prior to CUSTA, much of Canadian manufacturing was criticized as being protected, small in size and inefficient (Eastman and Stykolt, 1967 and Wonnacott, 1975). Closed borders and an inward-looking industry resulted in a preponderance of firms with less than minimum efficient scale and which offered too many product lines, often with short production runs. For example, fruit and vegetable canning, and pork and beef packing were identified as industries operating at less than minimum efficient scale (Harris and Cox, 1983). Trade liberalization should force some inward looking firms to look to export markets, to rationalize their production runs, and to achieve minimum efficient scale.

The other effect of trade liberalization is an increase in intra-industry trade. These intra-industry effects tend to dominate between countries with similar factor endowments (such as Canada and the United States) where the comparative advantage effects of trade liberalization are of less importance. Associated with the increase in intra-industry trade is an increase in specialization of plant production. Thus, expanding the size of the market through trade liberalization has the possibility of increasing both product specialization and scale economies of production. In turn, these impacts may have the effect of increasing concentration measures based on national boundaries. At the same time, the increased scale and increased specialization may result in lower costs, thus implying an inverse relationship between concentration and price mark-ups.

Industry rationalization typically occurs through mergers and acquisitions. Mergers occur for a variety of reasons. They may be a way for low cost firms to take over the production of high cost firms, thereby increasing profitability and increasing efficiency. Mergers may occur as firms attempt to acquire new intellectual property. Mergers may also be the result of different

valuations of companies that are held by different industry players and the result of a drive by company leaders to increase their personal influence (Shy, 1996). Farrell and Shapiro (1990) evaluated the conditions that are required for a merger to produce cost savings that can increase output and reduce price after the merger. Cost savings can occur when: (1) the merged firm reallocates production between plants; (2) the merged firm shifts capital across plants; and (3) the firms in the merger entity learn from each other in terms of sharing techniques, patents or management skills.

There have been a significant number of mergers in the agrifood sector over the past ten years. Between 1987/88 and 1999/2000 the Canadian Competition Bureau examined 265 mergers in the agrifood sector; this number represents nine per cent of the total mergers during that time period (Palsson and Monteiro, 2001).

Despite their prevalence, the literature on mergers and acquisitions in the agrifood industry is very small. One of the few studies is Buschena and Gray (1999), who examined the incentives for horizontal mergers in the North American barley malting industry when trade was liberalized through CUSTA. They observed no movement of physical capital or closures of plants when the industry consolidated from four major firms in Canada and six major firms in the United States to five major North American firms. Trade induced mergers have off-setting effects: cost efficiencies increase welfare and a reduced number of firms can reduce total output. Buschena and Gray showed that the mergers were both profit-enhancing and welfare-enhancing. Looking at mergers more generally, Mcdougall (1995) found that Canadian corporations that have been taken over by foreign interests increase their investment and R&D spending, while firms taken over by Canadian interests had no change in investment in physical capital or R&D investment.

EMPIRICAL EVIDENCE ON CONCENTRATION

The period since the signing of the Canada-United States Free Trade Agreement at the beginning of 1989 has been a time of rapid adjustment for the Canadian food and beverage processing sector. Since 1988, the sector has recorded modest overall real growth in shipments of seven per cent and has under

Table 1: Food and Beverage Concentration (pre and post CUSTA).

Sector	*pre CUSTA Avg. Herf*	*post CUSTA avg. Herf*	*Change in Concentration*	*Annual Import Growth*	*Annual Export Growth*
				(percent)	
Poultry products	0.0505	0.0670	-	11*	21**
Other dairy	0.0846	0.1161	-	8*	8**
Prepared flour mixes and cereals	0.1757	0.1036	-	19*	19**
Potato Chips	0.2650	0.3416	-	16*	21**
Soft Drinks	0.1214	0.1951	-	1*	29**
Brewery Products	0.3047	0.4230	-	11*	4**
Vegetable oil	0.1586	0.3215	-	5	16
Canned and preserved fruit and vegetables	0.0598	0.0613	n/c	11	17**
Frozen fruit and vegetables	0.1931	0.1654	n/c	1	16
Fluid milk	0.0772	0.0889	n/c	12*	12**
Flour	0.1842	0.1770	n/c	15*	4
Biscuits	0.2431	0.2358	n/c	10	25
Bread and other bakery	0.0654	0.0790	n/c	15*	14
Confections	0.1381	0.1319	n/c	11	18
Dry Pasta	0.2467	0.2460	n/c	13	18**
Malt	0.0409	0.0396	n/c	-4*	11
Distillery Products	0.2366	0.2506	n/c	6*	5
Winery	0.1350	0.1654	n/c	9	24**
Meat and meat products	0.0593	0.0380	¯	6	10
Feed	0.0242	0.0205	¯	11	13**

Source: Authors' calculations with data taken from Statistics Canada (2000)
*value of imports less than 10% of value of shipments
**value of exports less than 10% of value of shipments
- statistically significant increase after 1989 (Wilcoxan-Mann-Witney test)
¯ statistically significant decrease after 1989
n/c - no statistical change in mean of Hefindahl index

performed relative to the U.S. food and beverage processing sector in terms of growth, productivity and return on investment. Between 1988 and 1991, performance of the sector deteriorated. This deterioration reflected a period of

performed relative to the U.S. food and beverage processing sector in terms of growth, productivity and return on investment. Between 1988 and 1991, performance of the sector deteriorated. This deterioration reflected a period of major restructuring and adaptation in response to trade liberalization, the high Canada/U.S. exchange rate, and the effects of the recession in the early 1990s (AAFC, 1998).

Table 1 examines the relationship between trade liberalization and market concentration in Canadian food and beverage processing. Concentration is measured by a Herfindahl index, which is equal to the sum of the squared market shares for all firms in the industry[3]. The second and third columns of Table 1 show the average Herfindahl index for the periods prior to CUSTA (1983-88) and following CUSTA (1989-96). Data for Herfindahl indexes are not available after 1996. However, over 70 agrifood mergers have occurred in the period from 1997 to 2000 (Palsson and Monteiro, 2001) so the results in Table 1 may significantly understate the degree of concentration that has occurred in the post-CUSTA period.

The fourth column of Table 1 presents the results of a statistical test of whether the average Herfindahl indexes for the two periods are statistically different.[4] To test the difference in averages before and after 1989, a non-parametric Wilcoxan-Mann-Whitney test was employed. This approach, rather than a t-test of equal means, was used because of suspected non-normality of the distribution of Herfindahl indexes[5]. The fifth and sixth columns show the average annual growth rates in the value of imports and exports between 1988 and 1999 for each sector. Care must be taken to recognize that trade is not

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[3] The Herfindahl index takes account of both the number of firms and their relative sizes. The reason why the Herfindahl index is used, rather than a CR4 index is because all of the industry's activities are accounted for rather than just for the four largest firms. As well, data on Herfindahl indexes are frequently available when CR-4 ratios are withheld for reasons of confidentiality.

[4] Since the definition of the concentration measures used in Table 1 does not change between periods, this test can not account for relevant geographic markets as discussed by *McGeorge* (2001).

[5] The W-M-W test is a less powerful test than the t-test. When a t-test is used to compare the means, a few cases emerged in which the t-test indicated a statistically significant change while the W-M-W indicated a non-significant change.

important for some of the industries listed in Table 1. For instance, the average import intensity (imports divided by shipments) of fluid milk is 0.1 per cent and the average export intensity is 0.5 per cent. Industries with low trade intensities (less than 10 per cent) are highlighted with an asterisk.

A number of conclusions can be drawn about concentration in the food and beverage industry from the data in Table 1. First, over half of the sectors display no significant change, suggesting that trade liberalization has had little effect on industry structure, at least as measured by the Herfindahl index. Second, a number of the sectors which showed a statistically significant increase in concentration involved goods with little trade, either because the border is closed due to supply management (e.g., poultry products and other dairy) or because the products are not extensively traded because of high product transportation costs (e.g., soft drinks), or because of product characteristics (e.g., taste) specific to Canada (e.g., potato chips and brewery products). Third, concentration fell in only two sectors, meat and meat products, and feed.

The results presented in Table 1 provide only very limited support to the belief that market concentration falls with an increase in the size of the market (in this case, trade liberalization through CUSTA). This limited support follows both from the observation that concentration only fell in two cases (meat and meat products and feed), and from the fact that concentration appears to rise for goods that are not traded.

However, even this limited support must be questioned. The falling concentration in meat and meat products and in feed are probably not a result of trade liberalization, but likely derive from other industry factors. Likewise, the cases of significant increases in concentration largely reflect industry trends and structural change that are independent of trade liberalization. For instance, casual observation of the poultry and dairy sectors in the United States suggests that concentration has risen there as well. Thus, rising concentration should not be attributed- - at least solely- - to supply management. Similarly, concentration appears to be rising in brewery products in the United States, again suggesting that other factors are at work in determining concentration. The following paragraphs examine some of these industry specific trends and changes.

First, meat and meat products. Concentration in this sector has to be examined at a more disaggregated level than is possible using the statistics used in Table 1. While the overall statistics show a decline in concentration, this decline is likely the result of a fall in concentration in further-processing. Further-processing makes up a significant portion of the meat and meat products industry. For example, in pork, 65 per cent of the slaughtered product goes to other Canadian meat processors, while in beef, 25 per cent of slaughter goes to other Canadian processors (AAFC, 2000b).

The beef slaughter industry in Canada, like its counterpart in the United States, has become significantly more concentrated over the last decade. Between 1992 and 1999 the four-firm concentration ratio for federally inspected Canadian beef slaughter steadily increased from 53 percent to 78 percent (AAFC, 1999a). By comparison between 1990 and 1998 four-firm concentration in U.S. steer and heifer packing increased from 73 percent to 80 percent (MacDonald, 2001). The increase in Canadian beef packing concentration has been driven by U.S. investment in the Alberta sector, which has resulted in two firms, Iowa Beef Packers (IBP) and Cargill, dominating Canadian cattle slaughter. Additional investments by these companies have increased this concentration over time.

The parallel change in concentration on both sides of the border is unlikely due to trade liberalization. The North American beef trade was largely integrated prior to CUSTA/NAFTA. The major impact of CUSTA on beef trade was that Canada and the United States exempted each other from their meat import laws. Tariffs prior to 1988 were low and represented only a minor barrier, while measures such as border inspection and equivalent grading still have not be resolved (Hayes and Kerr, 1997). Factors such as wages (MacDonald, 2001), exchange rates, environmental policies and domestic regulations have likely had a larger impact on trade flows than a change in border measures.

CUSTA, of course, has had some impact. For instance, CUSTA, and later NAFTA, provided Cargill and IBP with an increased sense of security to invest in Canadian slaughter. Nevertheless, there is no reason to expect that further trade liberalization will have any further significant impact on concen-

tration. However, the composition of ownership may change as a result of potential acquisitions such as Tyson buying IBP.

For pork, trade was also relatively barrier free prior to CUSTA, with neither Canada nor the United States assessing tariffs on fresh or frozen pork. Until 1998 Canada prohibited the importation of live hogs from the United States for health reasons (pseudo-rabies). Since 1998 hogs can be imported from designated disease free areas. Increased concentration in Canadian hog slaughter has been more gradual than that in beef, with the four-firm concentration ratio increasing from 51 per cent to 56 per cent between 1992 and 1999 (AAFC, 1999b). In the United States the four-firm concentration rate increased from 40 per cent in 1990 to 54 per cent in 1998 (MacDonald, 2001).

For the feed industry, other factors besides trade liberalization, e.g., technology, are likely behind the decline in concentration. Automation and computerized least cost formulation, the availability of pre-mixes, and the establishment of integrated feed and livestock operations have all had a huge impact on the feed industry. These developments have led to an increase in on-farm mixing and a decline in the importance of large-scale commercial feed mills. As noted above, sectors such as poultry products, other dairy products, and soft drinks are not open to the direct forces of trade liberalization and experienced a significant increase in concentration. Dairy and poultry are supply managed sectors and were not subject to additional market access through CUSTA. The soft drink sector involves a non-traded product and the largest soft drink companies tend not to ship finished product across the Canada-U.S. border because of differences in ingredient and labeling regulations (AAFC, 2000a). The brewery sector also experienced a significant increase in concentration, but the trend in increased brewery concentration predated CUSTA. CUSTA did advance the elimination of intra-provincial trade barriers in beer, which resulted in a significant consolidation and rationalization in the Canadian industry.

Vegetable oil has been the fastest growing food processing sector over the last decade. Between 1987 and 1997 capacity has increased by almost 150 per cent. Two companies, CanAmera and Archer Daniels Midland (ADM), dominate the industry with 78 per cent of the crush (AAFC, 1997). It is difficult to determine if trade liberalization increased concentration in this sector as

the period just prior to CUSTA caused severe financial difficulties for the sector, and the period subsequent to the agreement coincided with a rapid expansion of Canadian oilseed production. Oilseed crush capacity has increased from 6,850 tonnes per day in 1987 to 16,865 tonnes per day in 1997 (AAFC, 1997). This increase in capacity in a capital-intensive industry has come through expansions and modernization, which has resulted in increased concentration.

Increased concentration for the snack food and prepared flour mix and cereals sectors may well be associated with industry rationalization. The snack food sector has large sunk costs due to intensive advertising and therefore is susceptible to increased concentration. Furthermore, the sector is capital intensive, and over the last decade has faced a rapidly growing market. Other food and beverage sectors showed no statistically significant change in concentration at the four-digit level. The fruit and vegetable sector faced significant restructuring and consolidation of product lines but at the same time national brands were facing increased competition from private labels. There are, however, pockets of extreme concentration such as H.J. Heinz, the sole supplier of jarred baby food in Canada[6]. For the bakery sector, economies of scale are hard to achieve given the perishable nature of the product. The confectionery sector has faced significant rationalization, and has become more open to trade; some of the larger plants have been able to establish global product mandates because of cost advantages for sugar. Nonetheless there are still regional differences in tastes for confections and niche markets play a significant role. Although change in concentration for flour processing is not significant up to 1996, concentration increased substantially in 1997 when ADM purchased Maple Leaf Mills. This acquisition is not accounted for in Table 1.

Publicly available information on concentration in the farm input sector is difficult to acquire and is not reflected in Table 1. In many cases Canada is a price taker on global markets for farm inputs and domestic measures of concentration are meaningless. Furthermore, for the most part this sector did not face significant trade barriers prior to CUSTA and changes in market structure and conduct in this sector cannot be traced back to trade liberalization.

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[6] An anti-dumping suit against Gerber Baby food has left Heinz as the only source of jarred baby food in Canada.

However, some spatial elements of the market may allow for limited exercise of market power in select geographic locations.

Recent linkages between the agri-chemical and seed markets, on a global basis, have occurred at rapid pace through numerous mergers and acquisitions as chemical companies vertically integrate into the seed and biotechnology industries in order to capture profits from biotechnology innovations which are complementary to their chemical technology[7]. Since 1996 Monsanto has spent over $US 8 billion acquiring seed and agriculture biotechnology companies (RAFI, 1999). The top ten agri-chemical companies account for approximately 85 per cent of the global agri-chemical market ($US 31 billion). Likewise the top 10 seed companies control over 30 per cent of the world seed market, with even higher concentrations for specific products (four companies control 69 per cent of the North American seed corn market and four companies control 47 per cent of North American soybean market) (RAFI, 1999). Five companies, dominated by Aventis, formulate farm chemicals in Canada, with the basic ingredients all imported.

Sales of bulk fertilizer in Canada is dominated by Agrium with almost 50 per cent of the market (authors' estimates based on firm employment). In terms of the production of nitrogen fertilizer, the four-firm concentration ratio is the range of 80-85 per cent (authors' estimates based on capacity). Canadian-based operations produce a quarter of North America's nitrogen fertilizer and Canada is the world leader in potash production. The farm machinery sector in Canada is dominated by three mainline brands (John Deere, Case-New Holland and Agco) and most of the equipment is imported at world prices. There is also a competitive fringe of innovative "shortline" manufactures.

DOES INCREASED CONCENTRATION LEAD TO MORE MARKET CONCENTRATION?

A concept central to the industrial organization literature is that increased concentration leads to increased market power, while less concentra-

[7] See Hayenga (1998) for a description of acquisitions in the seed industry by chemical companies. RAFI (1999) provides some up dated details.

tion increases the disciplines on industry pricing. This concept forms the basis of the classical Structure-Conduct-Performance (S-C-P) approach to industrial organization[8]. Under the logic of the S-C-P approach, there is a straight line relationship from structure (e.g., size of market, number of firms) to the conduct of the firms (e.g., level of price mark-ups, advertising) to performance (e.g., profitability and economic efficiency). The determination of structure is explained by barriers-to-entry that are exogenously determined. The implication of this theory is that the more concentrated an industry, the larger is the deviation from competitive pricing and the more market power that firms exercise.

The one-way causality aspect of the S-C-P model is its most controversial aspect. In response, economists have developed models in which there is substantial feedback between structure, conduct and performance[9]. For instance, under the new theory, determinants of market structure are not exogenous, performance affects structure and profitability affects entry. The newer literature stresses how firms can strategically manipulate their environment rather than simply adapting to existing environmental conditions. In this more dynamic world, more efficient firms should grow faster than less efficient firms resulting in a more concentrated industry structure Viewed in this light, increased concentration, when combined with cost efficiencies, does not necessarily lead to higher prices and may in fact result in lower prices. In general, the belief is that there is a trade-off between increased efficiencies and increased market power. Azzam (1997) makes an explicit attempt to measure this trade-off between market power effects and cost efficiency effects.

The view that there is a trade-off between market power effects and cost efficiency is not shared by all economists. Baumol, Panzar and Willig (1992) recognize that while certain cost structures, for example increasing returns to scale, may lead to markets of one or few firms, they stress that firms may not be able to exercise market power because the markets are contestable. The equi-

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[8] This approach to empirical industrial organization was introduced in Mason and largely developed by Joe Bain. See Carlton and Perloff (1999), p.p. 238-267, for more details.

[9] See Jacquemin (1991) for an excellent survey of modern industrial organization, including the adaptation of the S-C-P approach, and new strategic approaches to industrial organization.

librium in a contestable market has all the desirable properties of perfect competition, i.e., prices as low as possible while still covering costs, and there is cost minimization and zero economic profits. Moreover, this result is obtainable with only a few firms so that very concentrated markets can end up with the same characteristics as competitive markets.

The key requirements for market contestability are: (1) potential entrants must not be at a cost disadvantage to existing firms; and (2) entry and exit must be costless. For entry and exit to be costless, there must be no sunk costs. If there are no sunk costs, potential entrants can use a "hit and run" strategy in which they enter an industry, undercut the price of incumbents, reap the profits and exit before the incumbents have time to retaliate. In anticipation of entrants acting in this manner, the incumbents forestall entry by keeping price at average cost. The consequence is that, even in an industry that is highly concentrated, prices can be kept at or near competitive levels. However, if sunk costs are present, firms entering an industry are unable to exit again without losing a portion of their investment. As a result, "hit and run" strategies are much less profitable and incumbents are able to keep price above average cost. Thus, with sunk costs, markets are not contestable and market power is once again an issue.

Sunk costs can have additional effects on the market structure and conduct. Sutton (1991) reformulates the basic theoretical model in industrial organization with a two-stage game formulation to explain the two-way link between structure and conduct. The focus of Sutton's theory is sunk costs. In the first stage of Sutton's model, the firm makes investments in advertising and research and development in order to enhance the consumers' willingness to pay. In the second stage firms engage in some form of competition (price, quantity, or joint profit maximization)[10]. Sutton identifies two types of sunk costs, exogenous and endogenous. Exogenous sunk costs depend solely on entry costs such as the construction cost of a minimum efficient scale plant. If only exogenous sunk costs are present, Sutton predicts that an increase in the size of the market will lead to less concentration. Sutton also shows that with exogenous

[10] Rather than identifying unique equilibrium outcomes Sutton (1991) uses a bounds approach to narrow down a set of feasible outcomes which can be supported as equilibrium.

sunk costs, increased "toughness" of price competition leads to a more concentrated industry. This latter prediction opens the possibility of direct contradictions to the predictions of the S-C-P approach.

Endogenous sunk costs are firm-level strategic variables such as advertising or research and development. Firms choose their expenditures on these costs depending on the demand characteristics in the market (e.g., size of market). There are three predictions for endogenous sunk cost markets. First, as market size increases, concentration will not decrease and has an effective lower bound. Second, there is no monotonic relationship between market size and minimum concentration levels. Third, increased setup costs increase minimum concentration levels.

EMPIRICAL EVIDENCE ON MARKET POWER

Empirical evidence on the exercise of market power in the Canadian agrifood sector is limited, with research focused largely on the food processing sector. This narrow focus is largely due to the lack of sufficient empirical data to examine other agrifood sectors. Lopez (1984) measured market power in the Canadian food processing sector at the two-digit level. Lopez's approach employed explicit price theory and optimizing behavior by firms[11]. Lopez estimates market power with a Lerner index that is the difference between price and marginal costs as a fraction of price, and measures a mark-up of prices over marginal cost. Lopez could not reject the hypothesis of the exercise of market power in the Canadian food processing sector and found an average Lerner index of 0.504, which implies that on average prices were 50.4 per cent above marginal costs. Lopez's results have been criticized for being too aggregated.

Cranfield et. al. (1995) attempted to remedy this shortcoming by examining the food processing sector at a more disaggregated level: dairy processing, fruit and vegetable processing, poultry processing, and the processing of meat and meat products. The authors again rejected competitive behaviour

[11] This approach, which is commonly referred to as an Appelbaum model, differs from empirical applications of the S-C-P approach, because it accounts for explicit optimization by firms. The approach estimates market demand equations, a complete cost system (input demands and marginal cost equations), and an explicit measure of a Lerner index [(P-MC)/P].

across the more disaggregated group of food sub-sectors. Market power increased over time (1966 to 1990) for dairy, poultry and red meats, and declined for fruit and vegetable processing. The average Lerner indexes were 0.390 (dairy), 0.407 (fruit and vegetables), 0.024 (poultry) and 0.374 (red meats).

In a subsequent study of beef processing alone, Cranfield (1999) found much lower levels of market power. He found that price was 12.5 per cent above marginal costs over the study period (1973-1991). In another industry-specific study, Fulton and Tang (1999) tested for competitive behaviour in the Canadian chicken industry. Their study, which examined both the processing and the retail sectors, found departures from competitive pricing in the sector. However, the source of this market power- the processing and/or the retail sector- could not be identified.

While the prior empirical research on market power in Canadian food processing indicates a departure from competitive behavior, the studies do not provide much information about the impact of trade liberalization on the exercise of market power. We attempt to provide more information about the relationship between concentration and market power by reverting to a S-C-P approach of estimating the relationship between a price-cost margin and various proxies for industry structure[12] . Rather than following the standard S-C-P approach of cross sectional estimation, price-average variable cost margins for selected food sub-sectors are regressed on structural variables over time.

Given data limitations, the estimation period is restricted to the period 1983-96. The price-average variable cost margins are calculated by taking the value of shipments less materials costs less wages and salaries and dividing this term by the value of shipments[13] . This margin is a proxy for a Lerner index with average variable costs. The explanatory variables, which are intended as

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[12] Many economists examine the relationship between average variable cost margins, based on Census of Manufacturing data, and various proxies for industry structure such as concentration ratios, capital to output ratio and other variables deemed important. For an example of this approach see Domowitz, Hubbard and Petersen (1986).

[13] The price-average variable cost margin is typically calculated as sales revenues minus payroll minus material costs, all divided by sales (Carlton and Perloff, 1999). As an alternative to the margin discussed in the text, we also calculated the margins as the difference between industrial product price indexes and materials cost indexes. For the most part this alternative definition of the mark-up did not produce significantly different results.

Table 2: Estimation Results.

	Elasticity of concentration	*CUSTA Dummy*	*Change in Concentration*	*average margin*	*average annual margin growth*
					(percent)
Poultry	1.20**	nss	-	11	8
Fluid milk	0.40**	nss	n/c	17	2
Other dairy	1.30*	nss	-	20	2
Bakery	0.70*	nss	n/c	26	1
Vegetable oil	0.60*	nss	-	13	10
Snacks	0.66*	nss	-	43	2
Fruit and vegetables	nss	nss	n/c	32	1
Flour	nss	4%*	n/c	13	3
Feed	nss	2%**		15	2
Pre mixes and cereals	nss	nss	-	44	1
Sugar confections	nss	nss	n/c	33	0
Pasta	nss	12%**	n/c	27	5
Meat	-0.39*	nss		11	3

Source: Estimated by authors.
nss º not statistically significant from zero
*significant at 95% confidence level

** significant at 90% confidence level

proxies for industry structure, are the Herfindahl index and the ratio of the capital stock to the value of shipments. A dummy variable is included to account for the post-CUSTA period[14] .

Table 2 presents a summary of the estimation results for a selection of food sub-sectors. The first column of Table 2 gives the elasticity of the price mark-up with respect to changes in concentration (changes in the Herfindahl

[14] It would be desirable to include measures of trade intensity in the estimation, but due to introduction of H-S system these data are only available on four-digit SIC basis subsequent to 1988.

index). The second column shows the change in mark-up associated with a change in trade policy regimes (i.e., the introduction of CUSTA). These numbers in column one are reported in percentage terms since the mark-up is a percent of average variable cost. The final two columns are descriptive statistics showing the average mark-up and average annual growth rate in the mark-up for the sample period 1983-96. Details of the empirical estimates are provided in Appendix 1.

The results in Table 2 are similar to many previous S-C-P type studies that "have difficulty detecting economically and statistically significant effects of concentration on performance" (Carlton and Perloff,1999). This difficulty in finding a relationship between concentration and market power may be a result of data limitations (see discussion earlier in the paper), specification error, or problems with the level of aggregation.

Two general observations can be made from Table 2. First, those sectors which show a statistically significant positive relationship between concentration and market power are generally those sectors which have seen a significant increase in concentration over time. As a result, there appears to be some support for the standard S-C-P proposition that rising concentration does affect price margins. Second, the dummy variable for CUSTA is only statistically significant in three sectors. The lack of a connection between the trade liberalization and mark-ups across a large number of sectors of Canadian agribusiness suggests that other factors besides trade are at work in explaining the industrial conduct of these industries. The rest of this section looks at these sector-specific factors.

A significant positive relationship between concentration and market power is found in the supply-managed sectors of other dairy products, poultry products, and fluid milk, as well as in the bakery, vegetable oil and snacks sectors. The concentration elasticities for poultry and other dairy products exceed unity while elasticities for the non-supply managed sectors are inelastic. The connection between concentration and market power for the supply-managed sectors is consistent with earlier studies (Cranfield et. al. 1995, Fulton and Tang 1999). A note of caution is again in order, however, dairy and

poultry processing in the United States have also become increasingly concentrated and concerns about potential abuse of market power exist there as well.

The significant negative relationship between the Herfindahl index and the mark-up for meat and meat products is a matter of interest, and is further explored below[15]. For the U.S. beef packing sector MacDonald (2001) found that although concentration was increasing dramatically, the farm-wholesale price spread had decreased over time. While the results of this paper find a similar negative relationship between concentration and mark-ups, the measured change in concentration in the Canadian case is exactly the opposite to what MacDonald (2001) found, i.e., in Canada, the numbers show an increasing margin with less concentration.

How can the differences between Canada and the United States be reconciled? Much of the difference stems from the aggregation of the data used in this analysis. As pointed out earlier in the paper, the data used in Table 2 contain both the slaughter sector and the further processing sector. As in the United States, concentration in Canada has been rising at the slaughter level. Concentration at the further processing level in Canada, however, appears to be falling.

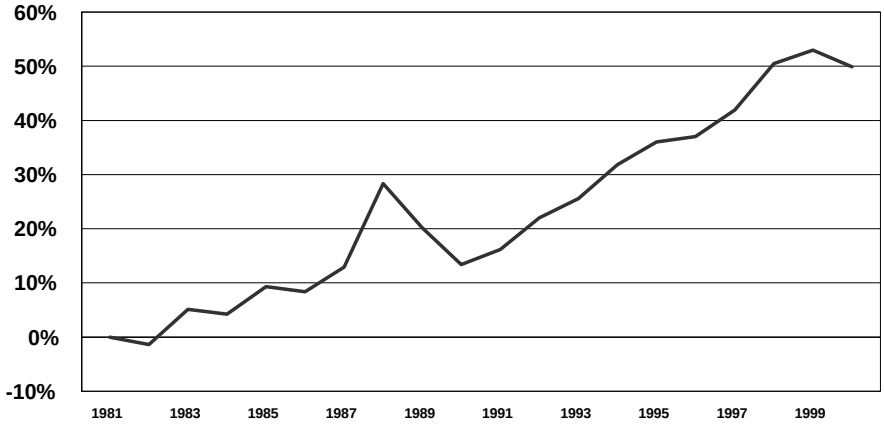
To make a meaningful comparison with U.S. data, the five-digit Annual Survey of Manufactures data should be used to focus specifically on the slaughter industry. However, this information is not publicly available for Canada so an approximation must be made. MacDonald calculated a deflated price spread between what packers pay for animals and what they receive for beef, with adjustments for transportation and slaughter costs and profits. Given data limitations, an approximate Canada wholesale-farm price margin for beef was calculated as the difference between the industrial product price index for fresh and frozen beef (Statistics Canada, 2001b) and the material products price index for slaughter cattle and calves (Statistics Canada, 2001b). This margin was then divided by the industrial product price index to get an approximation of a mark-up. Figure 1 shows the wholesale-farm price mark-up for beef. Although this approximated mark-up is not directly comparable to MacDonald's spreads, it indicates that cattle prices were not outpaced by beef prices and that the

[15] Cranfield et.al. (1995) also obtained a significant negative coefficient on the Herfindahl index in their red meats mark-up equation.

Figure 1: Beef Wholesale-Farm Price Mark-ups, 1981-2000.

Source: Calculated by authors.

Figure 2: Pork Wholesale-Farm Price Mark-Ups, 1981-2000.



Source: Calculated by authors.

margin has in general trended downward as the four-firm concentration rate increased from the mid-30s to almost 80 per cent. Thus, MacDonald's conclusion of "hard competition with high concentration" also appears to apply for Canadian beef packing.

A comparison of hog and pork prices is made using the industrial product price index for fresh and frozen pork and the raw materials price index for hogs for slaughter. Figure 2 shows the proportional mark-up is increasing over time; federally inspected hog slaughter is also slowly becoming more concentrated over time. On the surface, this positive relation between mark-up and concentration implies the existence of market power. However, it is also possible that the rising mark-up is due to increasing processing costs as the amount of value added pork products increases. It is not possible to answer this question at this point without further information that is not available.

The significant relationship between concentration and price-average variable cost mark-ups for vegetable oils and bakery products also raises questions. Oilseed crush margins are notoriously variable, yet the price-average variable cost margin increases over the sample period. A comparison of industrial and raw product price indices for the sample period indicates significant fluctuations in the price spread. The production of bakery products has tended to shift from independent establishments to in-store supermarket bakeries. While this may put upward pressure on bakery concentration, it is questionable whether prices will rise given the practice of using bread as a "loss leader". The results for both of these sectors raise questions about the reliability of the data and the need for further disaggregated analysis.

The nitrogen fertilizer sector has also been subject to suspicions of abuse of market power and in 1998 the Competition Bureau initiated an inquiry into the practices of one manufacturer/ vertically integrated distributor. However, there was insufficient evidence to support the allegations and the inquiry was closed (Chandler and Jackson, 2000). Payne (1998) examined pricing practices for nitrogen fertilizer in a spatial context. He found no relationship between price and distance in western Canada. In fact none of competitive-behavior, base-point pricing, or collusion was supported by the price/distance data. Payne concluded that the U.S. market is the focus for Canadian nitrogen fertilizer producers and that Canada was a secondary market. Uniform pricing throughout western Canada might be a strategy to avoid charges of dumping into the U.S. market. The ability to pursue this strategy indicates some degree of market power.

McEwan and Deen (1997) examined pesticide pricing in Canada. They found that over time there was strong price competition in the pesticide market. However, their focus was mostly with the distribution and retail levels of the market and they did not examine the North American pesticide supply chain for evidence of market power. They did conclude that the pricing of product is only marginally influenced by the cost of production.

The Competition Bureau initiated an inquiry of Monsanto's canola marketing practices under the tied selling, exclusive dealing and abuse of dominant provisions of the Competition Act. With a tie-in sale a customer can buy one product only if another product is purchased. The Competition Bureau concluded that under Monsanto's new marketing program, there is no restriction on the ability of farmers to use any brand of glyphosate herbicide registered for use with its herbicide tolerant seed. As a result the inquiry was discontinued. (Chandler and Jackson, 2000).

As scientific innovations increase the interdependence between agricultural inputs, issues surrounding vertical market restrictions and vertical market conduct will increasingly surface. Researchers in agricultural economics are beginning to pay attention to the strategies that are used by firms to exploit these vertical relationships. For instance, Hennessy and Hayes (2000) examined product tying in agri-chemical and seed markets by looking at the motivation and behavior of some of the participants in the glyphosate and 'Round-up' ready soybeans markets. A great deal more attention will be paid to abuse of market power between vertical markets in future research.

CONCLUDING REMARKS

The purpose of this paper was to examine the issues of whether more, larger markets result in greater concentration and whether greater concentration results in a greater exercise of market power. The focus of the study is the Canadian agribusiness sector over the period 1983-96. Examining the first question, the results of this paper suggest that there is little connection between larger markets and market concentration. The paper could identify only a few instances where increased market size (as measured by trade liberalization in the form of CUSTA) lead to changes in concentration. While concentration is

rising in some parts of the Canadian agribusiness sector, the increase appears to be associated with industry-specific factors and not trade liberalization. Likewise falling concentration ratios, although confined to only a very few sectors, appears not be linked to trade liberalization.

On the second question, the results of this paper show that in a number of agribusiness sectors there is a positive relationship between greater concentration and the exercise of market power. Sectors in which the exercise of market power appear to be a concern are poultry products, fluid and other dairy products, vegetable oil, snack foods, and bakery products. Flour[16], feed, and prepared flour mixes and cereals, fruit and vegetable processing, and sugar and chocolate confections did not appear to represent a problem with market power. However, as is discussed below, these results should be treated with some hesitation, since further research is required.

An important corollary to both of these results is that detailed sector information is required to identify the source of market concentration and to understand the relationship between market concentration and the exercise of market power (Palsson and Monteiro, 2001). One of the findings of this paper is that both data and research on market concentration in Canadian agriculture is generally lacking. Undertaking the research that is necessary to fully understand the many issues involved in industrial structure will require efforts in a number of areas.

Determining concentration requires a definition of the relevant market. This relevant market will have different geographic bounds depending on what product is being studied. For example, the relevant market for feed mills that serve a local market will be different than a biotechnology based seed/herbicide market that may be global or North American at its smallest delineation. Relatively little information on measures of concentration is available on a regional basis[17]. Concentration measures do not cross international borders

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[16] Late in 1997 ADM acquired the milling assets of Maple Leaf Mills Inc. The Competition Tribunal reviewed this acquisition and issued a consent order requiring ADM to divest some of its assets.

[17] In Canada, although regional information on concentration is publicly available for hog and cattle slaughter it is not readily available for other markets.

and other relevant industrial data has only just become available with cross-border concordances in the new North American Industrial Classifications System. Relevant markets do not always respect vertical boundaries as in the case of vertical restraints in seed and pesticide products where dominant players are vertically integrated between these markets. There is virtually no information on concentration between vertical markets.

While this study was able to identify evidence of increased concentration, it was not able to identify trade liberalization as a major cause. In fact, the authors speculate that concentration was driven by other factors including supply management, cost structures, and the local nature of some markets. But conjecture must be backed up by evidence and to date this evidence does not exist. Empirical evidence on the cost structure of meat processing industries, which is available for the United States, is not available for Canada[18]. To obtain this information detailed plant specific data sets are required which are not available outside of Statistics Canada.

Two of the problem areas identified involve supply managed products which have not been exposed to trade liberalization. Will complete trade liberalization lead to less concentration in these sub-sectors and therefore reduce the amount of market power exercised? It is not clear that an expanded market will lead to less concentration. Although neither dairy nor poultry processing involves large research expenditure, advertising expenditures on dairy products can be important (Goddard and Tielu, 1995). As Sutton predicts, increased market size may not reduce concentration because of the endogenous sunk costs in advertising. Problems with vertical integration in the U. S. poultry industry might be imported to Canada in an open market. As such there is always a danger of swapping one form of distortion for another.

Although this study was unable to find a strong link between industry concentration and trade liberalization, concentration remains a problem in number of Canadian agrifood sectors. The problems associated with increased con-

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[18] See for instance Ollinger, MacDonald, and Madison (2000) cost function estimates of structural change in the United States poultry sectors and MacDonald, Ollinger, Nelson and Handy (2000) cost function estimates of the meat packing sector and the associated implications for consolidation.

centration are further exacerbated by structural changes in agriculture. Domestic competition policy remains a viable means of dealing with increased concentration due to mergers and non-competitive pricing behavior. Domestic competition laws can be viewed as complementing trade liberalization agreements by ensuring that the benefits of such agreements are realized and not negated by private restraints to trade. Firms are unlikely to have market power where entry into a particular industry is relatively easy and trade liberalization should improve the conditions for easy entry.

However, trade liberalization creates problems for competition policy and its enforcement. National competition laws face jurisdictional limitations as multinational companies expand their enterprise, possibly with anti-competitive activity. Further, except for mergers, competition laws are not equipped to handle structural problems. Two alternative methods of strengthening competition policy are by international cooperation[19] or by harmonization of national competition policies including the strengthening of structural remedies. A description and analysis of these alternative approaches is a subject for further research.

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[19] International cooperation in competition policy involves voluntary codes of conduct through the OECD and UNCTAD and through bilateral agreements for information exchange among competition authorities in a number of countries.

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APPENDIX 1

Table A1: Estimation Results

	constant	*Herf*	*K/shipment*	*dummy*	*r-squared*	*D-W*
meat	0.07	-0.93	0.74	-0.01	0.66	1.79
	(1.24)	(-2.11)	(1.71)	(-0.99)		
poultry	- 0.01	2.30	-0.24	0.02	0.76	1.79
	(-0.09)	(1.55)	(-0.77)	(0.69)		
fruit and	0.34	1.10	-0.42	0.01	0.37	1.53
vegetables	(2.50)	(1.28)	(-1.34)	(1.22)		
dairy	-0.08	2.49	0.28	-0.04	0.65	1.27
	(-0.94)	(2.10)	(1.36)	(-1.09)		
flour	0.04	0.02	0.45	0.04	0.87	2.16
	(0.56)	(0.05)	(3.77)	(6.11)		
feed	0.15	-1.96	0.17	0.02	0.38	1.38
	(2.98)	(-0.86)	(1.38)	(1.71)		
pre mix	0.50	0.01	-0.11	0.02	0.67	2.76
cereal	(5.23)	(0.02)	(-2.00)	(1.04)		
vegetable oil	-0.04	0.30	0.56	0.01	0.90	2.22
	(-1.79)	(3.97)	(4.81)	(0.78)		
snacks	0.28	0.92	-0.48	-0.01	0.69	1.12
	(1.60)	(1.79)	(-1.52)	(-0.30)		
pasta	0.29	-0.66	0.15	0.12	0.58	1.90
	(0.60)	(-0.35)	(0.83)	(1.51)		
bakery	0.12	1.59	-0.21	0.03	0.80	1.88
	(1.10)	(5.78)	(-0.54)	(1.27)		
fluid milk	0.19	0.85	-8.13	-0.02	0.37	1.60
	(1.94)	(1.55)	(-1.16)	(-1.24)		
sug conf	0.36	0.08	-0.08	0.01	0.13	1.32
	(6.25)	(0.12)	(-0.43)	(0.76)		

Note: t-statistics in brackets

Source: Base data Statistics Canada, (2000c)

AGRIBUSINESS CONCENTRATION, COMPETITION AND NAFTA

James M. MacDonald

INTRODUCTION

Two related developments drive current concerns over competition in agribusiness. The first is increasing concentration in many industries that either buy agricultural commodities from farmers or sell inputs to farmers. Second, methods of exchange are changing, as cash markets handle declining shares of commercial transactions between farmers and their buyers or suppliers. Participants in concentrated markets frequently rely on contracts and vertical integration to handle exchange, and in a world of substantially increased concentration, contracts can at times be structured to extend or exploit market power. Competition is currently an important topic in the food sector. I expect that it will continue to attract attention, and that competition and competition policies will affect, and be affected by NAFTA trade issues.

This paper describes some recent trends in agribusiness concentration and in contracting that drive competitive concerns. Increased concentration results from a variety of causes and can have complicated effects. The paper summarizes evidence efficiency gains from increased concentration, as well as evidence on the effects of concentration on competition and market power. Finally, the paper reviews areas where greater applications of competition policy

Table 1: Aggregate Concentration in U.S. Food Processing.

	1967	*1972*	*1982*	*1992*	*1997e*
Share of Value Added Held by 100 Largest Processors	51	53	61	69	75
Share of Grocery Sales Held by 20 Largest Chains	34	34	36	38	48

Sources: Richard Rogers, "Structural Change in U.S. Food Manufacturing, 1958 to 1997," and Phil R. Kaufman, "Structural Change in Food Retailing: Structural Changes and Their Implications for Consumers and Market Participants," papers prepared for ERS conference on The American Consumer and the Changing Structure of the Food System, May, 2000.

to agribusiness can be expected, and identifies the likely connections between those applications and international trade issues.

CONCENTRATION IN AGRIBUSINESS

Leading agribusiness firms grew steadily over the last several decades, with the result that small processors and small agricultural producers became a shrinking part of the landscape. Tables 1 to 3 highlight recent developments. Table 1 shows that aggregate concentration, measured by the share of food processing value added held by the 100 largest processors, grew steadily through time, and by 1997 was more than 20 percent greater than in 1982. Mergers accounted for much of the increase, but the disappearance of small food processors also matters. Table 2 presents data on changes in mean plant for 31 well defined food processing product classes (such as tea, wheat flour milling, or pickles). In order to avoid deflation issues, the table uses Census of Manufactures product classes that report physical output quantities. Mean plant sizes in every class increased between 1972 and 1992, with a median increase of 88 percent (the 1997 Census contains more limited output data, so we can not extend the analysis). Those familiar with Census data know that plant sizes are quite skewed, and that changes in mean plant sizes are driven by the closure of many very small plants.

Table 3 shows changes over time in farm numbers and mean farm size (in acres) as measured by the Census of Agriculture--farm numbers have fallen steadily while mean farm size has grown. Farms have also become more spe-

Table 2: Increasing Mean Plant Sizes in Food Processing, 1972-92.

SIC	*Name*	*1972-92 Percent Change in:*		
		Plants (N)	*Output (Q)*	*Q/N*
20210	Creamery Butter	-86	4	650
20223	Natural Cheese	-11	212	250
20224	Processed Cheese	-50	195	491
20240	Ice Cream	-35	40	115
20331	Canned Fruits, Juices	-53	-11	89
20332	Canned Vegetables	-49	14	122
20341	Dried Fruits & Vegetables	-12	39	60
20352	Pickles & Pickled Products	-52	62	237
20354	Mayonaisse & Salad Dressings	-16	161	210
20372	Frozen Vegetables	-11	114	141
20411	Wheat Flour Products	-10	59	76
20413	Corn Mill Products	-15	16	36
20440	Milled Rice	-7	64	77
20460	Wet Corn Milling	24	230	164
20470	Dog and Cat Food	29	104	58
20511	Bread: White, Wheat, Rye	-50	-5	90
20521	Crackers, Pretzels, Biscuits	19	55	31
20610	Raw Cane Sugar	-42	53	162
20620	Refined Cane Sugar	-48	-29	37
20630	Beet Sugar	-34	10	67
20648	Chewing Gum	-47	-33	27
20661	Chocolate Coatings	-47	19	125
20792	Margarine	-30	36	94
20830	Malt	-35	33	106
20923	Frozen Fish, exc. Shellfish	159	190	12
20950	Roasted Coffee	-19	-10	11
20980	Macaroni and Spaghetti	3	42	38
20993	Sweetening Syrups & Molasses	-17	17	40
20994	Baking Powder and Yeast	16	29	11
20996	Vinegar & Cider	-28	34	88
2099D	Tea in Consumer Packages	12	93	73
	Medians	-19	39	88

Source: U.S. Census of Manufactures, 1972 and 1992.

cialized; the number engaged in various specific activities--selling hogs or cattle, dairying, or harvesting wheat or cotton--has declined quite sharply, by as much as 85 percent in the 28 years covered.

Table 3: Consolidation in U.S. Agriculture.

	1964	*1969*	*1978*	*1987*	*1997*
Farms (millions)	3.16	2.73	2.26	2.09	1.91
Mean Farm Size (Acres)	352	389	449	462	487
Number of Farms that:			—thousands—		
Sold hogs, pigs	803	645	423	238	102
Had milk cows	1,134	568	312	202	117
Sold cattle	1,991	1,645	1,320	1,150	1,011
Harvested wheat for grain	740	584	378	352	244
Harvested cotton	324	200	53	43	31

Source: U.S. Census of Agriculture for each year listed.

Table 4: Structural Change in U.S. Meatpacking.

	1980	*1985*	*1990*	*1995*	*1998*
Concentration -CR4-					
Steers and heifers	36	50	72	79	80
Hogs	34	32	40	46	54
Large Plants		-Share of Slaughter in Large Plants-			
Steers and heifers	24	53	66	81	81
Hogs	63	67	79	86	88

Source: USDA/GIPSA

Note: Large steer and heifer plants slaughter at least 500,000 head annually, while large hog plants slaughter at least 1 million head.

Aggregate concentration statistics convey useful summary information about the relative importance of small and large firms in agribusiness, and they send a clear message of consolidation as smaller market participants exit. But such statistics are not directly useful in measuring concentration in particular markets. For that we turn to more specific measures. Table 4 highlights concentration in U.S. meat packing, showing estimates of four firm concentration (CR4) for hogs and for steers and heifers[1]. Steer and heifer CR4 is quite

[1] A four firm concentration ratio (CR4) measures the share of industry output produced by the four largest firms in an industry. They are widely used because the U.S. government has traditionally published such measures for manufacturing industries. Other concentration measures (such as the Herfindahl index, which is the sum of square market shares) are more appropriate in some contexts, but for broad delineation of levels of, and trends in concentration, all commonly used measures are highly correlated with one another. The CR4 measure in Table 3 is based on shares of livestock inputs instead of packer output (meat), and is appropriate for looking at buyer market power.

high, but the dramatic increase, from 36 in 1980 to 72 in 1990 and 80 in 1998, is particularly striking. I know of no other industry with as sharp an increase in any comparable period. CR4 in hog slaughter has increased as well, although not as dramatically, from 34 in 1980 to 54 today. Many of the same firms, including IBP, Cargill, Farmland National, and Conagra, are active in each industry.

The table also summarizes plant sizes: meat packing has shifted sharply toward large plants (at least 1 million hogs or five hundred thousand steers and heifers annually). The shift in steer and heifer slaughter was especially striking; large plants handled less than a quarter of 1980 slaughter, but over 80 percent just fifteen years later. Increasing plant sizes suggests scale economies: they may help to account for increased concentration, and increased concentration may therefore reflect improved efficiency. We return to that suggestion below.

The largest packing plants handle around 5 percent of annual slaughter, so the industry could be unconcentrated if firms each owned only a single plant. Concentration therefore results partly from large plants, but also because firms own many plants. For example, the four largest hog packers own 18 plants, and the four largest steer and heifer packers own 25 plants, according to USDA data. But the number of plants owned by the largest packers changed little after 1980, and indeed, over one hundred years ago, the largest packers of 1890 each owned six plants. Recent CR4 increases were largely driven by increasing plant sizes, not by increases in the number of plants owned by big packers.

Meat packing represents the most striking example of agribusiness concentration. Table 5 shows that CR4 is also quite high in U.S. grain and oilseed milling, and has generally grown over time; in particular, CR4 in flour milling and soybean processing grew sharply. Grain producers do not only sell to processing plants, but substantial volumes are exported. Table 6 reports 1998 CR4 ratios for 3 major commodities (corn, wheat, and soybeans) for exports through major port districts[2]. The data again show high levels of concentra-

[2] These data were gathered during the evaluation of the Cargill-Continental Grain merger case and are based on USDA export inspections records. Inspection records were not designed for concentration measurement and may not always accurately capture ownership (for example, if one exporter has a marketing agreement to elevate grain owned by another exporter), and may miss some intra-company shipments.

Table 5: Concentration in U.S. Grain and Oilseed Processing.

Industry	*Leading Firms*	*Four Firm Concentration*			
		1977	*1987*	*1992*	*1997**
Flour Milling	ADM, Conagra, Cargill, Cereal Food	33	44	56	62
Wet CornMilling	ADM, Cargill, Staley, CPC	63	74	73	74
Soybean Milling	ADM, Cargill, Bunge, AGP	54	71	71	83
Cottonseed Milling	Anderson Clayton	45	43	62	n.a.
Malting	Conagra, Cargill, ADM, breweries	59	64	65	n.a.

Sources: 1977-92 concentration data are from Census of Manufactures. 1997 data are from trade sources.

Table 6: CR4 in U.S. Grain Exports, 1998.

Port District	*Share of Exports in Four Largest Firms*		
	Corn	*Wheat*	*Soybeans*
New Orleans	75	72	71
Texas Gulf	80	79	100
Atlantic Coast	100	100	100
Great Lakes	86	81	67
Pacific Northwest	100	86	100
All U.S.	70	47	62

Source: USDA export inspections data, as described in MacDonald (1999).

tion. Moreover, a few firms (such as ADM, Cargill, and Conagra) are widely active across processing industries, grain merchandising, and livestock feeding.

Among input industries, mergers led to sharply increased concentration in seeds[3]. Table 7 shows CR4 measures for four different seed categories (two for each of corn and cotton), indicating substantial levels of concentration. Concentration has increased in other key input industries: Census Bureau data show increased concentration in equipment and in agricultural chemicals.

[3] Biogenetic developments in the 1990s led to the development of seed traits that had strong demand connections to agricultural chemicals, such as herbicides or pesticides. Firms with bases in agricultural chemicals, like Monsanto and DuPont, purchased biogenetic trait developers, seed producers, and seed and chemical distributors in strategies aimed at exploiting complementarities among seed and chemical markets.

Table 7: Four Firm Concentration in Seeds.

Crop	*Largest Companies*	*CR4*
Corn	DuPont/Pioneer, Monsanto, Novartis, Dow	69
Soybeans	Monsanto, Pioneer, Novartis, Dow	47
Wheat	Monsanto, Pioneer, Novartis, Dow	36
Cotton	Delta & Pine Land	87

Source: Unpublished ERS report, by John L. King and Kenneth S. Krupa

Table 8: Scale Economies in Meatpacking.

Plant Size	*Processing Costs Only*	*Full Costs*
1,000 Head per Year	*—Cost Index—*	
Cattle:		
175	130.7	104.3
425	100.0	100.0
825	85.0	97.9
1,350	78.6	97.0
Hogs:		
400	117.5	104.3
1,000	100.0	100.0
2,000	84.6	96.1
4,000	74.5	93.5

Source: Data from U.S. Census Bureau, Longitudinal Research Database; analysis developed in MacDonald and Ollinger (2000). Processing costs exclude animal purchase expenses.

Recent mergers have also reduced the number of independent railroads, important in grain and fertilizer shipments, to two or sometimes three in most parts of the country. Finally, recent and likely future mergers among supermarket chains, which may not greatly alter the number of stores that consumers generally have available to shop at, may still sharply reduce the number of different chains competing to buy produce from agricultural shippers. Table 1 shows that aggregate concentration among grocery chains rose sharply in the 1990s. In short, farmers face important reductions in buyer numbers in a wide range of markets.

SCALE ECONOMIES AND AGRIBUSINESS CONCENTRATION

The dramatic changes in plant size in some concentrating industries suggest that there may be important scale economies. Table 8 reports some evidence for meat packing, drawing on a recent ERS report (MacDonald, et al,

2000). The table lists indexes of average cost for hog and cattle slaughter plants of different sizes. In each case, the largest plants in the table correspond to the largest slaughter plants now operating while the smallest categories match commercial slaughter plants that were common in the 1970s but under increasing pressure in later years. We report separate indexes for processing costs (exclusive of animal purchase expenses) and for full costs in order to highlight some sources of scale economies.

The table shows large and extensive scale economies in processing costs. Costs per head at the largest hog slaughter plant (4 million head/year) are 12 percent below a plant half its size, and 25-40 percent below small plants. Similarly, processing costs at the largest cattle plant are well below those at smaller competing commercial plants. Processing scale economies arise from opportunities to more intensively use labor and capital in large plants, so that meat output per unit of labor or capital input is larger in big plants. Now review the data on full costs. Animal purchase expenses account for large shares (80-95 percent, depending on animal prices, plant size, and product mix) of full cost, and as a result large scale economies in slaughter cost must translate into small scale economies on a full cost basis. If all plants pay the same livestock prices, the largest plants will be able to deliver meat to wholesale buyers at costs that are 3-5 percent lower than competing plants that are one-third their size.

Packer scale economies became more important in the 1980s. First, technological scale economies became more important as packers built bigger plants and learned how to organize production for more intensive utilization of capital and labor at slaughter plants. Second, consolidation in cattle feeding and hog production provided packers with assured supplies of large volumes of animal. Without assured animal flows, large plants run the risk of sharply rising costs in periods of low slaughter volumes. Third, changes in the labor market eliminated a pecuniary diseconomy of scale faced by large packers, reinforcing the technological scale advantages shown in Table 8.

Table 9 shows average wages in hog slaughter plants, by year, region, and plant size (cattle developments are quite similar). The data source is the U.S. Census Bureau, production worker payroll divided by production worker hours, and wages are not adjusted for inflation. First, note the plant size-wage

Table 9: An Emerging Global Labor Market and Meatpacking Wages.

Hog Plant Characteristics		Predicted Mean Hourly Wages ($)		
Head per year	*Location*	*1972*	*1982*	*1992*
400,000	Western Corn Belt	5.04	12.17	8.08
1,000,000	Western Corn Belt	5.54	13.61	8.22
1,000,000	Southeast	3.64	9.15	7.81
4,000,000	Western Corn Belt	6.40	16.11	8.44

Source: MacDonald and Ollinger (2000).

relation evident for 1972; wages at a 2 million head plant in the Corn Belt are about 10 percent higher than at a 1 million head plant, and wages in the Southeast fall considerably below wages in the Corn Belt. During the 1980s, the industry underwent a series of lockouts, strikes, and renegotiations as labor and management battled over wages and other workplace issues. The table displays several results: wages fell quite sharply; the size-wage premium disappeared, providing large plants with an important cost advantage; and the regional wage differential narrowed sharply.

Scale matters in some other sectors as well. In a recent article, Buccola, Fujii, and Xia (2000) analyzed scale economies and productivity growth in grain processing. While using aggregated industry-level Census data, they found two developments that mirrored those that we found in meat packing. First, scale economies were extensive and important. Second, mean plant sizes changed (grew) over time to take advantage of scale economies. The findings for meat packing and grain processing indicate that we need to be careful in assessing the impacts of increasing concentration. In some cases, concentration changes may reflect the exploitation of scale and may arguably result in lower costs, lower product prices, and expanded output[4].

[4] It is also important to emphasize the unusual nature of the findings in these cases. Extensive scale economies may be more the exception than the rule in U.S. manufacturing industries. Moreover, mergers often are ill-conceived actions that lead to higher costs and lower efficiency (for recent evidence, see Kaplan, 2000). One should not simply assume that mergers or concentration changes are automatically efficiency-enhancing.

CONCENTRATION AND AGRICULTURAL CONTRACTING

The increasing use of contracts as a method of market exchange, while bringing many benefits, may exacerbate some concerns with concentration. Agricultural contracts are arrangements under which farmers agree to deliver products of a specified quality and quantity to a contractor at specified times, under a specific payments agreement (an actual price or fee, or a pricing formula). Contracts generally stipulate who owns the product, who pays for specific inputs, and who bears various risks. USDA 1997 ARMS contract usage data are used in Table 10, focusing on family-owned farms for whom farming is the principal occupation. Farms are classified by size--small (less than $250,000 in annual farm sales), very large (more than $500,000), and large. Nearly one third of all family farm sales were covered by production or marketing contracts in 1997, and coverage is closely related to farm size--nearly two thirds of the very largest farms had contracts, and 44 percent of sales from those farms were covered by contracts (Table 10). In contrast, only 16 percent of small farms had contracts, and contracts in turn covered only 20.9 percent of their production.

Contracts can provide a variety of benefits. They may reduce producer price risks, ease acquisition of debt financing, allow processors to improve capacity utilization by providing steady flows of the agricultural commodities through plants, and provide incentives to produce higher and more consistent levels of product quality. But reliance on contracting may also introduce new costs. In particular, in concentrated markets with only a few buyers, buyers may be able to use contracts as a tool of price discrimination, thereby exploiting the potential market power created by concentration. Under some conditions, they may be able to use contracts to deter entry and create market power (Hennessy and Hayes, 2000). Concentrated buyers may be able to manipulate thin cash market prices, which frequently form the basis for contract settlements. In short, contracts may combine with buyer concentration to allow buyers to exploit market power.

Market power concerns are exacerbated, for many farmers, by the close linkages between contract utilization and farm size. Note that over 83 percent of small farms do not have contracts, and but this group alone accounts for over two thirds of all full time family farms (Table 10). For many of these producers, contracting is a tool used by much larger farm enterprises, and is therefore

Table 10: Contracting Among Family Farms, 1997.

Farm Size	Farms	Farms with contracts	Value of Production	Contract Share of Production
	number	*percent*	*($m)*	*percent*
Small	574,908	16.4	55,222	20.9
Large	79,240	47.2	30,231	27.8
Very Large	45,804	62.9	59,583	44.3
All	699,952	22.9	145,036	32.0

Source: 1997 USDA Agricultural Resource Management Survey. Definitions are based on ERS farm typology; table includes only family owned farms for whom farming is principal occupation.

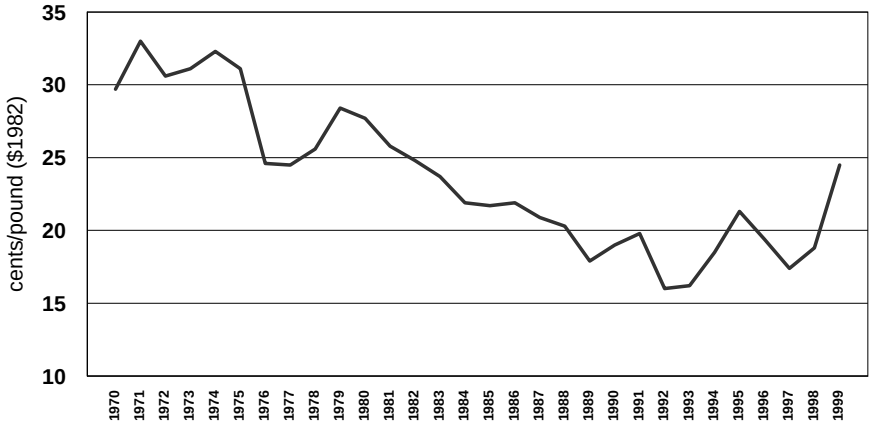
associated with consolidation into larger farms, cost pressures on smaller producers, and with dwindling numbers of farm communities.

DOES CONCENTRATION REDUCE COMPETITION?

High concentration often drives high prices. For example, Crandall and Hausman (2000) found that prices for long distance telephone service (an industry whose concentration levels are now close to those in steer and heifer slaughter) still exceed competitive levels by 150 percent, despite declines in prices through the 1980s and 1990s. MacDonald (1987) found that rail rates rose by about 20 percent as the number of competing railroads fell from 3 to 1, a result confirmed in more recent data by Grimm and Winston (2000). Many studies have found small but statistically and substantively significant effects of airline competition on air fares (with an additional carrier reducing rates by 3-5 percent). And Connor (1997) demonstrates the strong effects of explicit collusion on prices in the case of the lysine price-fixing case, 40-70 percent increases. On the consumer side of the food sector, the results of government attempts to induce competition among the three makers of infant formula are striking. The federal WIC program, which purchases about half of the infant formula consumed in the United States, now pays wholesale prices for formula that are one fifth the wholesale price offered to non-WIC buyers (GAO, 1998). These examples should give pause to anyone who thinks that cartels are inherently unstable or that competition can have only small effects on prices[5].

[5] Examples of markets with large effects of concentration on price were selected, to emphasize the potentially serious effects of concentration. On average, prices tend to be higher in concentrated markets, but the more typical effect is small (Weiss, 1989).

Figure 1: Real Farm-Wholesale Price Spreads, Choice Beef, 1970-1999.



Source: ERS choice beef farm-wholesale price spread, deflated for input price changes by author.

But increasing concentration does not necessarily imply sharp increases in market power. Consider trends in the farm to wholesale price spread for choice beef, displayed in Figure 1. The price spread is the difference between what packers pay for animals and what they receive for beef; it includes value of by-products, slaughter costs, transport expenses, and profits. The series in Figure 1 *was* deflated with an index of packer input prices, and the resulting real spread should measure changes in packer profits and input quantities per pound of retail beef. The spreads are represented as annual averages of cents per retail pound, which smooths sharp fluctuations in monthly data.

During the period from 1980-92, when slaughter CR4 increased sharply from 36 to 75, spreads fell quite sharply, as packer cost declines were apparently passed forward as lower beef prices, and backward as higher cattle prices. Spreads fluctuated widely during the 1990s but showed no trend increase through 1998. The data tell a strong story: if large increases in CR4 gave packers extensive new market power, it did not show up as long term increases in farm to wholesale spreads. More sophisticated econometric analyses support the inferences drawn above.

For example, Azzam (1997) formally modeled the forces driving the annual farm-wholesale price spreads shown in Figure 1, by explicitly taking account of the effects of concentration on pricing and on the realization of scale economies. He designed a test for perfect competition in packer purchases of fed cattle, and rejected the hypothesis of perfect competition - - producer prices fell below competitive levels as packer concentration rose suggesting increased market power. However, the divergence was extremely small, and prices were quite close to perfectly competitive levels[6]. Moreover, Azzam found that slaughter costs fell as concentration increased, and the cost decline substantially exceeded the price effects of concentration[7]. Azzam's results indicate that the trend in Figure 1 reflects the net results of two offsetting effects of concentration: increased market power, which had small effects on prices, set against the larger opposing force of reduced slaughter costs. Cattle slaughter is highly concentrated. Yet the price effects of packer concentration appear to be very small. There are three good reasons for this result, and although my arguments here are speculative, they are consistent with the broader literature on the sources of market power:

- entry into the industry is relatively easy;

When compared to the industries cited above there is no specialized technology, no need to develop a cadre of highly skilled workers, and large plants still only account for 5 percent of output, with the result that scale-related entry barriers are modest. Entry only takes money, and there are many investors that can raise the resources for a profitable opportunity.

- the product is homogeneous and opposing players (cattle sellers and wholesale meat buyers) are informed and active, and can induce price competition among packers; and

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[6] Specifically, he found that the divergence between actual and competitive price was about one fifth that predicted on the basis of a Cournot model, which is itself based on independent (noncollusive) buyer behavior and predicts that prices move quickly away from monopsony levels as the number of buyers goes to three and four.

[7] I interpret Azzam's results as showing that increasing concentration in the 1980s, when set against steady overall levels of industry production, allowed leading firms to get larger and realize scale economies and reduced costs.

- the period of consolidation was one in which meat packers moved aggressively to expand plant operations and to attract cattle to fill the plants.

The cast of competitors changed as some firms entered while some long-time participants exited or were acquired. It is not at all uncommon for prices and costs to fall during such periods of sharp change (Peltzman, 1977; Gisser, 1984). During the last two decades, meat packing looked much like one of John Sutton's (1992) industries in which hard competition helped create high concentration by forcing out high cost packers.

EMERGING ISSUES AND CONCLUSIONS

Mergers

I expect more concentration in commodity processing industries, in part because scale economies have not been fully exploited. Concentration in those sectors may increase because large firms build new plants or expand old ones, or because leading firms merge. Mergers among rivals will attract increased scrutiny because the law provides a policy lever, i.e., antitrust agencies are directed to oppose those mergers likely to reduce competition. Increased concentration makes it more likely that a merger will reduce competition, and the political furor over concentrated agribusiness will provide further impetus for a closer review of particular cases.

The geographic extent of the market plays a crucial role in evaluating the competitive effects of agribusiness mergers. For example, in its review of the proposed Cargill acquisition of Continental Grain's North American grain operations, the Justice Department quickly decided that Cargill and Continental competed with many other firms in the business of selling grain around the world, and a combination of the two was not likely to lead to any increase in grain prices to buyers. Hence, the relevant product market for grain sales from those facilities was global, and world trade and efficient transportation systems would limit product market power. But the market on the procurement side was smaller. There, the Justice Department believed that relevant markets were local and regional--transport costs, among other things, limited grain produc-

ers' options- -and a merger would reduce the number of relevant buyers in some markets that already had only two or three (MacDonald, 1999).

Geographic issues will arise in a similar fashion in future cases. For example, should Smithfield acquire IBP, the key antitrust issue will not focus on national and international product markets for pork, but on local and regional procurement markets for hogs. Similarly, evaluation of future mergers among grain or oilseed processors will likely focus on local procurement markets and the effects on prices paid to farmers, on the grounds that product markets for processed products are of greater geographic scope and less competitive concern, often because of international competition.

Mergers among agricultural input providers will also attract greater scrutiny following recent increases in concentration in seed, chemical, and equipment markets. Moreover, those markets are beset by great uncertainty over future prospects and over the best organizational structures for firms, leading to many mergers, divestitures, joint ventures and reorganizations. Consider the creation of the Swiss-based company Syngenta AG, formed by combining the seed and agricultural chemical business of Novartis with the agricultural chemical business of AstraZeneca. The new firms' stock was issued to stockholders in the parent firms, but management is independent. The U.S. Federal Trade Commission (FTC) filed a civil complaint against the merger, alleging that it would reduce competition in two markets: (1) pre-emergent herbicides for the control of grassy weeds in corn, and (2) foliar fungicides for the treatment of diseases in cereal, citrus, cotton, peanuts, potatoes, rice, vegetables, and turf crops[8].

Novartis was the leading seller of corn herbicides for pre-emergent control of grasses, with half of the U.S. market, while AstraZeneca held about 15 percent. Fungicides are crop-specific, and there are typically only two or three significant sellers for any crop type. Moreover, Novartis and AstraZeneca

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[8] Two federal agencies, the Federal Trade Commission and the Antitrust Division of the Justice Department, share most antitrust authority in the United States (although other agencies also have roles; for example, Congress assigned antitrust authority for railroad mergers to the Department of Transportation). The two agencies generally agree to assign merger investigations to one or the other depending on available expertise.

were two of the three firms with strobilurin fungicides registered for sale in the United States (BASF was the third). Strobilurins are a new class of fungicides that are effective against a broader spectrum of diseases and are more environmentally friendly than other fungicides. The FTC ultimately cleared the merger under the conditions that Novartis divest its worldwide foliar fungicide business (to be sold to Bayer) and that AstraZeneca divest its worldwide corn herbicide business (to be sold to Dow Agro-Sciences).

Contrast the issues arising in commodity processing mergers with those involving seed/chemical suppliers. First, the relevant market scope differs, although each involves multinational firms with worldwide operations. Competitive issues in processing mergers typically come down to local and regional procurement markets, whereas the relevant agricultural chemical markets are considered to be national or global markets for narrowly defined products. Second, barriers to entry in chemical businesses are high, because of the risk and unrecoverable expense of the R&D investments needed to enter the industry. Even though many processing markets are highly concentrated, it is harder (though not impossible) to demonstrate substantial barriers to entry. Third, note an important similarity: the Cargill-Continental Grain and Novartis- AstraZeneca cases were each settled with the participants agreeing to divest some parts of the business as a condition of merger. Such outcomes have become far more common results of merger investigations in the last two decades, and have made merger policy into more of a regulatory instrument, subject to negotiation between antitrust authorities and the firms.

Contracts

I expect to see increased scrutiny paid to marketing and production contracts between processors and producers, as well as closer attention paid to contracts between producers and input suppliers that govern seed and chemical purchases. Antitrust issues will focus on contracts that appear to tie sales of one product to another, and to contracts that may serve primarily to limit entry by potential rivals into a market, while other regulatory issues (associated with USDA/GIPSA) will revolve around issues of price discrimination.

The antitrust treatment of vertical contracts is a complex and unsettled area of the law, and the competitive effect of vertical contractual relationships

is a complex and unsettled area in economics. Nevertheless, actions that might be unremarkable in unconcentrated and competitive markets may generate further legal and economic concerns in markets that are already concentrated (Kwoka and White, 1999).

One example of expanded antitrust scrutiny of agribusiness contracts occurred in September of 2000, when the Justice Department filed a civil suit against LSL Plant Science, a joint venture of Seminis Vegetable Seeds and LSL Biotechnologies. LSL, headquartered in Tucson, and Seminis (a subsidiary of the Mexican conglomerate Savia) together are the dominant sellers of seeds used to grow fresh-market tomatoes in North America during the winter. Hazera, an Israeli firm, is a major developer of seeds used in Europe and Asia. Beginning in the 1980s, Hazera and LSL signed a series of contracts to work together to develop tomatoes with a longer shelf life for the American market. Those contracts expired in December of 1995, except for a provision that forever bars Hazera from competing in North America against LSL and Seminis. The Justice Department sued to overturn that provision on the grounds that Hazera is the most likely entrant into a highly concentrated market and that the contract hence unreasonably reduces competition.

Note some important features of the case. First, the original agreement among the seed developers was primarily focused on investments in support of seed development, while only part of the contract related to competition. Second, non-compete provisions frequently appear in international technology transfer/development contracts (Scherer, 1994). Third, the offending agreement would have caused less concern if the seed market was unconcentrated, with many competing developers. In that case, the exclusion of one would probably not have a substantive effect on competition. But in a highly concentrated market, contracts that effectively exclude one of the few actual or potential competitors are much more problematic.

International Dimensions

Increased concentration will lead to greater antitrust scrutiny of agribusiness mergers and contracts because of competitive concerns. But expanded international trade may allay those concerns, and might thereby limit the need for expanded antitrust. The usual argument along these lines is that trade, aris-

ing from reduced transport and communications costs or from reduced government barriers, expands the geographic reach and commercial volume of markets (Scherer, 1994). Increased market sizes allow firms to expand to realize available scale economies, thereby lowering costs. At the same time, by combining previously separate markets, expanded market size brings local dominant firms into new competition with one another in the larger market, thereby driving prices closer to costs.

The combined effect can lead to sharply reduced prices for products where scale economies are large relative to the size of the market. That is more likely in Mexican and Canadian markets than in the United States where the large national market means that trade agreements will generally have only incremental effects on market sizes and competition. Nevertheless, expanded trade, by increasing the reach of some markets, will play a role in merger evaluations.

Expanded trade agreements will affect antitrust policy on contracts in more complicated ways. Consider the LSL-Seminis-Hazera contract case described above. The case itself illustrates a longstanding tension in competition policy between two goals: providing protection for intellectual property in the hopes that protection will lead to greater investment in innovation, and limiting such protection in the hopes that competition will allow the benefits of innovation to be widely diffused. Intellectual opinion and policy in the United States have oscillated between the two goals, at times leaning in the direction of greater protection for intellectual property (thereby foregoing a civil complaint against that type of contract) and at times leaning in favor of competition. Recent developments have intensified the issues, with more litigation and debate over intellectual property in agricultural biogenetics and with greater international trade bringing more firms and more countries into the issue.

Expanded North American markets will likely lead to conflicts as national competition authorities aim to apply their rules to larger markets. For example, U.S. laws against price fixing proscribe behavior that is not illegal in other countries, but is treated as a criminal violation, with substantial fines and possible jail sentences, in the United States. Foreign governments often resist U.S. efforts to gather evidence and subpoena witnesses from foreign based com-

panies that are the targets of U.S. price-fixing investigations. Recent successful U.S. prosecutions of international price-fixing cartels for agricultural inputs may lead to more extensive investigations and increased international legal conflicts.

Finally, expanded trade has created some losers among U.S. domestic producers, as well as some producers who see expanded trade and competition as the source of their difficulties. For example, the 1990s have seen sharply increased cross-border flows of fed cattle into the United States from Canada and Mexico. During periods of low cattle prices, U.S. producers frequently blame packers for low prices, and often also see freer trade as a problem (despite net exports). Many of those producers have in recent years called for changes in antitrust laws to explicitly provide protection for U.S. farmers and farm communities. As trade agreements expand markets and bring new participants into conflict, we are likely to see more attempts to use competition policies as protective devices.

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U.S. Department of Justice Antitrust Division

Robert L. McGeorge

INTRODUCTION

These comments address two of the primary competition issues identified by the organizers of this workshop and the authors of papers on competition in NAFTA markets:

- whether the elimination of trade barriers reduces market concentration; and
- whether special competition rules are or should be applied to the agriculture or agribusiness industries.

These issues are addressed from the perspective of U.S. antitrust law enforcement. The comments reflect my personal views, and not necessarily those of the U.S. Justice Department.

NAFTA'S EFFECT ON MARKET CONCENTRATION

When U.S. antitrust authorities analyze the competitive effects of horizontal mergers, they attempt to determine whether the transaction is likely to create or enhance market power or to facilitate its exercise in the product and geographic markets in which the merging firms compete. Guidelines for this analysis are found in: U.S. Department of Justice/Federal Trade Commission, *Horizontal Merger Guidelines* (*the "Guidelines"*), § *1.0*.[1] The relevant geographic market is defined as a geographic region in which a hypothetical monopolist could profitably impose a small but significant, non-transitory price increase. In most cases, a 5 percent price increase will be considered small but significant. (*Id.*, §§ 1.11, 1.21).

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[1] The *Guidelines* are available on the Antitrust Division's website ("usdoj.gov").

When a Free Trade Agreement (FTA) eliminates customs duties, quotas or other trade barriers, it often expands the relevant geographic market. To illustrate this point, assume that: (a) U.S. and Mexican firms sell a particular product in their domestic markets for approximately the same price; (b) the United States imposed a 10 percent duty on imports of that product before NAFTA: and (c) the United States eliminated duties on imports from Mexico upon NAFTA's implementation. Before NAFTA, the relevant geographic market might encompass all of the United States (with say six firms in that market). Even though there were, say, four Mexican producers located just south of the U.S. border in this hypothetical example, the relevant market would exclude Mexico if the addition of a 10 percent duty to the cost of imports from Mexico would make it impractical for consumers to switch to any of the four Mexican producers in order to avoid the U.S. producer's 5 percent price increase. *(Guidelines*, § 1.2).

Continuing with this example, if NAFTA eliminated the U.S. 10 percent customs duty, it might become feasible for U.S. consumers to switch to the Mexican producers in order to avoid the U.S. producer's 5 percent increase. If enough consumers were likely to switch to the Mexican producers to make the 5 percent price increase unprofitable, the relevant geographic market would be expanded to include the region in Mexico where the four Mexican producers were located.

The expansion of geographic markets, however, does not always result in market de-concentration. To illustrate this point, again assume that NAFTA eliminated the 10 percent customs duty. If all of the Mexican firms were independently owned, the number of firms in the relevant geographic market would increase from six to ten, and the relevant geographic market would be less concentrated after NAFTA. But, if some of the U.S. producers owned or controlled some of the Mexican producers, the larger post-NAFTA U.S./Mexican geographic market could be more concentrated than the smaller pre-NAFTA U.S. geographic market.

As a note of caution, governments that have the power to expand relevant geographic markets by adopting FTA's usually retain the power to subsequently contract those geographic markets. For example, NAFTA authorizes

member countries to exclude or limit imports by imposing antidumping duties, countervailing duties and other forms of import trade relief. NAFTA also includes "snap back" provisions that reimpose duties or quotas if there is a sudden surge of imports. And, currency fluctuations that occur after the adoption of an FTA can offset the elimination of customs duties.

RULES FOR ANALYZING COMPETITIVE EFFECTS OF AGRIBUSINESS MERGERS

The *Guidelines* apply a common framework for analyzing the competitive effects of mergers in all industries. In one sense, however, there are special rules for agriculture and agribusiness, because the application of this analytical framework requires an investigation into the specific competitive conditions in the industry in which the merging firms compete. Despite the specific nature of each merger investigation, it is possible to sketch some broad generalizations about merger investigations in the agriculture and agribusiness industry. First, although concentration at the farm level continues to increase as the number of U.S. farms decreases, farming tends to be an unconcentrated industry. It is unlikely that the U.S. competition authorities will challenge one farmer's purchase of acreage from his neighbor.

Second, the Department of Justice is concerned about mergers among firms that sell inputs to farmers that may create, enhance or facilitate the exercise of monopoly or oligopoly market power. Recent investigations under Section 7 of the Clayton Act include:

- Monsanto's acquisition of DeKalb Genetics corporation (which resulted in Monsanto's agreement to spin off important rights to agrobacterium-mediated transformation technology and to license its Holden's corn germplasm rights, as
  the price for avoiding a challenge in court);
- the New Holland/Case merger (which resulted in divestitures of New Holland's four-wheel drive and two-wheel drive tractor business and Case's hay tool business); and
- Monsanto's proposed acquisition of Delta & Pine Land's cottonseed business (which resulted in the parties' abandonment of the transaction).

The Department of Justice is also concerned about mergers among firms that buy products from farmers. Under the *Guidelines*, market power includes monopsony or oligopsony power- - the power to depress the price paid for a product below the competitive price. (*Id.*, § 0.1). Farmers, in particular, may be vulnerable to the exercise of monopsony power, because the relatively high cost of trucking their crops to distributors or processors in comparison to the value of crops often means that it will not be feasible to ship them very far past the closest buyer's facilities in order to get a better price. As noted in the MacDonald paper, the Department's actions in the Cargill/Continental transaction provide a useful insight into our analysis of concentration in the grain distribution business. After evaluating numerous local geographic markets in which the transaction might have created, enhanced or facilitated the exercise of monopsony power, we required divestitures of Cargill or Continental facilities in all of the approximately twelve local markets in which we concluded that the transaction might create this type of market power.[2]

The adoption of an FTA can affect our monopsony analysis in some cases. For example, if NAFTA made it feasible for farmers in northern Montana to sell their crops to nearby Canadian grain distribution companies, as well as nearby U.S. firms, the relevant geographic market would be expanded to include those Canadian buyers. As with the previous monopoly power example, the adoption of NAFTA could, but would not necessarily, ameliorate monopsony concerns by reducing concentration in the relevant geographic market. On the other hand, if NAFTA eliminated all Canadian duties and quotas, but its sanitary regulations precluded U.S. farmers from selling their crops to Canadian grain distributors, we would exclude those firms from the relevant geographic market, no matter how close they might be to the U.S. farmer.

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[2]The Antitrust Division's website (http://www.usdoj.gov) includes pleadings, briefs, press releases and other public documents for recent merger investigations and court cases. Documents such as Competitive Impact Statements and Responses to Public Comments often provide useful summaries of our legal and economic analysis.

Canadian Perspective on Competition

*Halldor P. Palsson and Joseph Monteiro**

INTRODUCTION

The authors set out to test (i) whether larger markets result in greater concentration and (ii) whether greater concentration increases the exercise of market power. The empirical work of James Rude and Murray Fulton to test these factors for Canadian agribusiness is based on the structure-conduct-performance (SCP) approach. We appreciate their effort and the importance of empirical work on the subject using data from the free trade era.

Our comments are organized as follows: First, we provide a brief summary of their paper. Second, we indicate from the antitrust perspective the importance of concentration in market power analysis. Third, we give our reservations with regard to their testing of the concentration and market power hypothesis.

A BRIEF SUMMARY OF THE PAPER

The study examines the impact of increasing the size of the market on concentration. A larger market should lower concentration and prices. This proposition is in the context of examining the impact of trade liberalization which would increase the size of the market. The authors then examine evidence on concentration for the period prior to the Canadian-United States Trade Agreement (CUSTA), 1983-1988, and for the period following the signing of the Agreement, 1989-1996, when the market was supposedly larger.

Their principal result is that there is no significant change in concentration between the two periods. Only two sectors have a decrease in concentration. There is an increase in concentration for some industries. Decreases

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* The views are those of the authors and not necessarily those of the Competition Bureau, Industry Canada.

are probably not the result of trade liberalization. Increased concentration is attributed to factors such as supply-management, transportation costs and tastes. There is therefore no relationship between increasing the size of the market (or trade liberalization) and concentration.

The study then examines whether concentration leads to increased market power. The authors do not detect a statistically significant relationship between concentration and performance. This is similar to the past results of many SCP studies. The authors found a statistically significant positive relationship between concentration and market power but there is generally a lack of relationship between trade liberalization and markup, except in three sectors.

AN ANTITRUST PERSPECTIVE ON CONCENTRATION IN MARKET POWER

Rude and Fulton have treated broad sectors as product markets. The geographic market is always Canada. As antitrust practitioners we have a different view of market definition. Product markets are defined to determine which products are demand-side substitutes. These are products that are reasonably interchangeable by consumers for the same purposes when price, use, and qualities are considered. Geographic markets are defined by determining the location of firms that produce the same product to determine supply-side substitution. This is the area where customers can turn to other suppliers and transportation costs may be the determining factor.

The Standard Industrial Classification (SIC) is the system used to collect and analyze data on the activities of firms. The SIC classifications do not correspond to antitrust economic markets. In a properly defined antitrust economic market we know that concentration will be a good proxy for market power. We define antitrust markets by asking if a hypothetical monopolist could increase prices by, say, 5 percent in the proposed market. The SIC classifications have product markets that are either too broad or too narrow. The geographic market suffers from the same defect. For example, potato chips might be part of a broader snack products market. Should soft drinks be treated as a separate product market? We thought so and found many geographic markets in Canada based on the location of plants and the shipment patterns of bottlers.

Table 1: Mergers in Agriculture and Agri-food, 1986-2000.

86/87	87/88	88/89	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00
7	29	20	20	22	24	15	8	13	20	22	27	22	23

Source: Monteiro, Joseph, Statistics on Canadian Mergers Examined By The Competition Bureau (1986-1998), *Canadian Competition Record*, Winter 1998-1999, pp. 64-71.

We think that the inconclusive statistical results flow from these problems and the use of the SCP model. The discussion of the results in the paper makes a compelling case for addressing the issues at a lower level of aggregation. Rude and Fulton note that Heinz has a monopoly in jarred baby food in Canada. We can add that this is due to Heinz winning an antidumping case against Gerber. The Canadian sugar industry, which is a monopoly-duopoly, also won a dumping case against the United States and others in 1995, and now faces no import competition. The authors can cut and simplify the discussion on entry barriers and sunk costs by linking it to the Herfindahl index. We can presume that in industries with a low Herfindahl these are not important.

DATA ISSUES AND CONCLUDING REMARKS

A number of mergers have occurred after 1996 in the agribusiness sector. From our records, mergers that have been reviewed by the Competition Bureau are shown in Table 1. In other words, one-third of all mergers in the agribusiness sectors has occurred in the years after 1996 in comparison to the mergers that have occurred in the previous ten years. Without commenting on the significance of these mergers, had a similar study been done with regard to telecommunications we would have had no hesitation in indicating that the results would have been affected significantly if the last few years were omitted.

The authors have made a good attempt to investigate whether the agribusiness sector is becoming more concentrated in Canada and whether increased concentration leads to more market power. Their results should be interpreted with caution. Their research we hope will stimulate further work in this area at a more disaggregated level.

Castañeda y Asociados

Gabriel Castañeda

This note is intended to flesh out selected issues suggested in the MacDonald and Rude/Fulton papers from the perspective of the role of competition law and policy in agribusiness.

Conceptual Issues

Competition laws and policy (CLP) are among those issues consistent with Free Trade, a "mixture of public goods and a result of market failure", as stated by Knutson et al in the last paper in this publication. Thus, as a justification of antitrust policy, the power of the State intervenes in markets through regulatory enforcement to correct imperfections in the functioning of supply and demand.

The basic assumption of CLP is that a market with more competitors is a market that delivers lower prices, which is to admit that a monopolist extracts extra-competitive rents, thus reducing overall welfare. As commented by MacDonald, collusion - the meanest form of monopolistic conduct and undisputedly almost always an antitrust offense - attests to that. One example is the lysine world-wide price fixing scheme unveiled in 1998 which generated 40 to 70 percent price increases. Given the above principle, a more concentrated market creates incentives for collusive behavior and abuse of market power. But, are concentrated markets noxious by definition?

MacDonald identifies two basic areas of concern in agribusiness: 1) concentrated markets; and 2) contract agribusiness. In my view, neither paper provides solid evidence to conclude that agribusinesses operate in markets that are too concentrated, nor produced conclusive evidence to raise deep concerns on the contracting trend being followed by agribusiness. A particular market should not be regarded as too concentrated simply by means of a simple C4 or HHI index calculation, but rather by a thorough analysis of barriers to entry

(which both papers recognize as being very low in agribusiness). Also, efficiencies should be weighed against the alleged anti-competitive effects stemming from "excessive" concentration. Efficiencies (including innovation, economies of scale, intellectual property enhancement, among others) may be absent if markets become unconcentrated. As to the concerns raised by contractual arrangements, the MacDonald paper fails to balance anti-competitive effects against so many obvious benefits. Contracts tend to distribute risks among parties, reduce transaction costs, offer stability and may prevent free ride, so perhaps contractual arrangements may be doing more good than evil in many instances. At least in the case of Mexico, my hunch is that contract agribusiness is a feature of the more developed areas, while contractual investments are close to zero in the poorest farms.

The Mexican Perspective

Over the last fifteen years, Mexico has implemented a three-pronged strategy towards structural reform: trade liberalization, deregulation of crucial economic activities, and privatization of many industries previously under government control. Competition policy was seen in 1993 as a necessary complement to structural reform, therefore a pro-efficiency antitrust statute was adopted and its enforcement was entrusted to a truly independent agency, the Federal Competition Commission.

Discussion of competition law enforcement in the agriculture/cattle/farming area must be divided into: 1) the primary sector, mainly including peasants and basic production processes up to marketing, where lots of collusive arrangements in formal breach of the statute take place but that enjoy an understandable de facto structural exemption; and 2) the processed goods sector, where cases have been reviewed by the Federal Competition Commission. Most relevant cases in this area include:

- market obstructions by local governments;

In 1996 there was a case where the Government of the State of Sinaloa[1] was found unduly impeding entry of flowers from other states alleging lack of a local permit to enter. The FCC instructed the State to cease and desist such

[1] See: *Economic Competition Report*, 1995-96. Federal Competition Commission, p.72.

practice. The FCC has pursued a good number of cases of similar nature afterwards.

- price fixing;

In a 1997 case, the FCC investigated an alleged price fixing scheme in the marketing of poultry in Yucatán. The defendants were acquitted. Since then, the FCC has pursued tortilla distributors (1999)[2] http://cfc.gob.mx November 1999. and milk cooperatives (2000) for similar collusive behavior, with no condemning rules thus far.

- merger control.

The FCC cleared the merger of several mill facilities related to a vertical integration plan of the Bimbo Group (bread) in 1998[3]; and also the integration of similar production facilities of the Gamesa-Pepsico Group (cookies and crackers)[4]. The FCC also authorized Bachoco[5] to purchase Campi, a horizontal merger of prominent and efficient poultry Mexican firms. Finally, two technology related international transactions were reviewed by the FCC: the Monsanto/Asgrow/Cargill/Sehisa[6] merger, cleared with conditions, which involved certain ingredients of an international relevant market and also considered the importance of research and IP efficiency. The FCC also cleared the BASF/American Cyanamid[7] merger, citing research and development efficiencies.

Cross- Border Issues And Potential Developments

As far as NAFTA is concerned, its Chapter XV contains too few provisions on competition law and policy, and they are vague.....only stating that Parties shall "adopt or maintain measures to proscribe anti-competitive business conduct and take appropriate action with respect thereto", a will to coop-

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[2] See: Federal Competition Commission Investigation of Monopolistic Practices Resolution at *http://cfc.gob.mx/cfc99i/resolutions/investigaciones/november99/TORTILLAS.htm*

[3] See: Economic Competition Gazette March-August 1998, p. 111.

[4] See: Economic Competition Gazette March August 1998, p.140.

[5] See: Federal Competition Commission Merger Resolution at *http://cfc.gob.mx* Dec.1999.

[6] See: Economic Competition Report 1999. Federal Competition Commission, p. 28.

[7] See: Federal Competition Commission Merger Resolution at *http://cfc.gob.mx* June 2000.

erate, some obligations as to check on state enterprises conduct and the establishment of a Working Group to report and make recommendations on the relationship between trade and competition policy. Controversies on competition matters may not be solved through the NAFTA panel mechanism.

On the bilateral front, Mexico and the United States have entered into an antitrust enforcement agreement, in force since July 2000. This agreement involves the FCC with the U.S. Department of Justice and the Federal Trade Commission, and contains the following basic features:

- a notification mechanism by which enforcement actions taken by one country that may affect important interests of the other shall be notified;
- calls for coordination of enforcement actions between agencies;
- provides positive community obligations (country A may request country B to investigate anti-competitive behavior in the latter's territory when such conduct affects interests of country A);
- agencies may share non-confidential information;
- agencies shall grant each other assistance to obtain evidence or testimony.

The United States and Canada have a similar arrangement in place.

What can we expect on this front? As investments from the United States, Canada and Mexico increase, one could expect cross-border problems to arise. Problems could arise in the area of state aid/subsidies, or in the area of protective regulation, and in antidumping procedures, due to the cartel-like arrangements organized to litigate these matters. Attention should be directed to minimize potential risks: why not eradicate antidumping in the NAFTA area (and replace it with predatory pricing regulation), especially in view of the success stories of Australia/New Zealand or, more recently, the FTA between Canada and Chile?

More has to be done to eradicate regulation that over-protects groups that abuse their power to engage in anticompetitive conduct. For example, CONPAPA, the Mexican trade organization, allegedly was used by Frito-Lay as a vehicle to fuel a "buy-Mexican" campaign designed to obstruct competitor "Pringles" from entering the market, under the claim that "Pringles" was not from Mexican potatoes. Another issue to look at: is the antitrust exemption for export cartels still justified?

Competition Under Free Trade

Role of Antitrust Remedies. Discussion indicated that there are serious questions of whether antitrust in its present form is the best approach for dealing with agricultural issues of concentration, contracting, and pricing. Antitrust/competition policy in general is not designed to deal with structural issues although it can deal with merger issues, but maybe not to the degree desired by the stakeholders. Contracting is sometimes viewed as a problem but there is nothing that antitrust can do unless there is evidence of systematic abuse.

A belief was expressed that there is a substantial monopoly problem at the local level in the agri-food sector. The U.S. Department of Justice investigated this issue as a component of the Continental-Cargill acquisition and required several divestitures where local monopolistic conditions were found. Also, the point was made that this only just touches the tip of the structural iceberg. The point was then made that little can be done about this issue unless there is overt abuse and the existence of a complaint. An alternative then ends up being one of increased cooperative involvement in markets to make them more competitive. (Editors note: discussion came up short of suggesting revisions in antitrust policy to make it more applicable to structural problems in the agri-food industry). At other times in the workshop, the need for more cooperation among the NAFTA partners on issues of competition were identified, particularly in research, information sharing, administration, and policy development.

In agriculture there is a significant tradeoff between economics of scale and monopoly issues that extend to the local level. The issues then becomes one of the tradeoff between cost reductions and price increases, but margins often decline. That is, price does not decline as much as costs decline. The evidence also suggests that consumers get most of the benefits of economies of size.

Impacts of NAFTA. One of the main competitive impacts of NAFTA has been reduction in barriers to entry. This is an important antitrust consideration to Mexico. Antidumping laws were identified as barriers to competition. It is interesting to note that the Canada-Chile free trade agreement contains a provision to eliminate antidumping complaints. Canada would be far more concerned about concentration if NAFTA did not exist. For example, NAFTA was indicated to be very pro-competitive in the malting barley market.

Section 4

Subsector Analysis

This section reviews structure and competition in the hog/pork, cattle/beef, and field crop subsectors

IMPLICATIONS FOR TRADE TENSIONS AND DISPUTES FROM STRUCTURAL IMPACTS OF THE NAFTA: A U.S. PORK INDUSTRY PERSPECTIVE

Steve R. Meyer

INTRODUCTION

After accepting our charge to address the title subject, Martin Rice and I concluded that the differences in our perspectives would do more to meet the goal of this conference than would a consensus piece. While Martin has addressed trade issues in a broader context, I will confine my comments to structural changes and their long-term implications for the partners to the NAFTA. The entire idea of NAFTA (and any other free trade agreement for that matter) is to integrate markets so that resources can be used most efficiently, costs minimized and, consequently, public welfare maximized across the trading countries. This in no way implies that all consumers or producers will be better off or that no consumer or producer will be worse off. The collective welfare (as measured by consumer surplus) will, however, be maximized under free trade and competitive markets. Adjustment times and phase-in periods allow time for those made worse off to make adjustments to take advantage of the changes wrought by the agreements.

The NAFTA formalizes a paraphrase of communications theory's admonition that "You cannot choose to not communicate"..... the NAFTA brings to hog and pork producers in all three countries the message that "You cannot

Table 1: Population and Population Growth Estimates, NAFTA Countries.

	2000 Pop. (Mil.)	*2025 Pop. (Mil.)*	*Natural Growth Rate (%)*	*Time to Double (yrs.)*
United States	275.6	337.8	<1	120
Canada	30.8	36.0	~0	178
Mexico	98.8	132.0	1.95	36

Source: Population Reference Bureau, 2001

Table 2: Pork Production, Imports, Exports and Consumption, NAFTA Countries.

	Production		***Imports***	***Exports***	***Consumption***	
	000 MT	*% of Total*	*000 MT*	*000 MT*	*000 MT*	*% of Total*
U.S.	8758	76.5	453	569	8440	80.1
Canada	1675	14.6	70	750	998	9.5
Mexico	1010	8.9	130	35	1105	10.5
Total	11443				10533	

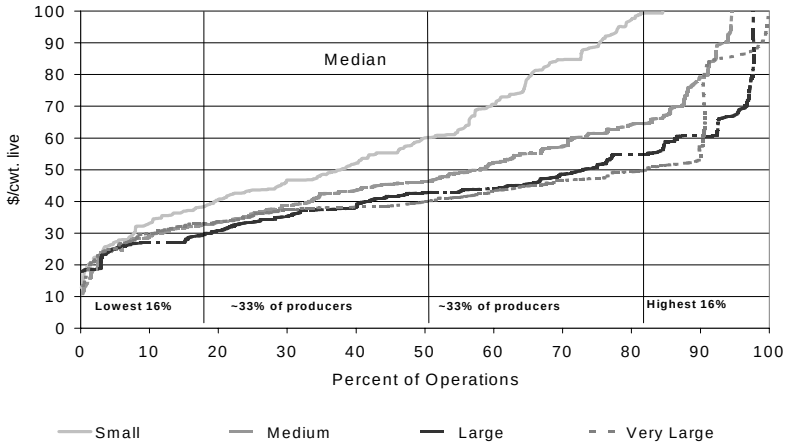
Source: USDA Foreign Agricultural Service

choose to not compete." The emergence of Japan as the major export market for all three countries would have eventually driven this point home. The NAFTA has accelerated the process dramatically. We can no longer view each country's "market structure" as a stand-alone entity. We must redefine structure to encompass the entire trading community.

The key to the NAFTA appeal is what each market offers in terms of consumers. Table 1 illustrates that NAFTA immediately increased the number of buyers for goods from all three countries, mainly due to the overwhelming size of U.S. population and it's relatively high personal income level. In fact, the $37 billion consumer expenditure on pork in the United States will eventually be completely open to trade from both Canada and Mexico . Mexico offers a long-term population growth rate that will not be matched by either the United States or Canada.

At the same time, the number of sellers chasing consumers, and the amount of product offered to them, increased dramatically. The dominant role that the United States plays in the overall supply and demand picture of the North American pork industry is illustrated in Table 2. But economic theory

Figure 1: Production Cost Distributions of U.S. Hog Producers, Operating and Ownership Costs.



teaches us that it is the marginal unit of production that determines price. As a result, each country will bear equal responsibility for the sector's performance. While this is true, the United States appreciates the importance of a small change in its already-large production base. We have clearly been the major determinant of supply and demand balance but growth of Canadian production and integration of three separate markets will reduce this role over time.

Against this backdrop, I would like to address four aspects of industry structure that are expected to have a bearing on the future of the North American pork industry, and discuss how they might give rise to various types of trade tensions and disputes.

Economies Of Size In Production

The same economies of size that have driven major changes in producer structure in the United States since the 1980s are now being realized in Canada and Mexico. The competitive pressure of generally larger, more efficient units will drive the hog production sectors of all three countries over the next 20 years. The opening of markets due to NAFTA will speed up this process. USDA, Economics Research Service research in 2000 showed dramatic

Table 3: Operations and Inventory share with costs above $50/cwt.

				Costs above $50.	
Category	Number	Inventory Share	Percent	Number	Inventory Share
Small	88,985	12	65	57,840	8.0
Medium	18,175	25	40	7,270	10.0
Large	4,765	22	10	477	2.2
Very Large	1,905	41	10	191	4.1
Total	113,830	100		65,778	24.3

Source: McBride, William, Production Costs of U.S. Pork Producers, USDA-ERS and Hogs & Pigs, USDA-NASS, December 1999. In this study, "Small" producers had 1-499 head in inventory, "Medium" had 500-1999 head, "Large" had 2000-4999 head, and "Very Large" had 5000 head and more.

differences in the cost distributions of U.S. hog producers of various sizes. Figure 1 shows the cumulative probability distribution functions from this study. Note that nearly 80 percent of the large and very large producers had total costs of $50/cwt or less. Only about one-half of the medium-sized and one-third of the small producers had such costs. Herein lies the main force for change in the U.S. industry over the past 20 years, and this force is now at work in Canada and Mexico as well.

What does this mean for the structure of the U.S. industry? Table 3 shows the ERS cost distributions and December 1999 data for the number of hog operations in the United States. The data show that about 58 percent of the operations in the United States, representing nearly one-fourth of the hogs in inventory, are at competitive risk from more cost-efficient producers.

Economies Of Size In Packing and Processing

Cost data for pork packers are much harder to come by than data for hog production costs but consideration of the recent history of North American packing companies points out that significant economies of size exist and that these will drive change throughout the NAFTA countries. The cost efficiency of U.S. packers long made the United States the lowest-cost supplier of pork to world markets. Canada had an advantage in hog production costs but was at a decided disadvantage in packing costs due to U.S. packers economies of scale and generally lower wage rates. Much of that disadvantage for Canada has

disappeared. The Maple Leaf Foods strike in 1997 lowered the wage structure of Canadian packing plants. Modernization, expansion and construction of new plants has left Canada with several world-class packers which, when combined with Canada's already efficient production segment, can compete effectively in any market in the world. The same pressures will likely now affect Mexico. We already see new plants aimed at export markets and we will likely see more as Mexico's pork industry competes with the United States and Canada at home, and in export markets.

Can packing economies-of-scale grow farther? I'm always hesitant to rule anything out but it is not clear that anyone will be able to push chain speeds higher than what we see now in Brandon, Manitoba and Tarheel, North Carolina. But there are a number of middle-tier packers that can capture some economies by merging into multi-plant companies. Heightened concern about food safety and the food safety risk faced by single-plant firms will only enhance the incentive for this type of consolidation. The competitive bar will rise even farther.

Barriers To Entry

This is a separate but closely related topic to the discussion of economies of size. As shown explicitly for production costs, these economies yield substantial advantages to large firms. They also necessitate very large capital investment. While modern hog production involves $4-$5 of capital per dollar required in modern pork packing, the packing sector must also invest enormous amounts to establish brand identities and build marketing relationships. Brands are a key element in pork marketing in North America. A high proportion of pork (60 percent or more) is processed and branded and, with the advent of deep basted "fresh" products, this percentage is rising and will reach 80-90 percent in the not-too-distant future. The brands themselves are viewed by many as barriers to entry. Indeed, any new entrant would be remiss if they did not recognize the value of a brand name and the long, difficult, sometimes expensive road that must be traveled to develop a successful brand. But this is not a function of corporate manipulation; it is a function of consumers' valuing consistency and dependability. Here again, food safety concerns have added a new aspect to the loyalty and trust relationship between a consumer and a brand.

Finally, the difficulty of breaking into established relationships can serve as a large barrier to entry. This is especially true in international dealings. Retail chains and foodservice operations hold the key relationship, contact with the consumer. The size, importance and power of both retail and foodservice firms has grown over time. Getting access to these channels is no easy task, due largely to their value to incumbent suppliers.

Product Differentiation

Product differentiation has often been viewed as a barrier to entry, especially when incumbent firms are zealous about developing new product varieties. I'm not sure the pork industry can be viewed as "zealous" in the same way that, say, ready-to-eat cereal manufacturers were viewed in the 1970s and 1980s when this theory was developed. This viewpoint is raised only to offer the pork industry as its antithesis. Product differentiation is, in fact, the flip side of market segmentation. What good does it do to differentiate a product if there is not a market segment that wants the "different" product? In that regard, I think it is obvious that new market segments are developing at a rapid pace in all three NAFTA countries and in their export markets as well. Consider China as a 1.2 billion consumer "segment" that generally eats pork products that U.S. consumers don't eat! That may be less true for Canada and Mexico but among 1.2 billion people there will be segments larger than our respective countries! In addition, these emerging segments will lend themselves to service from smaller, more nimble companies. The large, "economies of scale" firms will be able to serve some of these by sorting from the wide distribution of products, but many of these segments will be served by smaller firms who can extract enough value from their products to overcome scale disadvantages.

These opportunities should exist in all three NAFTA countries, and abroad. Market segmentation and product differentiation will be a wonderful opportunity in years to come.

Vertical Integration

Vertical integration is the Devil himself to many producers in all three NAFTA countries! Vertical integration is almost always synonymous with BIG. The future, though, will require some variant of vertical integration regardless

of size. Value chains are composed of innately interdependent agents. Consumer needs for consistency, convenience, safety and specific traits like "green" pork, Berkshire pork, "welfare" pork, etc. will require the control of vertical integration. In fact, I believe we will see the smaller producer/packer segments become highly vertically integrated long before we see the larger ones. It's already happening, helped along by more face-to-face contact among the various firms and the resulting easier path to beneficial trust relationships.

Effect on Trade Tensions and Disputes

One conclusion that seems obvious from the first six years of the NAFTA is that there will be more trade among North American countries. Whether this causes more tensions and disputes because of more opportunities, or less tensions and disputes because of more familiarity and comfort remains to be seen. It appears to me that relations are getting better and that the parties involved are learning how to effectively settle disputes as they arise. I believe, however, that the competitive pressure of structural changes will cause considerable dissatisfaction within certain sub-sectors of member countries. This dissatisfaction will manifest itself in political responses within the NAFTA countries. My experience is that politicians can usually best solve an internal political problem by finding someone outside their borders to blame. So, I think these disputes will, in turn, manifest themselves in trade disputes.

The hog price crisis of late 1998 had nothing to do with trade, especially within North American, but NPPC found itself arguing with our own producers about the effect of Canadian imports. "Yes," we said, "live hogs from Canada have worsened an already bad situation, but if you want free trade it's a two-way street and you can't bail out when it works against you!" Most reasonable producers accepted that position but I fear that the argument fell on far too many deaf ears belonging to producers who wanted to create "Fortress America" in response to a severe short-term problem. Furthermore, most of these producers are the same ones who look for government intervention in the market-driven changes that have occurred in the U.S. producer segment over the past decade. When similar structural change occurs in Mexico and Canada, I suspect that many producers in those countries will also want to blame NAFTA trading partners.

The shift of the U.S. pork production segment to larger, generally more efficient units is driving changes in both Canada and Mexico. My friends in these countries producer organizations are, I'm sure, already having discussions about the wisdom of subjecting themselves to such direct competitive pressure. The aggressive growth of production in the Canadian prairie provinces has many U.S. producers posing the same question.

Remember my earlier paraphrase of communications theory: "you cannot choose to not compete"..... to which I would add.... "short of exiting the business!" Whether competing in North America or Southeast Asia or Russia, the pork industries of the United States, Canada and Mexico will compete with one another. Some producers and processors in all three countries will be harmed by the competition, but many will flourish. Ultimately though, our eyes must be on our customers and it is they who will be the ultimate benefactors of more competition and more cost-efficient production and processing.

IMPLICATIONS FOR TRADE TENSIONS AND DISPUTES ARISING FROM STRUCTURAL IMPACTS OF NAFTA: A CANADIAN HOG INDUSTRY PERSPECTIVE

Martin Rice

INTRODUCTION

It is almost taken as a given that trade liberalization arrangements such as the North American Free Trade Agreement exert a huge impact on the structure of an industry. The introduction of greater competition arising from the reduction or elimination of import barriers, and the additional sales opportunities provided by improved access for domestic industries to foreign markets, will almost certainly accelerate the pace of modernization, innovation and other behavioural norms that help determine the structural profile of an industry.

As I understand the objectives of this workshop, our purpose is to ponder the implications of these structural developments for the tendencies toward pursuing trade dispute actions by affected economic sectors. My own task is to look at it from a specific agri-food perspective, the hog/pork subsector. The co-speaker on this topic, Steve Meyer from our U.S. counterpart National Pork Producers Council, and I have chosen to look at this question from our own respective economic circumstances. We thought it could be the differences in what we have to say, as much as what we would say in common, that will be of interest to the workshop participants.

The way that the Canadian industry would look at this issue is with the perspective of a country with a relatively smaller domestic market and production, and also greater dependence on trade, particularly export access. Roughly one in every two pigs born in Canada is ultimately exported, as a feeder pig, a slaughter hog, or more often, as pig meat. The U.S. industry is a larger industry, thus providing an advantage in identifying and exploiting economies of scale. Their domestic market is relatively much more important in determining their overall economic health. Our other NAFTA partner, Mexico, has its own unique circumstances, and Enrique Dominguez remarks will be as important as our own comments in considering industries trade dispute behavior under a free trade arrangement like NAFTA. Ed Tyrchniewicz, with academic as well as what one might call public interest reconciliation facilitation experiences, is bound to add some interesting content to the discussion.

NAFTA CONSEQUENCES ON INDUSTRY STRUCTURE

To contemplate what have been the impacts of the North American Free Trade Agreement for our hog/pork industries, one needs to examine the situation prior to the trade deals existence. Was the subsector in a strong or weak position relative to its competitors in the other country? Had it been exposed to, and had it been able to take advantage of internationally competitive input prices?

Prior to NAFTA, both the United States and Canada had zero import tariffs in effect on unprocessed pork as a result of previous GATT rounds, and as major players in the world grains and oilseeds markets, had internationally competitive feed grain prices[1]. Mexico, however, had not been a member of the General Agreement on Tariffs and Trade for very long prior to the creation of NAFTA, and had in place high tariffs on meat as well as significant restrictions on the use and importation of corn for livestock production.

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[1] There was an exception, small grains in western Canada (wheat, barley) where local feed prices were higher due to transportation subsidies on export grain, a situation that was largely corrected by the revocation in the mid-1990s of the Western Grains Transportation Act.

For the Mexican pork industry, adjustment to a free trade environment involved much more significant change than was the case for their northern neighbours. They had to adjust from a situation where prices of inputs and output were largely determined within Mexico, to one of more North American-origin prices subject to a declining tariff. This included having to adapt to the same up-and-down hog price cycle that their northern counterparts were used to. To make matters even more challenging for a protected industry moving to open competition, they were being directly exposed to Canadian and U.S. hog prices which, due to our production and marketing efficiencies, are generally the lowest in the world, at least among open market economies. While modernization was no doubt already taking place within the Mexican hog and pork sector, the new market realities made it more important, and more feasible, to tap into the feeding, genetics and other input strategies being pursued elsewhere.

Another consideration for examining structural impacts of free trade is whether all segments of the supply chain are in similar circumstances, or is one better able to withstand, and even thrive on, increased competition and opportunities arising from the trade agreement? At the time that the North American continental free trade negotiations were conducted, the hog growing segment of the Canadian hog/pork subsector was quite competitive vis-à-vis its U.S. counterparts. Such was not the case for the hog processing segment. There developed in the 1980s and into the 1990s a significant and growing export of Canadian feeder and slaughter pigs to the United States. The smaller and technologically older Canadian slaughter and processing facilities were unable to pay prices for the hogs that would prevent a growing proportion of them from moving to the U.S. buyers that were paying higher prices. For a time, Canadian hog processors were provided something of a cushion against the lower cost U.S. packers when a countervailing duty was applied on live hogs moving from Canada into the United States. However, as Canadian subsidy programs were eliminated, the duty declined and thus that protection was also eroded. By the time the duty was eliminated, it had become quite apparent to Canadian hog processors that they had no choice but to make significant capital expenditures and labour cost-saving measures so they could achieve cost economies that would permit them to bid competitively for hogs against the U.S. companies.

Now, for the first time in probably decades, there actually are some Canadian hog processing facilities which offer an attractive alternative marketing opportunity for U.S. hog producers, particularly in northern states.

What the free trade agreement provides that is of great importance here is the clear signal to all market participants that the barriers that now exist are in support of, not restrictive of, cross-border trade. The elimination of tariffs, the establishment of rules providing imports accorded equal treatment with domestically produced goods, and the availability of binding dispute settlement procedures have provided a solid foundation for market transactions between countries to become essentially like transactions within countries in terms of some assurance of being able to retain that business once the individual buyer and seller considerations have been met. Increased understanding of the rules, and confidence that they will be applied, seems to lead to greater cross-border business collaboration and specialization. In the hog/pork subsector, one example is the long-term contracting of feeder pigs from Canada to growers in the United States. Even with the emergence of more competitive hog purchasers in Canada, the flows of feeder swine remain steady. That channel of commerce has become quite well established in the form of long-term partnerships.

The Canadian hog processing industry was for many years entirely in Canadian hands. Recently, Smithfield has taken an important position in that sector through purchase of all or a majority interest in two of Canadian companies, Schneider[2] and Mitchell's Gourmet Meats.

SOME IMPLICATIONS FOR COMPETITION POLICY

Traditionally, when examining the degree of competition within an industry (numbers of sellers and buyers, etc.) and the implications of consolidation within a sector, the geographical context has been the country itself for which the competition legislation applies. In the Canadian hog/pork subsector, there has been tremendous consolidation. If looked at in a Canadian context alone, there likely would be greater pressure being brought to bear on competi-

[2] Schneider Corp. recently sold its fresh pork business to Maple Leaf Foods.

tion authorities to examine the implications of the emergence of one or two major players in the purchasing of hogs in Canada. While there undoubtedly are some concerns with the increasing concentration of buyers, there also exists an attitude shared by many observers that for there to be any buyer willing to pay as much as U.S. companies do for market pigs, they will need to be large enough to compete in the larger North American context. And for Canada's approximately 25 million hogs produced per year, more than one or two players in the volume end of the spectrum is likely not feasible.

FREE TRADE IMPLICATIONS FOR TRADE RELATIONS

Just as a free trade agreement can lead to more efficient industries within the trade bloc, these industries may be more competitive vis-à-vis the rest of the world. The greater exposure to the intricacies of cross-border trade within the agreement territory may well also increase the appetite of these players for doing business with other nations. It is interesting to note, for example, that all three NAFTA countries have emerged as significant exporters of pork into Japan. Such developments lead to recognition of common interests in third country trade. This helps to broaden the nature of the dialogue among industries and their representatives, to more than simply bilateral issues.

While there are developments that may lessen the interest in, or likelihood of, trade disputes, some of the consequences of the free trade arrangement, and the attendant structural changes which it promotes, may actually increase the probability of a trade action through the greater volumes of commerce that inevitably occur. This is particularly the case during a cyclical downturn when commodity prices fall, and suppliers may see imports as being a large part of their problem. There can remain within the community of sellers, if they are not directly engaged in this new continental market reality, the notion that they should retain a priority with the buyers in their own country whenever total supplies start to become burdensome and prices are depressed.

Each country in the NAFTA has retained its own separate countervail and dumping legislation which may be applied to examine the impact of product coming in from another country, even a free trade partner nation, as if it is derived from a separate world altogether as the domestic supply. In fact, as a

result of the integration between the free trade countries economies, there is very little to distinguish between the two supplies in terms of how products are produced and priced. Increasingly, there are contracts in place between sellers and buyers that happen to be located on opposite sides of the political border. These contracts may not differ in any appreciable way from those in place between the buyer and more locally based sellers. Nevertheless, that buyer may come under pressure for continuing to purchase from foreign sources when, for example, hog numbers are high and prices low.

It becomes more complicated to operate separate, country-specific, trade remedy dispute systems as the economies of the countries within a trading bloc become more integrated. In Canada currently, there are provisional countervailing and antidumping duties on grain corn entering western Canada from the United States [editors note: the tariff was in place from November, 2000 to March, 2001]. Given that Canada, as a relatively insignificant importer of corn relative to the world market, has to absorb most of the impact of such tariffs, this new duty renders Canadian users of grain corn less competitive vis-à-vis U.S. counterparts. This, in turn, can lead to an increase in feeder animal exports thus losing value-added in Canada, and potentially becoming a trade irritant for some in the United States who see all of these additional feeder animals contributing to a buildup of total hog supplies relative to slaughter capacity in that country.

The Canadian Pork Council, along with several other Canadian parties, is actively opposing the permanent imposition of these duties. Although sympathetic to the notion that there be a level playing field internationally of government support for agriculture, we are not sympathetic to any means of achieving that objective which places the burden of adjustment on the backs of other segments of the marketing supply chain by imposing countervailing duties on imports. In our view, the costs of the battle to achieve international agri-food subsidy reforms is in the total public interest and the costs of achieving it therefore should also be borne by the general public.

With respect to dumping, the Pork Council urges that cost-of-production, the basis for the Canadian corn antidumping tariffs, only be allowed as the reference for assessing if dumping is taking place where there are no reliable

prices by which to determine if the imported products are being priced below the level in the country of origin. It is our view that in a free trade situation, all participants in the marketplace need to be able to get along with the same basic underlying prices[3], both in worse and in better times. It might also be said that generally, the greater is the trade, the greater becomes the awareness of each other business environment. This includes the availability of inputs such as medications, environmental regulations, animal welfare standards, and food safety requirements. Where differences exist, the side which thinks it carries the more onerous requirements can use this to complain about unfair trade. This is not at all limited to the North American context, as the EU continues to press for such non-trade concerns to be incorporated into the WTO. Presumably, countries would be provided certain import tariff and even export subsidy allowances for their alleged higher environmental and welfare standards, not an easy sell outside of the EU!

POTENTIAL FUTURE DEVELOPMENTS

Given some of the structural impacts of free trade that have been observed to date, the following are suggested as what one might expect for the future:

- agricultural support policy regimes existing in each country (e.g., relative levels of domestic support available, and how trade-distorting is this support) will continue to be closely examined, and trade instruments (e.g., countervail) will be used to reinforce a movement toward greater harmonization, and avoidance of trade-distorting practices;
- economies of scale available from larger plants will lead to further consolidation and fewer companies, but with NAFTA and free trade there is more potential for companies to operate in more than one country and/or have vertical or horizontal alliances which cross borders and reduce the incentive to pursue trade actions;
- with increasing economic integration and more political cooperation, there will be less appetite of governments for defending import

[3] This argument applies for inputs as well as output.

sensitive and less competitive industries which often are the cause of bilateral trade disputes;

- converging cross-border interests within many economic sectors make country-specific trade remedy administration problematic. Alternative means of addressing trade disputes with corrective measures that do not penalize innocent bystanders need to be developed;
- more frequent communications and further development of cross-border economic and political relationships can result in common efforts to address marketing challenges and further lower the potential for trade friction;
- the increased scrutiny by producers in one country of the business environment existing for their counterparts in other trading bloc member countries will produce increasing pressure for harmonization in such areas as labeling standards, availability of production inputs such as veterinary medications, and product definitions such as whether hams are derived only from pigs or also from other protein ingredients; and
- pressures for rationalization of marketing flows on a continental basis, such as U.S. pigs moving to nearby Canadian slaughter plants, and Canadian plants selling pork to major U.S. population centers because they are in closer proximity to those markets, will sustain interest in cross-border flows and on occasion, lead to trade disputes[4] However, other aspects of the developing free-trade-area relationships will cause many of these disputes to be addressed at a much earlier point, before they explode onto the stage of trade action plays. The costs of large-scale trade disputes are usually so great, and there are so many more losers and winners from these actions, that other mechanisms are being developed with still more to be created, to address cross-border trade tensions.

[4] This may include actions taken to distinguish domestic product from imports, such as country-of-origin labelling, that can in turn lead to a cross-border dispute.

Consejo Mexicano de Porciculura

Enrique Dominguez

The Rice and Meyer comments coincide when giving value to free trade, and at the time touching some concepts of a structural nature in the pork sector in Mexico, and referring little to their own countries. Substantial changes have been observed in Mexico's market structure, as indicated by my colleagues from NPPC and the Canadian Pork Council. To a large extent we have consolidated the procurement of grain and soybean meal both in the domestic market and in the United States and Canada. At the same time, great progress has been made in the consolidation of pork marketing. In some regions of the country, the integration has been vertical involving the best producers in the world.

As a result of the major economic setback in the Mexican banking system, the modernizing process of the pork industry stopped in 1995 and took the economic disaster to an important number of producers. The slaughter and processing of pork has been strongly concentrated as a consequence of the lack of commercial modernization. At the packers and meat processors level, this concentration has been alarming and to a great degree supported by meat imports (without paying import duties) which the government delivered in a discretionary way to a couple of countries, thus creating a problem that is analyzed from a perspective of corruption and economic competence.

Mexican producers never expected protection within NAFTA due to any lack of productivity. They merely demanded equality in the access and cost of inputs as a new trade partner. However, three structural problems arose which we hope will be understood, and in this case, analyzed from a conciliatory perspective within the framework of NAFTA-WTO.

1. The market structure of pork, as well as the perception of quality, is different in each country. This allows some cuts to subsidize others with a residual value since they are not demanded in the original market. These products have a different price/ quality per-

ception in the Mexican market, thus harming the price structure in our market.

2. Recently, prices in the U.S. market, due to structural conditions, have shown predatory levels derived from the lack of slaughter capacity, and due to the lack of barriers these products enter the Mexican market independently of the volume of imports of pork. These predatory prices can be legally compensated under the NAFTA-WTO.

3. The industry's high concentration due to the economic level is a great concern. Our experience has proven that costs and profitability are not necessarily associated with the size of farms. In this sense, each country has the right to decide what is considered best for its producers.

We are a country with a pork deficit, and the market conditions are favorable, as demonstrated by the level of imports of meats. Nevertheless, the Mexican producer is concerned, not about the volume of imports, but about prices below the normal value that are imposed in their market as a consequence of free trade. With the tremendous drop in prices in December 1998, Mexican producers sought protection against the threat of damages. The legal procedures (associated with this trade action) required documentation of imports, securing testimonies of damages, and the presentation of a formal request for investigation. The legal time agreed for these proceedings at NAFTA and WTO are extenuating and finally, no one was satisfied. I consider that we, as producer organizations, should have a better way to use our time and our money in legal proceedings if we could implement a real system to resolve disputes.

Facing a new federal administration, we are working hand in hand on sanitary issues regulations, and on the need to establish quality standards which will in some way be equal, as far as possible, with those of our NAFTA partners. It has taken a long time, but we will gradually seek better understanding in these work areas, following examples that have achieved progress.

After accepting the terms of the negotiations, and what can be considered as compensated within the agreement, we must seek alternate mechanisms to resolve conflicts. Our governments have already subscribed the terms, each Senate has agreed, and we are interested in strengthening a growing and constructive relationship. Let us now initiate this committee to solve disputes so that producer organizations can find the time and economic resources to support producers in each of our countries.

Canadian Perspective

Edward W. Tyrchniewicz

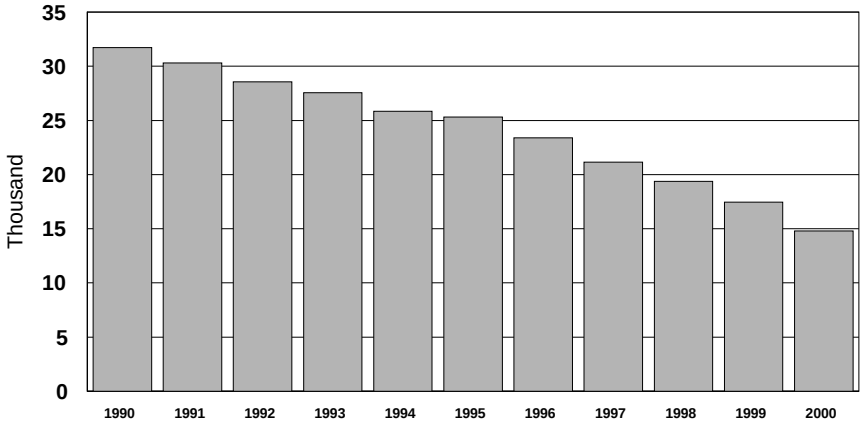
Meyer and Rice have done a good job of outlining the implications for trade tensions and disparities arising from structural impacts of NAFTA as applied to the U.S. and Canadian pork sectors. I generally agree with their analysis and conclusions. My remarks will focus on two areas: further elaboration on Meyer's point that competitive pressure of generally larger, more efficient units will drive the hog production sectors of all three countries over the next 20 years, and a point that neither author mentioned, namely the increasing opposition to large-scale hog operations.

With respect to concentration in the Canadian hog sector, Figures 1 and 2 illustrate that the number of hog farms has decreased by more than 50 percent during the period 1990-2000. At the same time, the number of hogs per farm has almost tripled. What these numbers do not address is the change in ownership structure of the production units. One term that is often applied to the evolving structure is "production system franchising."

Successful Farming provides a list of the 50 largest commercial pork producers in North America in 2000. The top five producers account for almost 50 percent of the sows identified by this listing, with Smithfield Foods alone accounting for almost 25 percent. The top three producers have expanded significantly between 1999 and 2000. Seven Canadian producers make up about six percent of the sows, while four Mexican companies account for just under five percent.

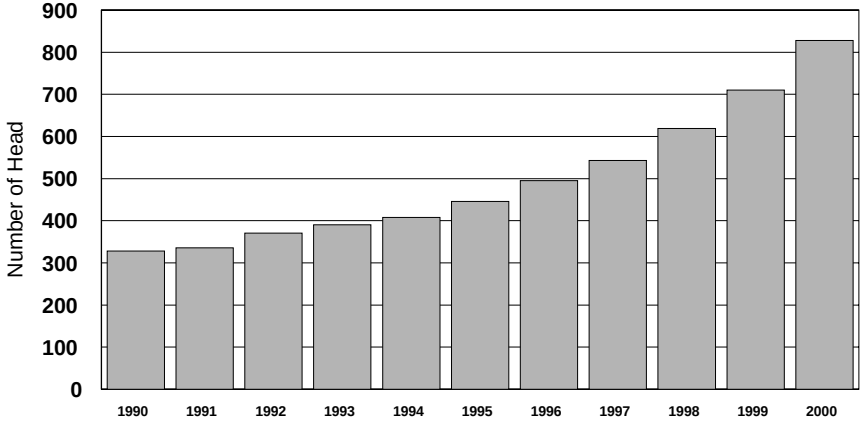
An obvious question is... where will future growth in hog production take place? Table 1 illustrates the cost per market hog for various sizes of production units in selected regions and countries. One clear conclusion from this Table is that costs per market hog decline as size of production unit declines, regardless of location. A second observation is that lowest production costs are to be found on the Canadian Prairies, the U.S. Corn Belt and the South

Figure 1: Number of Canadian Hog Farms, January 1, 1990-2000.



Source: Statistics Canada

Figure 2: Average Number of Hogs on Canadian Hog Farms, January 1, 1990-2000.



Source: Statistics Canada

Eastern United States. These results are consistent with where hog production has been expanding.

Table 1: Total Costs Dollars Per Market Hog For Selected Regions/Countries.

Region/Country	*Size of Production Unit*			
	180 Sow	*600 Sow*	*1200 Sow*	*3000 Sow*
US West Corn Belt	84.86	79.71	76.64	72.87
US East Corn Belt	89.41	83.94	80.13	75.49
US South East	92.35	86.09	82.96	78.88
US Mountain	97.48	91.09	87.85	83.66
Maritimes	106.15	96.92	94.00	89.26
Quebec	102.34	93.00	89.81	84.86
Ontario	92.57	84.24	79.28	73.22
Eastern Prairies	80.78	71.16	68.48	63.82
Western Prairies	89.02	80.64	77.76	72.63
Netherlands	185.82	154.23	150.24	143.48
Denmark	180.58	149.82	145.28	138.03

Source: Martin

Table 2: Factors Limiting Hog Production.

Factor	***U.S.***	***Russia***	***Denmark***	***Canada***	***Poland***	***Netherlands***
	X	X	X	X	X	X
Land			X			X
Capital		X			X	
Feed Grains		X				X
Environment	X		X	X		X
Disease	X				X	X
On-farm Technology		X			X	
Processing Technology		X			X	
Distribution		X				
Economic/						
Political Stability		X				
Animal Rights			X			X

Factor	***China***	***Taiwan***	***Mexico***	***Korea***	***Japan***	***Brazil***
Land		X		X	X	
Capital	X			X		X
Feed Grains	X	X	X	X	X	
Environment		X		X	X	
Disease	X	X		X		X
On-farm Technology	X		X			
Processing Technology	X		X	X	X	X
Distribution	X		X			X
Economic/						
Political Stability			?	X		X
Animal Rights						

Source: Giordano

But will hog production continue to expand in these areas? Table 2 provides a summary of factors limiting hog production in various countries in the world. It is interesting to observe that environmental concerns are identified as the limiting factor in both Canada and the United States. For Mexico, there are a number of limiting factors including availability of feed grains, on-farm technology, processing technology, and distribution.

These observations lead into the second area of my remarks, namely why is there growing apprehension in the public mind about the growth of intensive hog operations? I have had the opportunity to chair a panel that looked into sustainable livestock development in Manitoba. The panel obtained some first hand reactions to that question, and recently released its report. In essence, there are four main reasons for public apprehension:

- experiences from other jurisdictions with large scale livestock operations;
- local "horror stories;"
- perceptions of inadequate monitoring and enforcement of environmental regulations;
- and perhaps most importantly, declining familiarity with what actually goes on at a large farm/production unit.

The key environmental issues were water quality, odor, disease transmission, and swine housing. The key socio-economic issue was displacement of family farms by large corporate
"factory farms."

How significant are these concerns and will they impact future development of the hog sector in Canada and the United States? The expression "beauty is in the eye of the beholder" springs to mind. Opposition to large-scale livestock operations is strongly held by many rural nonfarm residents, smaller farmers, and urban environmentalists and better organized than proponents of intensive livestock operations. To dismiss this opposition as the babble of a small number of environmentalists who will someday find something else to complain about would be short sighted and foolish. As to the evidence brought forward in support of the claims of environmental damage by large-scale livestock operations, there is need for further scientific scrutiny.

On balance, I believe that further expansion of hog production in Canada and the United States can take place provided that three challenges are adequately addressed. These challenges are:

- to think in terms of "sustainable livestock development," i.e., environmental stewardship and social issues, as well as economic viability. To restrict our thinking and analysis only to economic considerations is unlikely to foster the longer run development of the hog sector.
- credible scientific information, and not just rhetoric, must be brought to the debate. This requirement will be increasingly challenging as data become more difficult to obtain, in no small measure the result of increased concentration of ownership of production and reluctance to make proprietary information accessible to researchers.
- we must move beyond talking to ourselves on these issues. Although trade and marketing economists and large commercial farmers bring a high degree of knowledge to discussions such as this workshop, perhaps the viewpoints of environmental economists and social activists would have pushed us into thinking in a broader context.

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CATTLE/BEEF SUBSECTOR'S STRUCTURE AND COMPETITION UNDER FREE TRADE

David Anderson, William A. Kerr, Guillermo Sanchez and Rene Ochoa

INTRODUCTION

This paper discusses the cattle and beef industries of Canada, Mexico, and the United States in terms of their structure and competitiveness in a future free trade environment. Some might argue, with reason, that these industries already operate in just such a world. While that may be true, these industries are going through rapid structural change that makes a look at the next 20 years very interesting indeed.

The last five years provide an excellent blueprint for structural change as a source of trade disputes. The cyclical nature of the cattle industry led to a sharp decline in cattle prices in 1994 and culminated with extremely low prices in 1996. Drought in the Southwest and in Mexico exacerbated the low prices as more cows went to market. The low prices were accompanied by increased numbers of calves and fed cattle coming to the United States from Mexico and Canada. The number of cattle entering the United States expanded rapidly in the mid-1980s to more than one million head coming from Mexico and Canada each. The visible shipment of those cattle to the United States led to several ITC suits and other trade disputes. These trade disputes are a direct result of structural changes in the cattle/beef sector.

The paper is organized in four sections, one on each country followed by a section that synthesizes the material and draws conclusions for the future. Each author examines the beef/cattle sector in his country with an eye toward a full-free trade environment. The final section synthesizes the material and attempts to draw a few conclusions about structural change, trade disputes and the future of the industries.

CANADA

On the Canada/U.S. international interface, the beef industry was considered one of the more open sectors even prior to the CUSTA and the NAFTA. In fact, prior to the CUSTA, the beef sector was often held up as a model of relatively unfettered trade and well advanced market integration (Kerr and Cullen, 1985). While tariff levels were low and international movements of cattle and beef relatively free, from the Canadian perspective a number of U.S. non-tariff barriers (e.g. border inspections, health regulations, non-reciprocal grading) and trade irritants (antidumping and countervail actions) remained and have proven difficult to remove (Hayes and Kerr, 1997). The NAFTA was originally touted as a mechanism for the further promotion of North American market integration. At least as far as the Canada/US interface is concerned, however, after in excess of a decade of trade agreements, it appears more and more as if it was a "one shot" deal with further liberalization within its structure problematic at best (Kerr, 2001). Some additional trade liberalization at the Canada/U.S. border has subsequently taken place (e.g. the limited import of feeder cattle into western Canada from specified U.S. states during months of low disease risk) but this was the result of World Trade Organization (WTO) initiatives to allow sub-national geographic areas to export even if an entire country could not meet an importer's animal health requirements.

The failure of NAFTA as a mechanism for ongoing liberalization means that whatever effect the CUSTA/NAFTA has had on the industrial organization of the beef sector is a result of one-time liberalization in the wake of the agreement ratification. Further, given that the Canadian beef industry was already well on its way to being well integrated into the larger North American market prior to the CUSTA in 1989, one might expect that it had little effect on concentration and the industry's conduct and performance. As in the United States, technological progress in feeding, disease control, storage, transportation and

information technology, as well as rising concerns relating to food safety, have been far more important in altering the industrial structure of the beef industry than the NAFTA. In addition, the changes brought by the Uruguay Round have also been more important to the industrial structure of the beef industry in Canada than the NAFTA. These forces will be explored in more detail later in this section.

While the Canadian beef sector is increasingly integrated into the North American market, important differences remain between the Canadian and U.S. sectors. The Canadian and U.S. beef sectors are organized in a similar fashion. Vertical segmentation exists between cow-calf producers, who utilize land resources largely unsuitable for cropping to provide grazing and forage for the breeding cow herd and young stock, and the cattle finishing industry that feeds grain in feedlots. Some animals go through an intermediate "backgrounding" stage between the cow-calf producer and the feedlot. The packing industry is dominated by a few large firms that co-exist with a relatively large number of small firms. The further processing industry is, to some degree, vertically integrated with the packing industry, but many independent processors exist and the industry is less concentrated than meat packing. Supermarkets and the hotel restaurant and institution (HRI) market represent the major outlets for sales to consumers. Specialty meat shops have only a small share of the retail market. The slaughter stage of the industry represents the most concentrated aspect of the beef supply chain, measured by volume, and it has been becoming increasingly concentrated since the CUSTA.

The most defining force in determining the industrial structure, and degree of concentration, in the Canadian beef industry, however, remains geography. As a result, drawing conclusions from simple measures such as four firm concentration ratios or Herfindal indexes may be misleading. Similar to the broader Canadian economy, much of the beef industry is strung out across the country in a narrow band that seldom exceeds 300 kilometres from the U.S. border.

In almost all parts of the country, on the fringes of cropland there is relatively marginal land which is suitable for grazing and forage production. This resource is used to feed either the cows that form the basis of cow-calf

operations or dairy cattle. Animals that can be used for beef production are bi-products of the dairy industry. Cull cows from dairy herds also contribute to manufacturing quality beef supplies. As fluid milk production remains based near final consumers (in part due to transportation costs as well as dairy regulations), there is a local supply of animals suitable for beef production in most parts of the country, also near the U.S. border. Small-scale local feeding industries exist to utilize this resource. As a result, a large number of small-scale abattoirs and slaughter plants exist to take advantage of available local cattle supplies. Hence, there is a low concentration, small-scale beef sector scattered across the country tied to the local resource base. This sector remains relatively static in total numbers and is going through slow consolidation as a result of scale economies.

In addition to this relatively static beef industry based on local resources, there is a large and growing industry in the grain surplus prairies. Alberta, in particular, is well positioned geographically to provide the base for this large-scale industry. It has abundant grazing lands, cropland well suited for barley production and a small transportation advantage over some major producing areas in the United States to supply the beef deficit west coast market (Gillis et al, 1985). In recent years, Alberta has seen considerable investment in both the cattle feeding industry and meat packing. It is increasingly characterized by large-scale feedlots and new and concentrated investment in meat packing. This expansion in meat packing has spurred investment in the cattle feeding industry which has, in turn, led to increasing demand for feeder cattle leading to both an increase in the number of cow-calf animals in the feedlots' catchment area and a geographic expansion of the catchment area.

Based on running two shifts, the IBP plant in Brooks, Alberta (the ex-Lakeside Feeders facility) has a slaughter capacity of 4200 per day while the Cargill plant in High River, Alberta has a double shift capacity of 3800 per day. These two facilities represent the majority of recent expansionary investment in the beef packing industry in Canada. This expansion represents part of the North American strategy of these two large U.S.- based agribusiness firms. The CUSTA/NAFTA helped create the conditions necessary for these investments to take place by removing some of the threats to cross border movements

of meat. This decreased the risks associated with making significant investment in beef packing in Canada.

The next largest plant is owned by Better Beef Ltd of Guelph, Ontario and serves the relatively large regional cattle catchment area in Ontario. Better Beef's capacity is approximately 1100 animals per day. The fourth largest plant, XL Foods, is located in Calgary, Alberta and has a capacity of 1000 animals per day. This plant changed hands in 1999 suggesting that they were unable to compete with IBP and Cargill in the Alberta market. With the assets written down, the new owners are able to keep this capacity on line. These plants represent Canada's "big four" comprising together approximately 85 percent of the country's slaughter capacity. The fifth largest slaughter facility (700 animals per day) is located in Moose Jaw, Saskatchewan. There are 14 small-scale plants in Quebec supplied largely from the province's dairy industry. In addition to the Better Beef Ltd plant in Guelph, there are approximately six more slaughter facilities in Ontario. There are three small plants in Canada's Atlantic provinces processing the small local supply of cattle. There are two small plants in Manitoba, one more in Saskatchewan, three smaller units in Alberta and two in British Columbia - one in the northern Peace River region and one in the heavy dairy production area of the Fraser Valley near Vancouver. This regional capacity represents, for the most part, long sunk capital.

In addition to the federally inspected slaughter facilities discussed above, there are a number of provincially inspected abattoirs. In Canada, meat exported internationally or moved inter-provincially must be slaughtered in a federally inspected plant. As a result, provincially licensed abattoirs tend to be small, specialized and of only limited consequence in the market.

The expansion of slaughter capacity in Alberta has contributed to an increase in feeding capacity in Alberta. Another major contributor to this change, however, was the ending of the subsidies for the transportation of grain out of the prairie region in the wake of the Uruguay Round (1995). The removal of the grain transportation subsidy altered the relative attractiveness of marketing grain through feeding cattle. The result was larger feedlots. In 1991 there were 229 feedlots with capacity in excess of 1000 head in Alberta marketing 927,000 head per year; in 2000 there were 212 feedlots in this category marketing

2,390,000 head (CANFAX, 2001). In 1991, there were 12 feedlots in Alberta with a one time bunk capacity of 10,000 head that accounted for 31 percent of fed cattle production in the province. In 2000, there were 32 feedlots with 10,000 plus capacity producing 56 percent of production. Alberta's 212 finishing feedlots (1000 plus capacity) have a total one time capacity of 1,578,200 head and there are 24 feedlots in Saskatchewan that have an additional 113,900 head of capacity. Alberta and Saskatchewan together account for approximately 80 percent of Canada's fed cattle production.

The packing industry in Alberta is relatively concentrated with the two large U.S.-owned facilities in operation. As yet, however, this concentration has not meant that these firms have been able to act as oligopsonists. This is because of the existence of the capacity provided by the XL plant in Calgary. This plant was in considerable financial difficulty prior to its sale and new infusion of capital, suggesting that there is excess capacity in Alberta. As a result, the three plants must compete for limited supplies of cattle making fed cattle to some extent a sellers' market. Until either the XL capacity is retired or the feeding industry expands to meet the total packing capacity, any oligopsonistic market power arising from the concentrated nature of the packing industry is likely to be minimal.

Rude and Fulton (2002) found a negative relationship between red meat concentration and market power, and that mark-ups in the red meat industry are low. These results are contrary to the findings of similar analysis of the U.S. beef sector. One possible reason for this difference is that the Canadian supermarket sector is much more concentrated than in the United States. Further, Canadian supermarket chains are, to a considerable degree, regionally segmented increasing the degree of concentration in any particular geographic area. As a result, it may not be possible for Canadian packers to exercise a significant degree of market power even with their considerable degree of concentration.

In Ontario, where there is one dominant plant, it faces competition from U.S. imports. Given the absence of a reciprocal beef grading arrangement or a harmonized grading system, beef retailers are able to import U.S. "no roll" beef in direct competition with Canadian beef which must be graded. As a result, the mark up on Canadian beef is restrained.

As suggested above, the post-slaughter processing of beef appears to exhibit a decrease in concentration with small processors entering to make niche market products that range from 'jerky' to airline meals. While beef has not been able to capitalize on new product development to the same degree as chicken and pork due to its stronger and more distinctive taste, it is progressing down the same path. Further, processors are not particularly hostage to the packing industry because they are often able to competitively source beef from offshore given the lower quality requirements when the product is processed. In the high quality segment of the further processed beef market, the niche market nature of the products allows processors to pass input cost increases on to their customers.

The Canadian beef supply chain is thus comprised of a widely dispersed cow-calf industry which depends on grazing/fodder inputs which have a low opportunity cost; a feeding industry which, while increasing in the scale of its operations, is still widely held exhibiting little concentration; and a packing industry which is highly concentrated but with the "tail" of its distribution comprised of a relatively large number of small firms. These aggregate pictures, however, mask a geographically influenced distribution of production and processing. Given the localized matching of production and processing that characterizes the industry, only in one area of the country does the beef industry exhibit dynamic growth and future potential. Southern Alberta and its immediate cattle catchment area has been allowed to expand primarily by investment in new and expanded processing facilities by major U.S. packers. This segment of the industry is integrated into the North American cattle industry. The industry in Alberta, however, is going through an industrial "shake out" whereby the combination of new and existing capacity in slaughtering outstrips cattle supplies. As a result, oligopsonistic behavior is not yet a major concern.

If supply and demand appear to be in balance in much of the country, the question for the future becomes how much additional growth can be expected in the Alberta-based segment of the industry? Given that considerable growth can probably be expected from the Asia-Pacific market in the future (Agriculture and Agrifood Canada, 1998), demand for beef manifest on the Pacific coast of North America can be expected to grow over the intermediate run. Given the integrated nature of the North American market, it does not

matter whether the industry in Alberta directly exports to the Asian market or increases exports to the U.S. west coast to replace U.S. beef exported offshore. If the demand constraint does not appear to be binding over the near term, constraints on the expansion of supply may be the important determinants of the industry's future.

There is some evidence that supplies of feeder cattle will not represent an important constraint on supply. While the rapid growth of the cattle feeding industry in Alberta has required an expansion in the feeder cattle catchment area, supplies of these animals are likely to be elastic. Saskatchewan exhibits considerable potential as a supplier of additional feeder cattle, particularly if international grain prices remain low. Expansion of the cow-calf industry can be easily accommodated by converting marginal crop land into grazing or forage production. Further, changes to the health regulations pertaining to the import of feeder cattle into Canada, the Restricted Feeder Import Program (RFIP), have allowed Alberta feedlots to source cattle in border states such as Montana and North Dakota. This program is likely to be expanded to allow year-round imports from selected states with equivalent animal health conditions (Kerr, 2001). This northward flow of feeder cattle further cements the integration of the North American beef market. It may also better protect Canada from anti-dumping and countervail actions by U.S. cattle producers in times of low prices. Given that selling below cost is a normal business practice in the beef industry at certain periods in the cattle cycle, the Canadian industry has been frustrated by U.S. anti-dumping actions, particularly given that the competitive nature of the cow-calf and cattle feeding industry does not allow for predatory pricing practices.

It seems clear that the anti-dumping and countervail actions brought by U.S. producers are pursued for their harassment value – U.S. producers have not won their cases in the domestic U.S. contingency protection forums but temporary duties provide protection and disrupt commercial relations between U.S. buyers and Canadian sellers as well as imposing significant costs in preparing and fighting the cases. Given the integrated nature of the North American market, when Canadian cow-calf producers are selling below cost it is equally likely that U.S. producers are selling below cost as well. If U.S. cow-calf producers were to find their markets in Canada threatened by Canadian

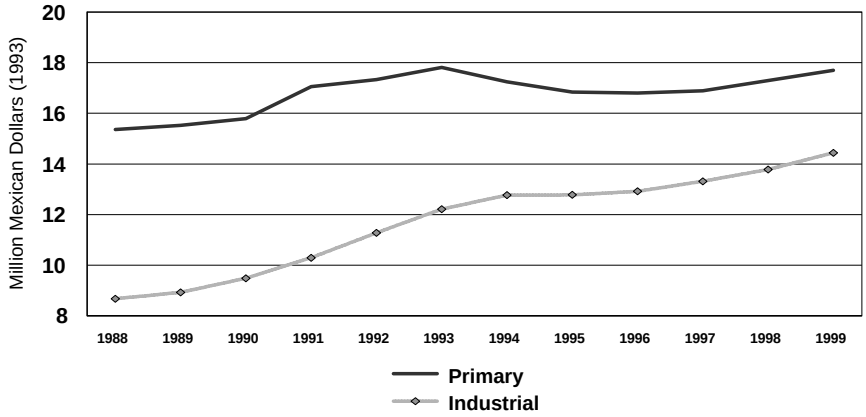
anti-dumping actions, then they may be more reticent to launch actions against Canadian imports.

The cattle feeding industry also exhibits a low level of concentration, even if the average size of units is increasing. The cattle feeding industry in Southern Alberta is, however, finding that it is facing constraints on expanding in the same way it has up until the present. New feedlot capacity has been concentrated near the city of Lethbridge in what is known as "feedlot ally". It has been suggested that this localized concentration allowed the creation of certain agglomeration effects in the cattle feeding input and support industries. The heavy concentration of large-scale animal agriculture, however, has brought forth concerns relating to the effects on water quality, the negative externalities associated with odor pollution, etc. As a result, for environmental reasons, further expansion is likely to be less geographically concentrated, lessening the agglomeration economies to some extent. There is, however, no constraint on expansion of the cattle feeding industry at lower levels of geographic concentration. Feed, in particular, is widely available and its production could be expanded easily in both Alberta and Saskatchewan.

Concentration in the ownership of feedlots i.e., multiple feedlots under a single ownership structure has not been manifest in Canada. Presumably there are considerable monitoring costs (Hobbs and Kerr, 1999) associated with the management of feedlots. Thus, if expansion of the feeding industry is more geographically diverse in the future, this may lead to a reduction in the concentration of ownership.

The beef packing sector in Alberta is well integrated into the North American industry. Its major investors are U.S. multinational agribusiness concerns that will make their decisions on a continent-wide basis. It seems unlikely that domestic Canadian investment in beef packing in Alberta is likely in the future. If the industry continues to grow and the current excess capacity is resolved through the retirement of the capacity not owned by IBP and Cargill, or through growth in demand, investments may be required in the future. These investments are likely to be influenced by conditions in the wider North American market rather than specific Canadian conditions. The larger U.S. market will establish the trends for the North American beef packing industry.

Figure 1: Growth of the GDP in the Mexican Beef Industry, 1988-1999.



Source: INEGI

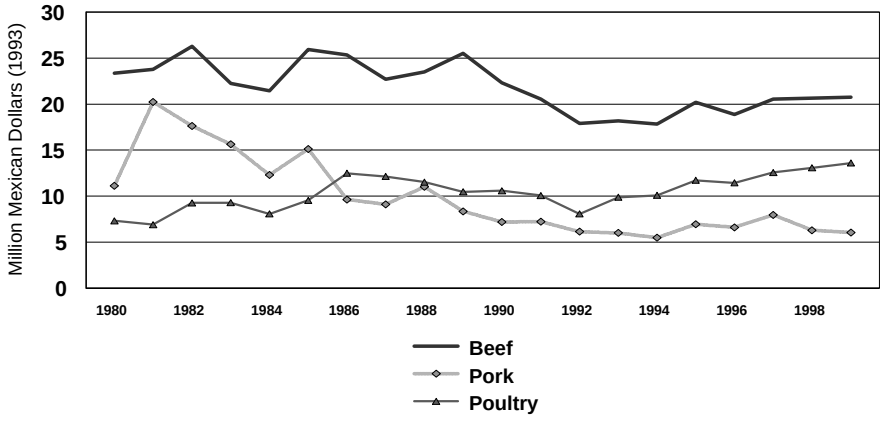
MEXICO

The beef cattle sector plays an important role in the Mexican economy. The contribution of this activity is about 1.2 percent of Mexico's GDP. It has been estimated that the beef cattle industry generates 4.7 million jobs in its primary industry of 1.4 million production units. The economic impact is generated along the production chain, from the beef cattle ranches to the meat packers, to the process and marketing of beef products. The beef industry also contributes to the crop industry with the purchases of approximately 1.5 million tons of grains, such as sorghum, corn, wheat and other feed grains when transferred to the feed industry. The livestock industry uses 150 thousands tons of soybean cakes and other meals from oilseed origin. In addition, beef cattle production is a significant user of sugar industry products using approximately 20 percent of the countries molasses production.

The Beef Industry and the Mexican Economy

In the last twelve years the Mexican beef cattle sector has appeared to be in a growth phase. While a cycle has been clearly defined over this period, GDP in 1999 exceeded that in 1988. Shown in real terms and based on 1993

Figure 2: Value of Mexican Livestock Production, 1982-1999.



Source: SAGAR/ Banco de México

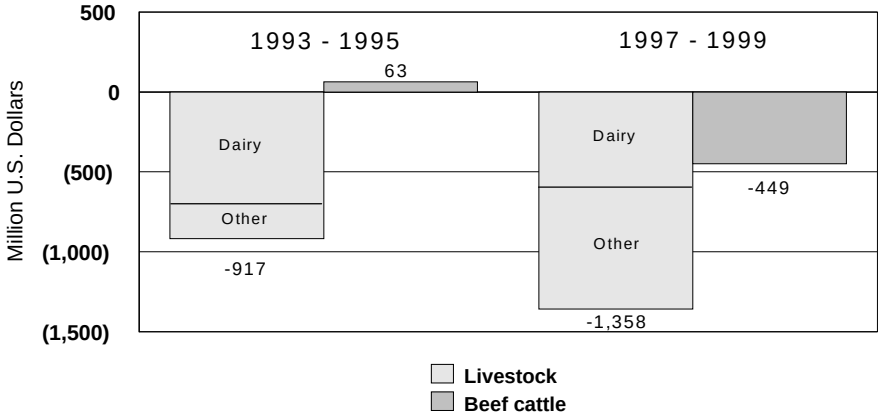
pesos, there are three clear segments in the GDP growth of the beef cattle industry (Figure 1):

- From 1988 to 1993, an upward trend is shown by both the primary and the industrial sector. The primary sector grew from 15.4 to 17.8 million pesos in that period. The industrial sector showed an even steeper growth, ranging from 8.7 to 12.2 million pesos over the same period.
- During the 1994 to 1996 period, the primary sector showed a small downturn in GDP contributions. The industrial sector kept a slight growth for that period.
- A clear upsurge is noticed after 1997. The primary sector has shown in 1999 levels of GDP similar to those in 1993. The industrial sector continued a steeper growth, reaching 14.4 million pesos contributed to the national GDP in 1999.
- The gap between the two sectors tends to narrow due to the steady growth of the industrial sector.

Value of Production

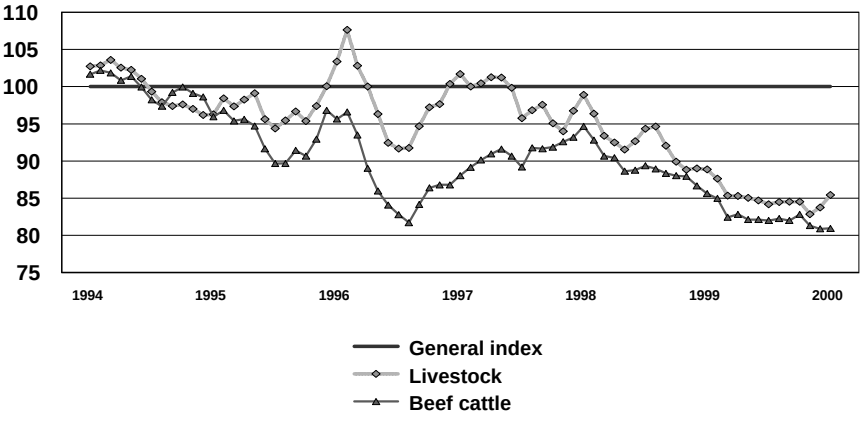
The value of production for meat products shows marked contrasts (Figure 2). The value of production, in real terms, has been decreasing for beef

Figure 3: Livestock Trade Balance, Mexico.



Source: SECOFI, SHCP, BANXICO, INEGI

Figure 4: Profitability Index, Mexico (1994 = 100).



Source: Banco de México

and pork during the last two decades. The value of beef production decreased from 26 to 21 million pesos from 1982 to 1999. Pork showed a more drastic decline, which values ranged from 20 to 6 million pesos, for the same period. For beef, although showing a decreasing trend over time, the value of produc-

tion has reflected the normal variation of business cycles. On the other hand, the value of production for pork showed a strong decline in the 1982-89 period. Since then, it has shown a slight decline up to 1994, when it almost dropped to 5 million pesos, approximately 25 percent of the value reached in 1982. In contrast, the popularity of poultry products shows in the steadily increasing value of production for this activity. The value of poultry production increased from 7.5 million pesos in 1980 to 14 million pesos in 1999.

Livestock Trade Balance

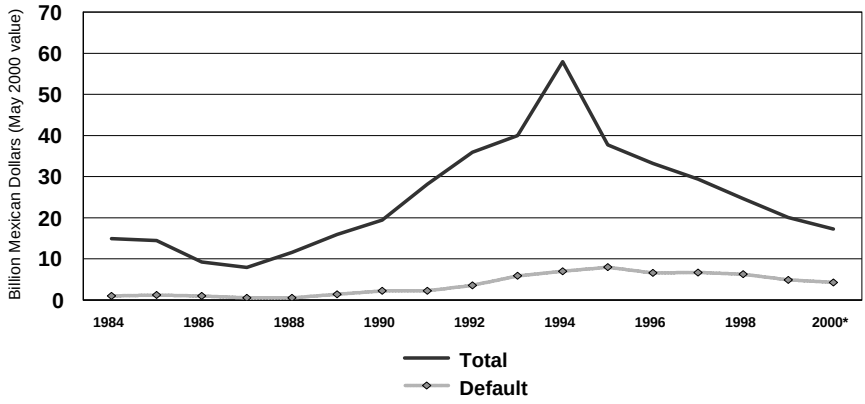
There has been a negative trade balance for the livestock sector in the last decade (Figure 3). There are two periods with major differences in trade balance. From 1993 to 1995, which represents the period of the Mexican economic crises, and the recovery period from 1997 to 1999. In the first period, the whole livestock sector reached a deficit of US$917 million. The beef subsector achieved a positive balance of US$63 million, probably fueled by a strong devaluation of the Mexican peso. During the recovery period, the livestock trade balance shows a deficit of US$1.3 billion, of which US$449 million corresponds only to the beef cattle subsector. As a result, it can be observed that the slow growth of the livestock industry is not necessarily due to the lack of consumer demand, but to the high rate of imports to fulfill the domestic markets needs.

Variations in the Profitability Index

The economic downturn of the livestock production systems in Mexico can be observed in the level of profitability that these systems have achieved during the last decade (Figure 4). Using a profitability index to show the relation of product prices and cost of inputs at the farm level a steady decline of profitability can be observed over the 1994-2000 period. Beef cattle production units have shown more reduction in profitability than the rest of the livestock production systems in general. During this period, a 20 percent decline in profitability for beef ranches is observed. This reduction in profitability may help to explain the decrease in the value of production and the lower contribution to GDP from this activity.

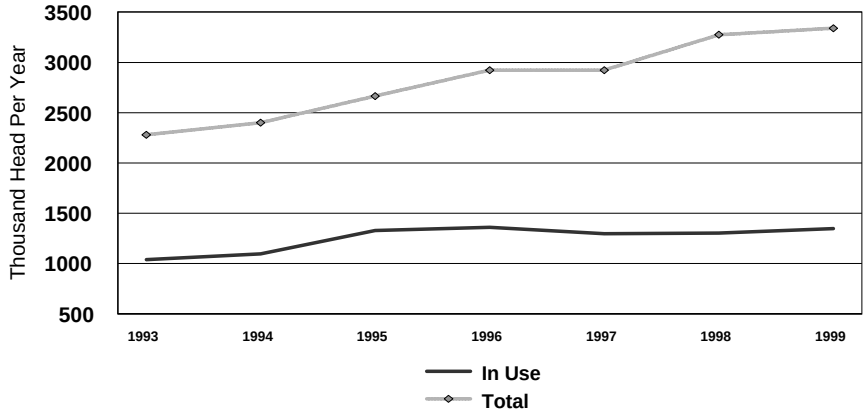
The severe reduction in the profitability index since 1994 caused a drastic reduction in the amount of livestock credit provided by the banking system.

Figure 5: Total and Default Loan Amounts for Beef Cattle, 1984-2000.



Source: Banco de México
* March 2000

Figure 6: Mexican Beef Cattle Slaughter Capacity, TIF Plants, 1993-1999.



Source: SAGAR/CNG/BANXICO/SECOFI/BANCOMEXT

In the last six years this amount dropped from MX$60 billion to less than MX$ 20 billion. At the same time the number of default loans grew significantly (Figure 5). This caused the banking system to consider financing the beef cattle sector, and agriculture in general, as a high-risk activity.

Figure 7: Mexican Beef Imports, 1991-1999.

Source: SAGAR/CNG/BANXICO/SECOFI/BANCOMEXT

Industrial Activity

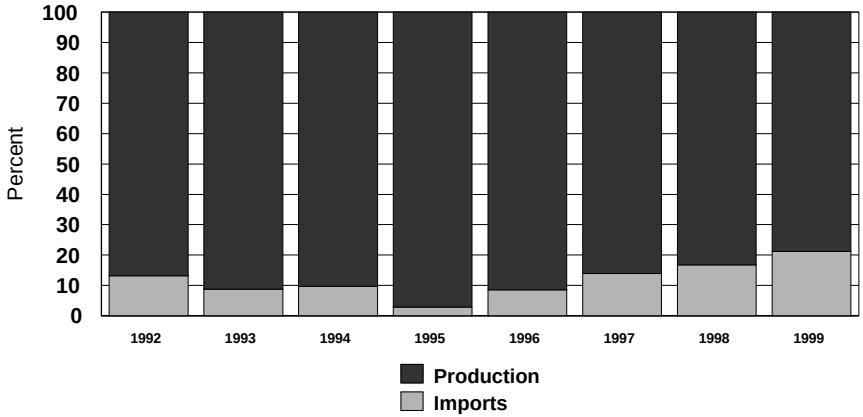
Although Mexico shows some comparative advantages in the primary production sector, it seems that the Mexican livestock sector is less competitive due to problems in production. Observing the behavior of the slaughter capacity of federally inspected plants (TIF)[1] shows that these plants have been operating at about 40 percent of their existing capacity. The slaughter of animals has heavily shifted to municipal and local abattoirs (Figure 6).

Beef imports show a trend for specific products (Figure 7). In 1991 the imports of beef were equally divided between boned meat, as well as carcasses and cuts. Imports of carcasses and special cuts have decreased in importance over the last decade. On the other hand, a greater proportion of beef imports, 80 to 90 percent, has been in the form of boned meat since 1994.

The structure of beef imports reflects changes in the preferences of retailers, including supermarkets. Boned meat is easier to handle, requires less

[1] TIF slaughterhouses are facilities approved by the Federal Government. They are privately owned, but built and operated under specific federal regulations and recurrently inspected by federal authorities.

Figure 8: Mexican Meat Market Demand, 1992-1999.



Source: SAGAR/CNG/BANXICO/SECOFI/BANCOMEXT

refrigerated capacity, reduces waste, and it is handled with less specialized labor. A fact that strengthens this trend is the greater concentration in the retailing market. On the other hand, beef slaughter and processing require a great number of skilled labor. From the standpoint of beef processing, Mexico has a competitive advantage due to its lower labor costs.

Beef Marketing

Although the beef sector in Mexico shows definite advantages, the industry has been unable to fulfill the increasing demand for this product. It has, in turn, lost market share for differentiated product. Mexico City and the surrounding areas represent up to 40 percent of the national demand for beef. Seventy percent of the beef trade takes place in this area, as well. For cultural reasons, there is a strong preference for fresh meat consumption. There has been a clear preference for fresh meat over frozen meat in the Mexican markets. As a result, a large number of slaughter facilities have settled in and around Mexico City to supply this large market with fresh meat.

Consumer preference has recently started to change (Figure 8). Fresh meat retailers have lost market share to supermarket chains. Supermarkets rep-

resent 57 percent of beef sales. The supermarket concept represents a major opportunity for value-added products with potential impact on the primary sector.

Major differences in beef marketing between the United States and Mexico is influenced by consumer preferences. The beef market in the United States is geared towards high value cuts. Only 20 percent of the carcass weight represent more than 60 percent of the total carcass value. The less preferred and lower priced parts of the carcass are dedicated either to the ground beef market or exported to the Mexican market. In the Mexican beef market, there is a minimal price differential among carcass parts in part due to the lack of a standard classification for quality beef cuts. Another important feature is the higher preference for beef offal. This clearly shows the differences between the two market preferences.

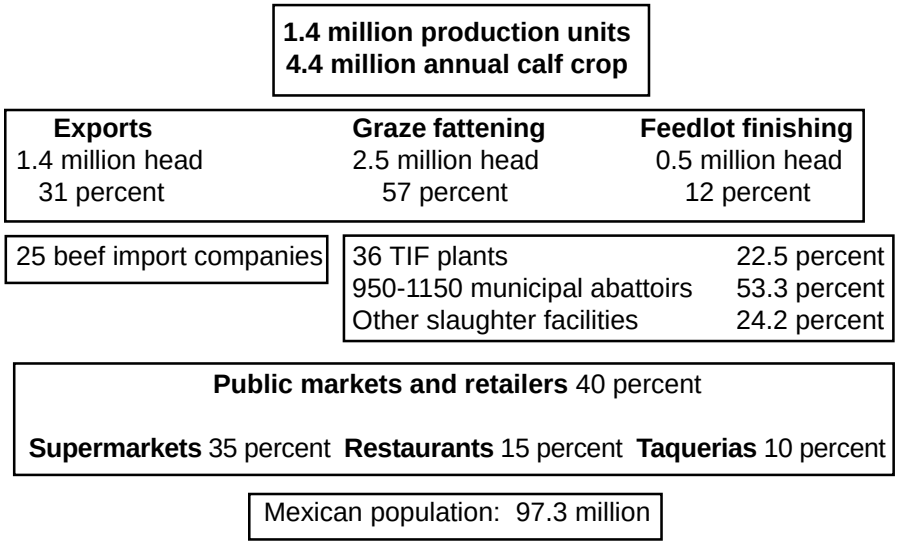
The U.S. meat packing industry is highly concentrated, as only four firms account for 80 percent of the industrial production. They operate on a efficient economy of scale basis. These four firms account for 80 percent of Mexican imports. The Mexican industry shows no sign of concentration because there are a large number of different size plants in the country. Moreover the products coming to the Mexican market are based on a market preference basis other than price, affecting the profitability of the whole industry. This situation should be seen as an opportunity to have complementary industries between Mexico and the United States, where both can benefit from the other market preferences.

The Beef Production Systems in Mexico

In Mexico there are three main beef production systems, which are clearly defined by geographic and climatic conditions. In the arid and semiarid areas of Northern Mexico, specialized beef cattle breeds in cow-calf operations are strongly influenced by the U.S. market demand for stockers and feeders from the feedlot industry. The temperate climate of the Central Highlands makes this region popular for dairy, poultry and hog industries. Beef cattle production is based on cow-calf operations in marginal areas for crop production. Feedlots, growing and feeding dairy calves, are highly disseminated in this region, as well.

In the tropical and subtropical areas, beef production is mainly based on grazing (mainly Zebu cattle breeds). The dual-purpose production systems

Figure 9: Mexican Beef Industry Structure.



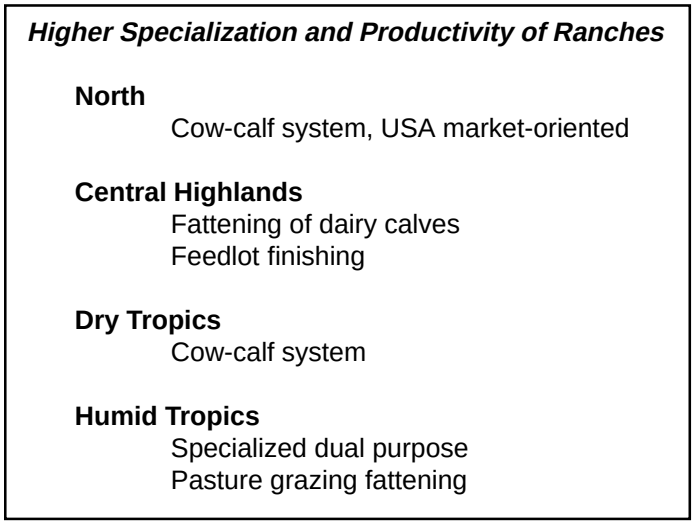
(dairy and beef) are very common in these regions. These systems present a high level of flexibility for the producer to emphasize on either beef or dairy and to shift production according to the variations in the local markets and to the cash flow needs of the production unit.

Beef Industry Structure

The primary beef production sector is made up of a large number of small cattle operations (Figure 9). The lack of productivity is a common factor among these operations. The feeder and stocker export market represents more than one third of the production in volume. Feedlots in Mexico represent a small part of the demand for this type of cattle. The rest of the calves coming from the cow-calf operations are grass-fed.

The industrial activity is based on the TIF plants. These plants represent the modern trend in beef processing that meet all the domestic and international industries' sanitary regulations. On the other hand, the municipal abattoirs are exclusively dedicated to supply local markets. These facilities are still

Figure 10: Mexican Beef Industry Outlook.



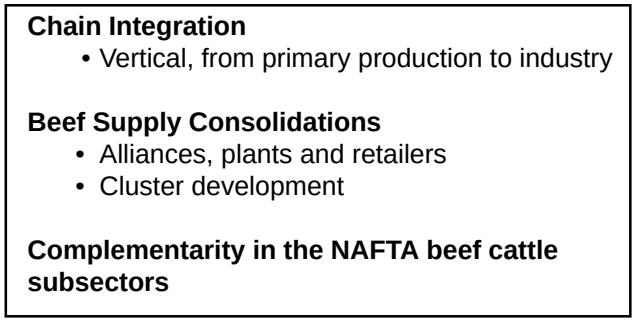
popular because they usually carry lower costs than the TIF plants. In addition, a significant number of cattle are slaughtered in non-regulated facilities in small villages and areas surrounding big cities because of the limited number of TIF plants available in the country.

Beef retailing is mainly carried on in public markets and small butcher shops in the most populated areas in Central and Southern Mexico. This system keeps the traditional marketing process in which most beef has been retailed for many years. One important outlet for beef consumption is represented by the traditional eateries called "taquerias" (from taco), small restaurants specialized in typical food, where beef and other meats are basic ingredients. The growing importance of beef retailing in supermarkets is a response to changes in income and consumer preference of middle class families in Mexico.

The Beef Industry Outlook

Primary Production. As previously shown, Mexico's geographic and climatic diversity have led to the development of different production systems (Figure 10). In the North, the cow-calf operations will continue focusing

Figure 11: Mexican Beef Industry Outlook (continued).



on the U.S. market. These production units will have to satisfy the specific demands of the feedlots, such as breed of cattle, weight and origin of the herds because of heightened sanitary regulations included in the NAFTA agreement.

In the Central Highlands the dairy industry will continue to grow. The local feedlots will dedicate part of their capacity to an increased number of culled animals from the dairy industry. So, the dairy industry will continue to complement the beef market in Central Mexico. Because of their proximity to Mexico City and its surrounding urban area, these feedlots might dedicate part of their capacity to finishing cattle from the tropics, which have been developed under grazing.

Low productivity and low quality levels in beef production have characterized the dry tropical regions. Cow-calf operations will continue to operate under these tropical conditions. The humid tropical regions in Mexico are expected to continue basing their beef production on the dual-purpose production system. Climate and animal health conditions (parasites and diseases) have always been a deterrent for the broader use of more specialized European type of beef cattle. If future research produces better methods to mitigate the climate impact on European cattle, these regions should utilize the great potential for livestock production, with a clear increase in the profitability of these operations. In any case, crossbreeding will continue providing the genetic poten-

tial to improve animal production and the rusticity that the cattle need to produce milk and meat under these adverse conditions. Although adjustments for grain-finishing cattle might surge in the future, grass-feeding is expected to continue as a popular component of the production systems in these regions. This practice is economically viable while avoiding the expensive inputs that burden the small producers' economy.

Sanitary issues will continue to play an important role in livestock trade. In order to reach the United States and other potential markets, Mexico will need to continue to strengthen its eradication effort on those diseases that impede the flow of live animals and animal products across borders.

Industrial Activity. In the coming years, Mexico's beef industry will move to a more vertically integrated production chain, from primary production to the industrial and retail industry (Figure 11). At first this integration will work between the closest players. There are already starting alliances between farmers and feedlots, in which they both benefit. The next stage will begin when feedlots try to integrate with packing plants looking for a share of the added value generated in the industry, through the creation of trade brands and innovative marketing programs.

Another important feature for the next years will be the consolidation of beef supply. This will become more evident when strategic alliances develop between slaughterhouses and packers target the big retail companies. It is difficult to envision a single trading scheme in the country, but all this should start with regional alliances. The regional cluster system seems to fit well the outlook of the beef cattle sector in Mexico. This trend will be further supported as the strength of regional clusters promotes production efficiency and linkages among the participants of the production chain.

It is expected that the regional cluster system will influence the efficiency of the industrial processes. This should generate higher quality products that satisfy the needs of consumers willing to pay for such quality. Another important effect will be shown on the role the government and producer organizations will have on the strengthening of sanitary rules. All these efforts will

achieve the complementarity of beef cattle industries of NAFTA members, where each country can profit from its own consumer preferences.

UNITED STATES

The United States is the world's largest beef producing country. While other countries have more cattle and buffalo, no other country produces as much beef. For example, and for obvious reasons, India has many more cattle and buffalo than the United States, but little beef consumption or production. In relation to the North American industry, the United States, with about 100 million head, has about three times as many cattle as Mexico and seven times as many as Canada. Cattle are produced in every state, but the major producing states are in the Plains and South. The three basic production phases are cow/calf operations, stocker or backgrounding operations, and feedlots. Calves are produced in cow/calf operations and after weaning move to stocker operation or to feedlots.

Cow/calf production is an extensive, grass based system. One production advantage of the United States is that the country covers a broad range of climate conditions. That is conducive to producing calves and feeders for feedlots year around. Cattle can be kept on pastures longer in times of high feed costs to lessen production costs. The average cow herd size in the United States is only about 40 head. The industry has many small producers where cattle are not their main occupation, but are more of a pastime. Many diversified farms have cattle that allow them to use land that would otherwise not produce income. This wide variety of producer with many small herds has implications for the future that will be detailed later.

Production costs vary widely but a strong element of economies of size are evident. Standardized performance analysis (SPA) data of cattle herds in the West and Plains report costs ranging from $65 to $100 per cow (McGrann, 2000). USDA cost of production data fall in this same general line with the lowest costs reflected in the Plains. Small herds generally have the highest production costs, but producers that are least reliant on cattle as a source of income. The cattle may be a small part of a diversified operation, they may be a pleasurable diversion, or the source of an agricultural-use property tax ex-

emption. As such these cattle are least likely to be affected by price downturns and by the changing structure of the industry. Cow/calf producers in the Western, public land states, have a host of other issues to contend with. The least of these may sometimes by the grazing fee. Changing notions of multiple use, new values placed on wildlife and recreational uses will probably push more cattle out of these public land areas. Although cow numbers in these states as a percent of total cow numbers have changed very little over the last twenty years.

Beef production per cow continues to increase due to more heifers fed, more dairy cattle fed in feedlots, rising slaughter weights, improved feed efficiencies, and higher calving rates. That means that fewer beef cows are needed to produce the same amount of beef. In fact there was record beef production in 2000 with almost 35 million fewer cattle than the old record in 1976. Over the last three years the United States has produced in excess of 26 billion pounds of beef per year with a declining cow herd, implying that, over time, fewer cows may be needed to supply domestic consumption and a growing export market.

Feedlots. Except for cull cows and veal calves, virtually all cattle are fed to slaughter weight in a feedlot. This sector is undergoing rapid consolidation as farmer-feeders exit the industry. Feedlot production has typically had 2 types of operations: farmer-feeders and "commercial" feeders. Farmer-feeders were located in farming areas of the country particularly the Midwest where crops were grown. Feeding cattle was one part of a diversified operation where corn was marketed through the cattle. In addition there were more packers available to which cattle could be easily shipped. Generally, cattle were fed only during the winter. Today less than 3 percent of cattle are in feedlots with 1,000 head or smaller capacity. Several factors have led to the demise of the farmer-feeder. One is economies of size. Larger feedlots enjoy sharply lower costs than do smaller lots (Richardson and Anderson, 1987), they purchase feed and produce cattle year around and they utilize capacity fully (referred to as turnover rate). Large commercial feedlots may have turnover rates of 2.5 while farmer-feeders often would have rates equal to one. On top of higher feeding costs, producers involved in crop agriculture have become more specialized, eliminating cattle feeding. As packing became more concentrated close markets often dried up.

Environmental regulations are an increasingly important factor in cattle feeding. While large feedlots have already dealt with the issue and have put in place technologies to deal with regulations (and are preparing for further regulations), smaller feedlots are increasingly burdened by regulation. Newly proposed EPA regulations on AFOs and CAFOs (confined animal feeding operations) will add to those burdens. Small feeders, including farmer-feeders, will be harder pressed to afford environmental compliance costs.

Large feedlots located in the relatively arid Plains continue to grow, achieving cost economies. Feedlots in the 32,000 head size and larger have grown in number. The major feeding area includes the Texas Panhandle, Oklahoma, Kansas, Colorado, and Nebraska. The arid area with little population puts the industry in the best position, environmentally speaking. There is less risk of water pollution and fewer people to be concerned over other environmental problems.

Economies of scale in cattle feeding imply that the ongoing consolidation will continue. Fewer, larger feedlots move the industry toward a more vertically integrated model. Large feeders can deliver cattle to large packers in a consistent, timely volume, reducing transaction costs, just as large ranches can ally themselves with feedlots and packers to deliver a particular type of cattle.

The United States feeds cattle because of the abundant feed base of the country. In addition, land expense and the beef demands of the population lead to more intensive beef production. While many in the beef industry argue that farm programs have injured livestock producers, to the extent that farm programs have expanded crop production and reduced feed prices the feedlot industry has greatly benefited. In fact the 1996 Farm Bill can be argued to have greatly benefited livestock producers. The elimination of set aside acres, expanded production, and very low feed prices have cheapened gains considerably. Lower prices have also led to increased cattle weights and beef production. Fed cattle production in a free trade environment that led to higher and more volatile prices could be expected to decrease fed cattle profitability.

The Packing Sector. The United States has a highly concentrated beef packing sector. The top four firms slaughter about 88 percent of the fed steer and heifers. In spite of many studies there has been little evidence of market power exertion by these firms. Some studies have shown slightly lower prices along with greater consolidation. Other studies have indicated that packing cost efficiencies actually have led to upward pressure on prices as increased profitability led to higher feeder cattle bids.

Research has shown costs economies in larger packers. Much of the packing sector consolidation has been driven by reducing production costs. Along with reducing production line costs comes an effort to reduce transaction costs. This is the argument for captive supplies. At times more than half of some states fed cattle are contracted to packers in advance. Captive supplies allow feeders and packers to reduce costs and risk further. The next twenty years will bring further integration between the packer and feeding sectors.

Packers perform much more of the "value adding" role than in the past. Continued work on case ready and branded products add value and are driven by what consumers want. Packers are also heavily involved in export markets. As exports have expanded this value added role has contributed heavily to widening farm to wholesale spreads in the industry. The packing industry leaders, IBP and Cargill, are multinational firms and control a large portion of North American fed cattle slaughter. Yet there is little evidence of conspiracy, collusion, or market power abuse. The similarity of fed cattle from Canada and the United States may mean that freer trade outside of NAFTA countries may matter less about which country it comes from as long as it gets to the export market.

Consolidation and concentration in the feeding and packing sectors is leading to a more integrated system. Fewer larger feedlots supply the fed cattle for fewer, larger packers. Packers align with feeders producing the cattle that fit their markets, both domestic and international.

Retail and Consumers. Consumer perception matters as the beef industry has been long in learning. As the industry becomes more integrated

the supply chain is identifying consumer desires and perceptions. A more concentrated industry also leaves more room for niches. If consumers want more lean beef, products like 'Laura's Lean Beef' emerge to serve consumers desires. Consumer friendly products like the "HEB brisket" that is pre-cooked and is "good" respond to consumer wants. Yet the retail market is also a more concentrated one. Fewer retail outlets desire fewer suppliers leading to a more integrated system. That consolidation is happening across the NAFTA countries (like Walmart). Demands for a more consistent, uniform product require a more integration production system.

This consumer/retail sector is also driving another type of structural change in the industry - food safety. Consumers want safe food and sue if they don't get it. Retailers demand a traceable beef supply chain that extends to the farm. Systems that do that very thing are being implemented. How they will extend through the extensive, small producers level is hard to fathom. One possible outcome may be that producers who ally themselves with a supply chain will adopt these technologies to ensure a market. Small producers who don't adopt will see sharp discounts in calf prices. Traceback systems will further move the industry toward a more integrated system. This also implications for trade as well.

Trade. The United States has an active trade in cattle and beef. Since the mid-1980s the United States has imported generally more than a million head of cattle annually from each of Mexico and Canada. Typically Mexican cattle exports have been calves that went to pastures then feedlots. Canadian cattle have been predominantly fed cattle going to U.S. packers. This change since the mid-80s represents a slight shift of the United States away from cow/calf production to feeder cattle production and to the United State's more efficient and larger packing industry. It also represents changes in Canada as their feeding industry expanded. These changes have also been a source of trade tension as more cattle came to the United States and as more beef went to Mexico.

The United States continues to be a net exporter of beef on a volume basis and exports have grown from about 1 percent of production in the 1980s to almost 9 percent of production today. Exports have become increasingly

important to the beef industry. While Japan is the largest U.S. beef export destination, Canada and Mexico are the number two and four destinations, respectively. While a source of recent disputes, increased beef trade with Mexico is likely, further integrating the North American market.

Other Issues. A couple of other factors may affect the future of the U.S. beef industry. One of those is BSE. The latest outbreak in Europe has led to estimates of a 30 percent decline in beef demand. It is difficult to overestimate the impact of a loss of consumer confidence of this magnitude in the United States. This supports further integration of the supply chain from a risk management perspective. It also leads to questions about the source of other cattle coming into the United States. Another issue of interest is U.S. farm policy. As marginal land leaves crop production cattle are an alternative. More beef production per cow mean continued increases in exports will have to materialize to expand cow numbers on more land area. There appears to be plenty of opportunity to increase supply.

SUMMARY AND CONCLUSIONS

This discussion of the cattle/beef industries in each country highlights a number of issues relating to structural change and trade disputes.

- Structural changes are occurring in the industry as shown in the growth of the feedlot industry in Canada, consolidation in feeding in the United States, concentration of packing in a few multinational firms, and consolidation of retail outlets.
- Structural changes have been the source of trade disputes and will continue to be even though the countries cattle industries are becoming ever more integrated.
- There essentially is a North American cattle/beef industry led by the United States which has by far the largest production.
- There is a large amount of trade between these countries and they will become more integrated over time. Other than nuisance trade actions, there hasn't been much change in trading relations in the last few years.

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AgInfo Link

Anne Anderson

NAFTA: Effect on the Cattle Industry Structure

For many in the cattle industry, NAFTA is the scapegoat for whatever is wrong. They are vociferous in their accusations of negative impacts of which there are a few. For the cattle industry's business minded producers, feeders, processors and packers, it represents opportunity that would not exist today without it. For both of these groups as well as all those falling between in opinion, NAFTA has meant change, even structural change.

NAFTA has emphasized that the beef market is, indeed, a global market affected by conditions all over the world. In both Canada and Mexico, as well as Australia and much of South America, a pound of beef can be produced at a lower cost. Cost is a key factor in market share. To be more competitive, vertical integration has occurred to better manage costs and more effectively purchase inputs. This is a structural change with one of two things happening: an entity owning two or more major production business components; or, two or more separate entities forming a new entity, functioning as one but remaining separate in identity while united in production.

To further explain the first structural change, lets look at a couple of examples. Tejon Ranch diversified their business to encompass the cow - calf business and the stocker business, and then purchased their own feedyards so that cattle would not change hands until they went to the packer or, under contract, to the supermarket. A similar example is the R.A. Brown Ranches which today produce their own horses, their own herd sires through a Purebred operation, have a commercial cow/calf operation to produce calves for their own stockering operation, and then have major ownership in a feedyard where their animals are specification finished for a supermarket. These entities are able to reduce duplicative costs, eliminate paying someone to facilitate the change of ownership, tremendously reduce outliers and produce a higher quality; more uniform product without significantly increased costs. One must also realize

that this has required additional capital, more risk to be managed and a bold attitude to break from the traditions of the past.

Operational vertical integration has resulted from independent entities functioning as a single production and marketing entity. A number of the new alliances fall into this category. Premium Beef and Ranchers Renaissance are two such examples. Both are alliances of independent producers of stocker and feeder cattle, packers and supermarkets operating as one. Their benefits are similar to those outlined above with two major differences-decreased need for additional major capital investment, and the ability to remain an independent business, a trait long cherished by many in the cattle producers. A hybrid of these two is the new Future Beef operation in Kansas where the legal structure consists of independent entities but the supplier partners and end users own a portion of the packer partner. This hybrid, scheduled to begin operating July 1, 2001, may have found a new structure even more profitable than the two previous examples.

Cross-border production has also "evolved" since NAFTA. "Cross-border production" as referred to here is the movement of animals across the border one or more times during the production phase for the purpose of decreasing the cost of production by locating each phase in the least cost country. This is occurring on both the Mexican and Canadian borders because it is frequently more cost-effective to finish an animal in Canada and slaughter it in the United States. An animal may be born in Montana, stockered in South Dakota, fed in a feedyard in
Alberta and slaughtered in Nebraska. Though transportation costs have significantly increased
the decreased cost of production at each point along the way has made the process profitable for each of its participants.

Mexico has experienced similar production initiative. Born in northern Mexico, calves are shipped to U.S. feedyards for finishing due to the availability of lower cost grain, and then shipped back to Mexico for slaughter and further processing where labor is much more economical. The meat is frequently shipped to end users in both Mexico and the United States, with the

higher quality cuts moving north and the cheaper cuts and offal product moving south.

Such changes have not come without a price. The alliances have proven difficult to keep unified as each production segment has historically experienced a profit at the price of another. Trust has taken years to build. Transparency of operation with a previous competitor and possibly future competitor if the initiative fails has been nearly impossible to evolve. The new Future Beef initiative has faced construction set backs and increased costs since the plan was initially written and the start-up capital assembled.

The good news is that NAFTA abetted structural changes that have occurred, and have produced a more consistent, more desirable, more cost-competitive product. That result alone will continue to drive additional changes. These first players most certainly will continue to be emulated by others. Production/marketing alliances have been increasing at a rapid rate, many of the associations without proper foundation. This proliferation with insufficient basis, incompatible partners lacking similar vision and "limited homework" will result in a number of failures leading to a pullback by yet others who may both fear failure and lack the business expertise. That inevitable set back will not affect the long term changes underway. These structural changes appear to be both positive and permanent for the producers experiencing them, the customers profiting from them and the increased market share for beef, the first in fifteen years.

Canadian Cattlemen's Association

Dennis Laycraft

I have reviewed the paper and concur with their overall conclusions. My remarks will concentrate on the "changing marketplace" and its impact on free trade. My purpose is to show that the marketplace is not only changing but, in some cases, is adapting to overcome some of the remaining (or new) impediments affecting the integrated North American market. Canada and the United States are the world's primary producers and exporters of high quality (grain fed) beef products. The two markets have effectively become integrated into one market with 88 percent of production occurring in the United States and 12 percent in Canada. Since CUSTA, both Canada and the United States have increased high quality beef exports substantially with the greatest growth markets being Asia and Mexico. The United States is now the second largest beef exporter in the world, and Canada is ranked fourth.

Food safety and animal disease are the most important issues affecting trade and consumer confidence. The BSE, Hog Cholera, and Foot and Mouth disease (FMD) problems in Europe and Asia have heightened beef safety and disease control issues around the world, and are resulting in greater measures of assurance and disease prevention to maintain both consumer confidence and access to markets. The national associations of beef cattle producers from North America have recently signed an agreement to work together to ensure that we remain BSE free, and they recently cooperated on FMD simulations with our animal health departments to test our respective systems.

Other recent developments that are noteworthy include a substantial increase in feeder cattle movement north from Mexico to the southern United States and from northern United States into western Canada, decreasing some of the tension in the north-western United States. Beef exports to Mexico continue to increase along with strong growth in offshore exports particularly to Asia.

The market is evolving and overcoming impediments as it transforms from a commodity business to a more customer-oriented industry. Communication is increasing across sectors leading to new forms of business relationships. Market driven specifications, usually as part of a "brand" based program, are raising the quality bar well above the regulated grading systems that were integral to pricing in a commodity environment. Although some regulators are trying to impede trade by restricting access to grading services, the market is moving beyond that standard.

As part of this evolution, new marketing approaches are being more broadly embraced, in some cases with considerable controversy. Grids, formula sales, forward or basis contracting, co-ops, and partnerships are affecting how price discovery and market signals are determined and transmitted. Few of these methods are new. What is new is the degree to which they are being embraced. A group in Texas, Consolidated Beef Producers, wanted to set up a bidding system where packers would bid "on the grid", and set out to attract 750,000 head to create the critical mass required for this system to work. Over 2.1 million head of cattle were enrolled. The program will market on carcass merit through a competitive grid bidding system.

Another group named Future Beef Operations is following the poultry lead using a network of herds and preferred suppliers and is now selling all of their production to Safeway. Their goal is to be sole supplier of beef to Safeway in 5 years. There is an array of 'Beef Dot Com' companies jumping into the business, in many cases involving huge investment capital. Some examples include: eMerge, Interactive & Cyber Stockyards, eHarvest.com, CattleSale.com, Agribuys.com, TradingProduce.com, MeatBroker.com, AgriPlace.com & CattlePlace.com, Food.com, FoodUSA.com, SellMEAT.com, and GlobalFoodExchange.com. And we are seeing quality based branded beef programs proliferating at a rate never witnessed before. These programs are packer, producer and retail driven. They:

- are based on specifications that go beyond grades; Specifications that can and have been programmed into CVS (a computerized grading system developed in Canada and installed in 10 plants).
- include premiums for cattle that qualify;

- include varying marketing options, some gate-to-plate, and some based on grading assessment.

CONCLUSION

New marketing innovations are occurring at a record pace. Free trade creates a more secure investment climate in which this occurs. Canada and the United States have grown to be two of the largest beef exporters in the world and dominate the high quality grain fed beef market. Beef quality and safety are key to ongoing success. While some regulators are working to impose policies that are considered protectionist or have impeded harmonization efforts, the market place is driving changes that go beyond these standards and attempts to impede natural competition.

Rabobank, Mexico

Kenneth Shwedel

INTRODUCTION: SOME CONCEPTUAL OBSERVATIONS

In the various discussions, market power was often defined primarily in terms of concentration. This definition may be acceptable for a single country economy. Within the context of ever increasing trade, the concept of market power should be revisited.

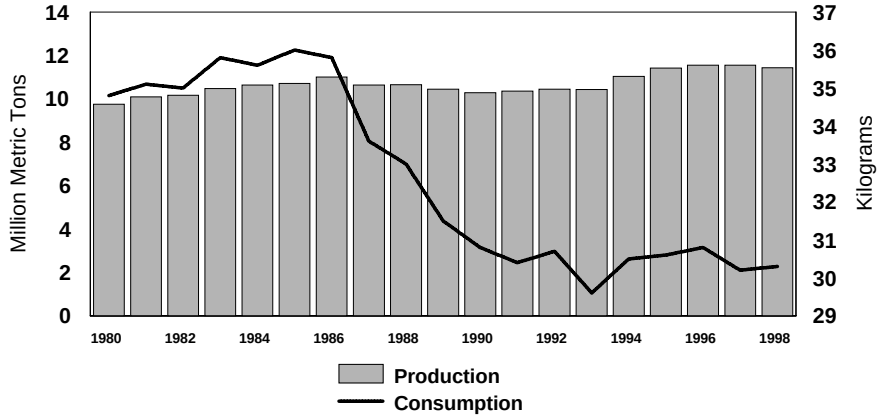
One alternative would be to combine absolute size with concentration ratios. For example, in the U.S. beef industry, the leading packers control over 80 percent of the market. In Mexico the leading four companies control about 12 percent of the market (based on slaughter). The size of the cattle herd in the United States is about three times that of Mexico. While it is not unusual to state that the market power of the U.S. industry within a trading context is higher than that of the Mexican industry, the combination of concentration and size puts that relationship in a new context. More work should be done to develop indicators that capture these cross-border differences.

Most of the discussions have tended to focus on one part of the industry, with a bias towards primary production. New business models are emerging which are both the result and catalyst of structural change in the food business. Trade disputes should be analyzed within a framework that takes into consideration chain management based on a series of strategic alliances built around strong food industry players. The remarks that follow will attempt to focus on some of the differences in the two business models, which tend to accentuate trade disputes.

The U.S. Beef Sector: An Industry In Crisis

In contrast with other speakers, I view the U.S. industry as facing a serious crisis. Production has grown while per capita consumption, in spite of a recent increase, is significantly below the levels of the early 1980s (Figure 1).

Figure 1: Beef Production and Per Capita Consumption in the United States, 1980-1998.



Source: National Cattlemen's Beef Assocation (USA)

The industry has attempted a number of measures to reactivate beef consumption in the United States but, in the final analysis, the alternative for the survival of the cattle/beef industry as it exists today is the export market. There is some question as to how much more meat can be consumed in the United States. If the beef industry is successful in expanding per capita consumption, that will mean that either poultry or pork producers will have to increase their dependence on the international market[1].

For the U.S. beef industry, Mexico represents a natural market for exports. Not only is it a reflection of location, but the growing economy and population suggests that meat demand will continue to grow. Furthermore, the structure of demand means that cuts with minimum market potential in the United States are widely consumed in Mexico. Added to this is the price structure in the Mexican market in which "popular" cuts are relatively more expensive compared to premium cuts than in the United States (Figure 2). This means that for U.S. companies, profits can be enhanced through selective exports to the Mexican market.

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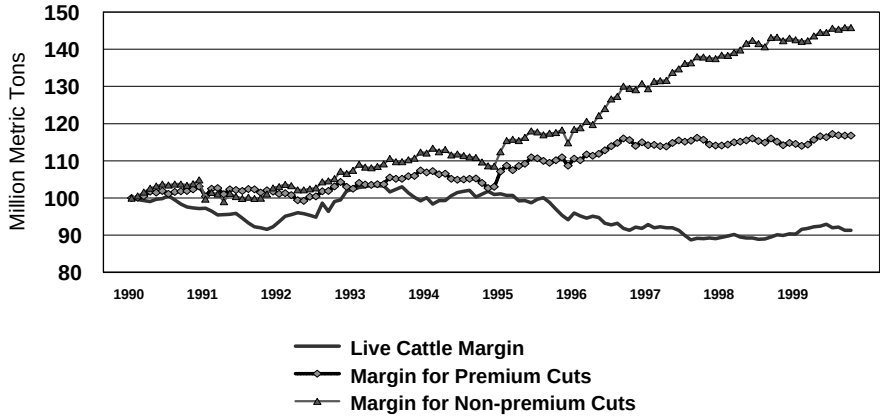
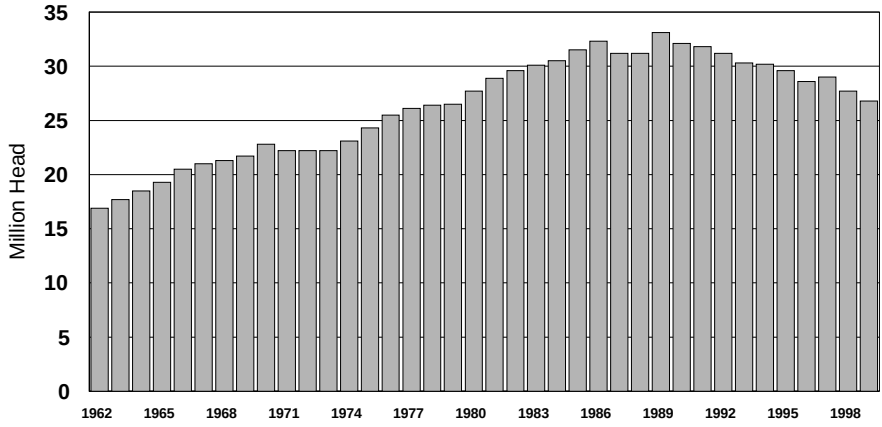
[1] The center of the plate business model that is emerging in the United States is an example of a strategic response to this situation. Research should be carried out in relation to this business model and its impact on trade and investment.

Figure 2: Margins in the Beef Marketing Chain in Mexico, 1990-1999.



Source: Banco de México

Figure 3: Cattle Population in Mexico, 1961-1999.

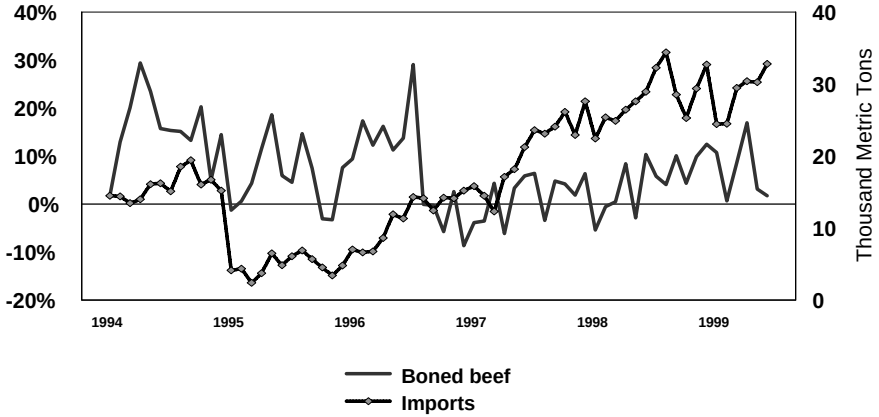


Source: FAO

The Mexican Beef Cattle Industry: On-Going Trade Disputes

The number of cattle in Mexico grew continuously up though the end of the 1980s (Figure 3). Recurrent economic crises, reduction in official support to agriculture, contraction of credit combined with high interest rates are

Figure 4: Margins of Producers of Mexican Boned Beef and Imports of Beef, 1994-1999.



Source: Rabobank International from INEGI and SHCP Data

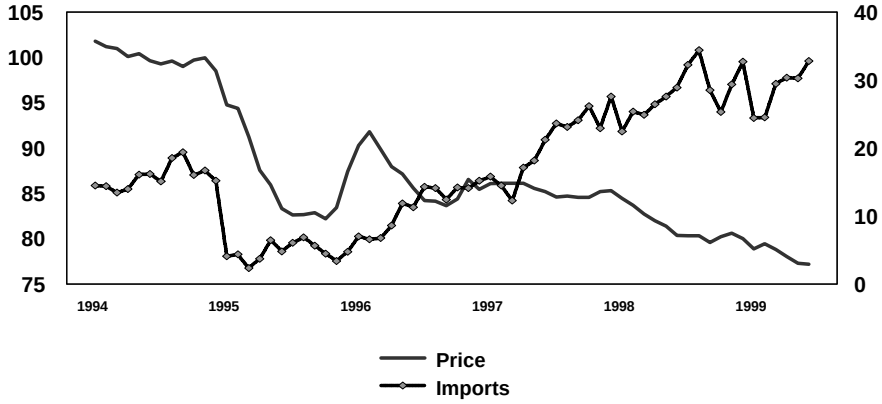
some of the reasons that explain the downturn in cattle numbers. Another important reason has to do with the increase in imports of beef. Accompanying the economic shock program that the government initiated in the late 1980s was a decision to open the border to imports of agricultural products, including beef.

As imports grew, cattle numbers declined. The imports put pressure on prices and margins in the industry (Figures 4-5). Yet, at the same time, consumption of beef grew reflecting the growing importance of imported meat. The pressure from imports, which in part results from the pressure coming from the United States to export, erupted in trade disputes. The first, brought by the National Cattlemen's Confederation (CNG), was settled through negotiations between the U.S. and Mexican cattle producer organizations and governments. In the late 1990s, the Mexican cattle feeder association (AMEG) initiated a dumping action against the U.S. industry. This action is now in the process of going to a dispute resolution panel.

The Structure Of The Mexican Beef Industry: A Study Of Contrasts

The previous discussions, while looking at certain segments of the industry, focused on primary production. It is considered that they could have

Figure 5: Real Prices of Beef* and Imports, 1994-1999.

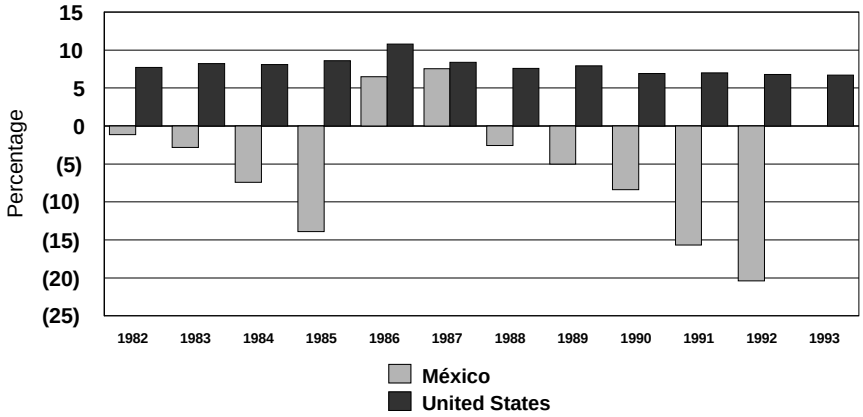


Source: INEGI y AMEG
* Deflated using producer price index

emphasized more structural differences and changes taking place throughout the beef marketing system. At the farm level, the Mexican beef sector encompasses a range of producers running from internationally efficient feedlots to small-scale dual-purpose operations, with a wide assortment of technologies and breeds. The diversity in production makes averages practically meaningless. While feedlot operations are becoming more important, it is still too early to say that they will become the dominant model for the industry.

At the same time, diversity that is found in production is also seen in the marketing of meat. The small butcher shop still predominates. Often they are located in public markets, with a number of shops clustered in one specific area. Supermarkets are becoming an increasingly more important source for retail sales of beef. In major urban centers and among the higher income groups supermarkets take on a more prominent role for food distribution. Growth in retail sales has been concentrated in supermarkets more than in the public markets. For 2001, the supermarket association projects growth in sales at 7.3 percent, more than twice the expected GDP growth.

Figure 6: Cattle Industry Producer Subsidy Equivalents, 1982-1993.



Source: United States Department of Agriculture

As supermarkets become an increasingly important channel, meat marketing will also change. Foreign investment is strong in the supermarket sector with the presence of Wal-Mart, Carrefour, Safeway and HEB, among others. These retailers will bring about changes in marketing and supply relationships that will impact the beef industry. There are already attempts, albeit limited, to develop branded fresh beef. At the same time, value-added packaged products are also beginning to be offered to consumers. The most common of these is a seasoned arrachera, which is a strip steak-like cut. Case-ready products are also making their appearance in Mexican markets.

If there is a strong presence in direct foreign investment at the retail end of the chain, at the production level there is little foreign investment. There are examples of U.S. investment funds as well as U.S. companies directly involved in cattle production, but these are still the exceptions.

Public policy is also an area of important differences. In the area of subsidies, U.S. producers benefit from extensive support programs (Figure 6). In Mexico, the emphasis in agricultural support programs tends to concentrate on grain producers. In spite of changes and attempts to bring a more market

focus to policy, the inconsistencies impact negatively on price and assured supply.

Information, or rather the lack of it, represents another important structural difference. Cattle numbers, for example, vary from source to source. Market data are difficult to obtain, and when available, are often out dated.

The Future: More Disputes As The Market Changes

Most of the speakers have focused on Mexico as a destination for U.S. exports. While this is valid at present, it is not unreasonable to see Mexico as an exporter of beef, as well as other meat products. Concerns about food safety in the United States are leading to a multi-plant model for meat companies. The expected growth in branding and new packaging technologies in the United States will facilitate long distance packer operations. These factors, along with the cost of labor in the U.S. market suggests that production of packaged cuts of beef can be highly competitive in Mexico. Nor is it unreasonable to think that live cattle from the U.S. would be shipped over long distances to take advantage of market and or labor conditions. For example, cattle are already shipped from Canada to packers in the United States.

What this implies is an integration of the Mexican and U.S. industries driven by cost considerations and the changing nature of competition at the retail end of the distribution chain. As this scenario develops, in the short run, the reaction to the structural change raises the spectrum of more trade disputes, this time initiated by U.S. cattle producers.

ISSUES AND TRENDS IN THE U.S. FIELD CROP SECTOR

Demcey Johnson

INTRODUCTION

The U.S. and Canadian crop sectors share several common trends. Changes in international trade patterns, the growing importance of privately funded agricultural research, and continuing pressures toward larger farm size are likely to affect both countries in similar ways. In what follows, I will expand on a few areas that Kurt Klein has already touched upon - -specifically, the differentiation of commodities by end-use characteristics and biotechnology - -and introduce another topic, e-commerce, that may have important implications for competitive conditions in the crop sector. I will also discuss three other areas of special interest in grains and oilseeds: consolidation and integration of handlers and processors; progress toward harmonization of regulatory regimes; and the recent evolution of U.S. agricultural policy.

DIFFERENTIATION BY END-USE CHARACTERISTICS

The marketplace for grains and oilseeds has seen a proliferation of 'value-added' varieties. Advances in plant breeding have made it feasible to design commodities with specific end-use characteristics. Some specialty crops, such as waxy corn, predate the biotech revolution by many years, and others, such as high-oil corn and food-grade soybeans, are more recent products of

commercial breeding programs. Genetic engineering can only further this trend by facilitating the incorporation of traits desired by processors, livestock feeders, and food manufacturers (Riley and Hoffman, 1999).

For producers, price premiums offer the main incentive for growing value-enhanced crops. Premiums must be sufficient to compensate producers for any yield differentials relative to standard varieties, and for any extra costs (including segregation) associated with production or on-farm storage. Because value-enhanced crops are identified with niche markets, premiums are highly dependent on supply conditions and, in some cases, can only be secured through contractual arrangements with buyers. These market factors point to a host of issues relating to 'vertical coordination' in the market channel for grains and oilseeds, for example the increased reliance of food manufacturers and processors on contracting, rather than spot-market transactions, for procurement of crops with specific end-use characteristics. As in the livestock and poultry sectors, an increase in contracting will tend to diminish the significance of traditional cash markets while accentuating the informational asymmetries among producers. Contracting may entail standardization of production methods (e.g., chemical applications) to ensure that the crop meets buyers' quality requirements. Some loss of control, either in production methods or marketing, seems inescapable for producers who contract for value-enhanced commodities. It should be noted that, for some crops and production regions, the potential for contracting could be limited by uncertainty over growing conditions and crop quality. For example, domestic millers and some export buyers of hard spring wheat have preferences for particular varieties due to their milling or baking characteristics, yet contracting with growers by wheat variety is quite uncommon[1], likely because of the large, intrinsic quality variation in spring wheat due to year-to-year changes in growing conditions.[2]

The differentiation of crops holds important implications for grain handling and transportation. Much of the U.S. grain handling infrastructure has

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[1] In fact, General Mills is one of the few firms with procurement for particular wheat varieties, and these account for only 15 percent of the firm's total purchases.

[2] William Wilson (personal communication) also suggests that premiums for specific varieties have not emerged because of difficulties in distinguishing wheat varieties in the U.S. system.

been designed to take advantage of low-cost, high-volume shipments and opportunities for bulk storage. This reflects deregulated rail rates and the advent of unit trains (both in the 1980s), in addition to Commodity Credit Corporation (CCC) loan programs and the Farmer Owned Reserve (FOR) under earlier farm bills, which created substantial need for commercial grain storage. Efficient handling and transportation of 'generic' commodities are likely to remain an important feature of the U.S. system. However, the growing importance of specialty crops and niche markets is creating new demands: for more careful segregation and identity-preserved (IP) shipments and other forms of coordinated 'supply chain management.' Vertical linkages between processors and grain handlers, through direct acquisitions, strategic alliances, preferred-supplier relationships or other methods, is often an outgrowth of commercial demand for grains or oilseeds with specific quality attributes.

Crop differentiation also presents a challenge to the public sector; for example, with respect to the price-reporting and commodity-analysis functions of USDA. Prices quoted for standard grades (e.g., No. 2 yellow corn) at traditional market centers, collected and published by the USDA Agricultural Marketing Service (AMS), give little guidance to producers or traders of value-enhanced crops. Similarly, data provided by the National Agricultural Statistics Service (NASS) for crop acreage, and Economic Research Service (ERS) *Situation and Outlook* reports, do not provide the level of detail necessary for analysis of supply-demand conditions for these crops within the broader commodity aggregates.[3] The absence of public price information for value-enhanced crops not only obscures the efficiency of the price discovery process, but also creates problems for crop and revenue insurance.

BIOTECHNOLOGY AND GENETICALLY MODIFIED CROPS

For a large segment of the public, the term 'biotechnology' is now firmly linked with genetic engineering, despite the more expansive interpretation given

[3] However, NASS does report acreage planted to genetically-modified crops as an aggregate.

it by many researchers.[4] Food products derived through genetic modification (GM) have found a level of acceptance in the North American market but are strongly resisted elsewhere, notably in Europe. Consumer resistance to GM crops and official trade barriers in foreign markets could have profound consequences for the U.S. crop sector in years to come.

Most of the commercially successful applications of genetic engineering to U.S. crops have targeted agronomic characteristics, e.g., insect resistance in corn and cotton, or herbicide tolerance in soybeans. Tremendous potential also exists for enhancing the end-use characteristics of grains and oilseeds through genetic engineering techniques. However, much will depend on consumer acceptance and the resolution of outstanding regulatory issues in U.S. and foreign markets. Differences in proposed labeling standards (mandatory versus voluntary, 'positive' versus 'negative' labels) and tolerances are now the subject of intense scrutiny. Growers of GM crops without enhanced consumption characteristics have no incentive to voluntarily label their production as 'containing GM'. On the other hand, voluntary labeling of 'GM-free' crops might be economically justified by price premiums or access to otherwise restricted markets. (See Golan, 2000 for discussion.) Internationally, the United States and Canada appear to be increasingly isolated in their opposition to mandatory labeling of GM crops.[5] Given the importance of offshore markets to both countries, it seems likely that foreign labeling requirements and standards will dictate more careful segregation of GM and non-GM crops within the North American grain handling system, whether or not labeling becomes mandatory.

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[4] Riley and Hoffman (p. 23) define biotechnology as "the use of biological organisms or processes in any technological application. Genetic engineering can be thought of as a subset of biotechnology ¼" According to Caswell, Fuglie and Klotz (p. 2), the term "refers to all parts of an industry that creates develops, and markets a variety of products using monoclonal antibodies, cell culture, biosensors, and genetic engineering techniques." More recently, agricultural biotechnology has referred to the use of recombinant DNA technology (DNA formed by combining segments of DNA from different organisms) to alter or move genetic material in plants (such as corn or soybeans) so that a desired trait is expressed.

[5] Labeling requirements for genetically-modified food are now in force in the EU, and soon will be implemented in Japan, South Korea, Australia, and New Zealand.

Additional costs of segregation and IP shipments must be ultimately borne by buyers or by producers and handlers, depending on the demand characteristics and shares of particular markets. The size and incidence of cost burdens associated with segregation are now attracting research interest. A recent study suggests that segregation of non-GM varieties could add about 22cents/bu to total marketing costs for corn (from country elevator to export terminal), and about 18 cents/bu or 54cents/bu for non-GM soybeans, depending on the segregation process used (Lin, Chambers, and Harwood, 2000). The economics of IP shipments are also important and likely to change in the near future, with larger container vessels reducing the cost of unitized shipments to overseas markets (Prentice, 2000). In combination with modern computer technology, intermodal containers offer the opportunity for direct shipments between producers and buyers in domestic or international markets, and traceability. The question is whether premiums for 'GM-free' crops will be sufficient to justify such shipments on a large scale.

E-COMMERCE

The revolution in information technology associated with computers and the internet has affected the U.S. crop sector in several ways, not least by providing ready access to a wealth of new market information. Farmers are increasingly using the internet to check prices of commodities and farm inputs. Although statistical evidence is limited, at least one study also suggests that 'farmers are quick to make the switch to e-transactions, specifically with regard to purchasing seed, crop chemicals, and machinery' (Mueller, 2000; p. 3). This technology seems certain to intensify the competitive pressures on farm input suppliers. (An example of an electronic market for farm inputs is ***xsag.com***). Whether e-commerce, i.e., transactions conducted over the internet, will play a major part in the future of crops marketing is a bit more difficult to anticipate, as there are several directions possible.

One of the more visible models of e-commerce is that of the electronic exchange, where buyers and sellers meet to transact business. Access to the exchange may require a membership fee or subscription, but firms can then post bids or offers in a neutral environment that is fully transparent to other users. (An example is ***AgEx.com***, which operates electronic markets in rice,

almonds, walnuts and pulses.) To their users, the chief advantages of electronic exchanges may be lower search costs and the ability to quickly review bids or offers of potential trading partners. Whether through organized auctions or simple posting of bids and offers, electronic exchanges can only widen the scope of markets (facilitating transactions with new players) and intensify price competition.

On-line business-to-business (B2B) marketing of grains and oilseeds has received backing from major industry players. An example is Pradium Inc., which promises to launch virtual trading pits for cash grains, oilseeds and products early this year. Major investors include Cargill and ADM; other investors include Cenex Harvest States, Louis Dreyfus Corp. and DuPont (*Milling and Baking News*, Oct. 31, 2000). This follows by some months the launch of ***Rooster.com***, an e-commerce site that links farms, elevators and suppliers of farm inputs, backed by many of the same investors. (*Agweek*, October 23, 2000). On first consideration, the promotion of e-commerce by major commodity trading firms is somewhat surprising because, by making market prices more transparent, electronic exchanges would seem to erode the informational advantages enjoyed by firms like Cargill and ADM. However, there may be considerable cost savings associated with shifting away from a telephone-based trading system to one based on computers and the internet. And the firms now taking the lead in e-commerce for grains and oilseeds are integrated and diversified processors, for whom commodity trading is becoming more ancillary.

The electronic exchange is not the only model of e-commerce relevant to grains and oilseeds. Producers, elevators and processors are likely to develop a greater reliance on electronic sharing of information- -e.g., procurement plans, detailed information on grain inventories, measures of end-use performance for specific shipments, etc. Those activities would be an outgrowth of greater vertical coordination of supply chains, as processors and food manufacturers seek greater control over quality and logistics. Intranet technology will allow partners in a supply chain to share as much (or as little) information as they like. This kind of selective information sharing takes e-commerce in a different direction than that represented by electronic exchanges: toward longer-term alliances and contractual arrangements between firms and less transparency in pricing.

Table 1: Measures of Market Power at Different Points in the U.S. Marketing System, 1995.

	4-Firm Capacity Share	*Herfindahl Index*	*Largest Four Firms in Each Sector*
		Export Handling	
Gulf and PNW	56	1334	Cargill, ADM, Harvest States, Bunge
U.S. Gulf	53	897	Cargill, ADM, Continental (HSPV& Corpus Christi tied)
PNW	69	2089	Cargill, TEMPCO (Harvest States), Peavey, United Grain
		Processing	
Flour Milling	70	1420	Cargill, ADM, ConAgra, CFP
Malting*	60	1178	ConAgra, Cargill, Anheuser Busch, ADM
Brewing	87	2818	Anheuser Busch, Miller, Coors, Stroh
Minor Oilseeds*	78	2085	ADM, CanAmerica,Cargill, Cargill Ltd.

* Shares in North America.

Source: Wilson and Dahl, 1999.

CONSOLIDATION IN GRAIN HANDLING AND PROCESSING

Concentration in the grain handling and processing sectors is a topic of perennial interest to U.S. farmers. Interest has been heightened recently by Cargill's acquisition of Continental's grain division,[6] but concerns about industry concentration and the major firms' market power in grains and oilseeds has a much longer history (Lauck, 2000). One of the interesting facets of this topic is that, while similar concerns were expressed over a quarter century ago (in the wake of the 'Great Grain Robbery'), the list of major firms has since changed drastically. Cooperatives now play a larger role than they did in the 1970s, and several of the private firms that dominated grain exports in the 1970s have exited. The 1990s saw a proliferation of mergers, acquisitions and joint ventures, most designed to combine country origination with export terminal

[6] See Hayenga and Wisner (year) for a summary of economic issues surrounding this merger.

or processing capacity. Joint ventures between various cooperatives (Harvest States, Farmland, AGRI Industries, Growmark) and privately-held companies (Cargill, Continental) or publicly-traded corporations (ADM, ConAgra) now make for a fairly complex picture of firm rivalry in individual market channels.[7]

Table 1 (from Wilson and Dahl, 1999, p. 26), shows two measures of concentration for different segments of U.S. grain handling and processing industries: the 4-firm capacity share and Herfindahl index.[8] In general, export grain handling is somewhat less concentrated than the processing industries. The Herfindahl index for export handling at PNW ports (measured as load-out capacity) suggests a greater potential for exercise of market power than at the U.S. Gulf. However, handling margins at export elevators are also limited by competition between port areas, so concentration measures at the PNW may be somewhat misleading. These results point to an analytical problem, i.e., how to define the market boundaries for investigations of industry concentration or market power. The issue of market boundaries applies equally to processing industries, such as flour milling or malting, where companies have integrated both horizontally and vertically. With the elimination of barriers to trade in North America, the frame of reference for competition (antitrust) policy will increasingly include Canada and Mexico.

Although public concerns about industry concentration tend to focus on market power, consolidation in grain handling and processing has also been driven by efficiency gains. In an empirical analysis of the hard wheat milling industry, Steigert and Carton (1998) found an inverse relationship between industry concentration and average marketing margins. They found little evidence that the industry exercised market power in either upstream or downstream markets, despite a 4-firm capacity ratio reaching 77 percent at the end of their study period.

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[7] For a review of ownership changes and joint ventures in grain handling, see Wilson and Dahl (1999). Between 1991 and 1998, they count 24 new joint ventures in the grain trade, and 91 mergers or acquisitions.

[8] Defined as $H = \_ S_i^2$ where S_i is the share (%) of firm i in a given industry or market segment. H=10,000 corresponds to a pure monopoly while H=0 corresponds to perfect competition.

Integration of the North American market for grains and oilseeds presents some interesting questions in this context. To what extent are horizontal mergers a response to reduced trade barriers? Are other factors at play? A recent study of the malting industry addresses the impact of the Canadian-U.S. Trade Agreement (CUSTA) on the economics of transborder mergers (Buschena and Gray, 1999). Prior to trade liberalization, the U.S. and Canadian malting sectors were distinct and separate; as a result of CUSTA, they evolved into a single continental market. The elimination of barriers to continental trade could have been expected to increase price competition between firms, but a wave of mergers and acquisitions, beginning in the late 1980s, left a handful of companies with most plant capacity on both sides of the border. Using a Cournot framework, Buschena and Gray illustrate two motivations for mergers: first, the anti-competitive effect; and second, cost efficiencies associated with coordination of production plans. Interestingly, they show that mergers of U.S. and Canadian malting firms could have produced a positive welfare effect despite a loss of price competition, due to savings associated with regional shifts of production.

There are other aspects of horizontal integration in the malting barley sector. Malt companies (or their parents) and Anheuser-Busch, the largest brewer (with substantial malting capacity of its own), have broadened their geographical access to malting-quality barley through ownership of grain handling facilities on both sides of the U.S.-Canada border. With geographical diversification in procurement, these firms are less vulnerable to quality risks and supply disruptions.

HARMONIZATION OF REGULATORY REGIMES

Although the United States and Canada have made substantial progress toward an integrated market for grains and oilseeds, further integration is limited by differences in marketing institutions and regulatory features. The role of the Canadian Wheat Board (CWB) as single-desk seller of Western Canadian wheat and barley provides the most obvious contrast with U.S. market organization, and seems sure to remain a point of contention. There are also other, subtler differences in the grains sector, including systems of grades and standards and controls over variety release. These do not appear to be signifi-

cant barriers to north-south trade.[9] Barriers to trade in the other direction have also been reduced. Exports of U.S. feed barley to western Canada are a reversal of the historical pattern, and U.S. exports of corn to Manitoba have provoked the kind of response (Canadian allegations of unfair subsidies) that North Dakota farmers might well understand.[10]

Apart from the role of the CWB, there are other regulatory differences that affect market integration in a nontrivial way. Canada's grain transportation system is much more highly regulated than that in the United States. As a result of caps on rail rates, movements of Canadian grain from the Prairies to export position are substantially cheaper than comparable west-bound movements from Northern Plains states. The rate caps apply only for Canadian grains. Their significance can be gauged by the observation that, if U.S. farmers had equal access to Canada's rail system and regulated rates, the drawing area of that system could extend well across the border into prime wheat producing areas of North Dakota and Montana (Wilson and Dahl, 1998). Of course, there is no prospect of equal access at these favorable rates, and the survival of rate caps will depend on Canada's own debate over rail deregulation. The point is that potential changes in Canada's rail system are also of interest to the United States- -at least to the extent that they facilitate transshipment of U.S. grain, thereby altering the competitive environment for U.S. rail carriers.

U.S. grain producers see the need for some harmonization of regulatory regimes. As an example, Canadian producers pay lower prices for many farm chemicals than their U.S. counterparts, partly because of differences in

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[9] In several ways, the Canadian system has adapted to accommodate preferences of U.S. grain buyers. For example, cleaning to 'export standard' is not required when Canadian wheat is shipped to U.S. destinations; this differs from Canada's treatment of offshore shipments. In the barley sector, the normal (multi-year) variety registration process has been expedited in recent years to meet U.S. demand for specific malting varieties. This was something of a challenge for the grading and handling system, because these varieties lack the visually distinguishable features Canada has traditionally used to prevent commingling (Johnson, 1999).

[10] Given past concerns of U.S. producers about wheat and barley imports, there was some irony in the recent dispute about corn exports to Canada. However, OECD comparisons of producer subsidy equivalents (PSEs) make clear that U.S. producers of grains and oilseeds are more heavily subsidized than their Canadian counterparts.

patent protection. Chemicals registered for use on a certain crop may not be registered in another, while no restrictions apply to cross-border movements of the farm output. Other examples concern phytosanitary restrictions, such as those applied by Mexico requiring mandatory fumigation and TCK testing of U.S. wheat. In such cases, the United States has sought bilateral agreement about which U.S. origins warrant special testing, fumigation or quarantine. One suspects that disputes over phytosanitary standards would be easier to resolve if it were clear that costs are incurred by both buyer and seller. That depends, in turn, on whether the buyer has access to alternative sources of supply not subject to the same restrictions.

EVOLUTION OF U.S. FARM POLICY

The 1996 Federal Agricultural Improvement and Reform Act (FAIR) was heralded as a major reform of U.S. agricultural programs, completing the trend toward decoupling of federal payments from planting decisions that had been marked by two previous farm bills. Under FAIR, producers of program commodities were to receive transition payments in decreasing amounts, year by year, in exchange for (nearly) complete flexibility in planting decisions. However, the collapse of commodity prices after 1997 led to financial distress in parts of the farm sector, and Congress responded with substantial programs of emergency assistance, rising from $2.8 billion in FY 1998 to $7.8 billion in 1999, and an estimated $8.9 billion in 2000. Combined with large loan deficiency payments (LDPs), the result has been a sharp increase in direct payments to farmers, to the extent that U.S. commitments under the WTO for reduction of internal supports could be jeopardized. In 2000, direct government payments were estimated to account for over 50 percent of U.S. net farm income.

This experience prompts several observations about U.S. farm policy. First, commodity prices continue to play an important role in determining program payments, partly due to the loan deficiency payment (LDP) mechanism, which provides a kind of price floor for producers of wheat, feed grains, soybeans, rice, and cotton, without constraining market prices.[11] In FY 2000, LDPs

[11] Loan rates under the FAIR were established at a time of much higher market prices. Few envisioned that loan rates would become relevant to producers within a few short years.

were estimated to reach $6.4 billion, up from an average of about $300 million per year during 1993-95. It also reflects an important political reality: that low prices can provide impetus for *ad hoc* federal assistance to farmers. In an era of widening federal surpluses, there is a chance that Congress will enact programs of emergency assistance with some regularity while commodity prices remain low.

Second, as a result of LDP payments and emergency assistance, farmers have been substantially cushioned from the effects of low commodity prices. This effect has negated the kind of supply response that might have been expected if producer returns were entirely linked to output markets.[12] Acreage planted to program crops has been fairly stable in recent years despite lower prices, although the share of soybeans has grown, and that of wheat has declined, in response to loan-rate differentials. Program benefits are still capitalized into land values and are reflected in farmland rental rates. In fact, average land prices have continued to rise over the past five years, even in the Northern Plains and Corn Belt, regions where there have been warnings of acute farm financial stress since 1997. A major obstacle to future elimination of farm subsidies, at least those tied to acreage, is the huge loss of wealth this could entail for landowners. Of course, that was part of the logic of transition payments under the FAIR Act.

Third, because most farm program benefits are tied to acreage or production, they accrue mainly to large commercial farms. This outcome represents a problem for policymakers, because much of the motivation for farm programs has been support of small and moderate-sized 'family farms.' There is a growing recognition of segmentation within the farm sector, although no universal agreement about definitions[13], or about which segments should be targeted for 'safety-net' protection. The largest share of government payments

[12] Some argue that the absence of a U.S. supply reaction has pushed more of the burden of adjustment to low commodity prices on foreign producers (outside of the EU). See Penn, 2001 (pp. 22-30) for discussion of the 'U.S. supply response anomaly.'

[13] USDA-ERS (2000) has developed a typology of family farms: five types of 'small' family farms (sales less than $250 thousand); 'large' family farms (sales between $250 thousand and $500 thousand); and 'very large' family farms (sales of $500 thousand or more). See *ERS Farm Typology for a Diverse Agricultural Sector*, USDA-ERS Agriculture Information Bulletin No. 759, September 2000.

(about 60 percent) accrue to farms with sales in excess of $100 thousand per year. These farms represent less than 15 percent of all farms, but account for nearly 45 percent of total acres. Family farms in the larger sales classes tend to be more efficient as measured by operator expense ratios, and their longer-term economic prospects may be quite different than those of lower sales classes.

Fourth, U.S. farm programs have historically been focused on commodities. This means that farm programs have supported and stabilized farm incomes only indirectly. An alternative approach involves developing a safety net for farm households based on income and earnings criteria (Gundersen, et al., 2000). This would lead to a very different distribution of benefits than current programs.

CONCLUDING REMARKS

Predicting the future course of U.S. farm programs is not easy. Much depends on progress toward multilateral reductions in farm subsidies under the WTO and on changing international market conditions for major crops. Other changes in the U.S. field crop sector seem more certain. The historical trend of increasing farm size seems likely to continue, driven by technological change and economies of scale. The field crop sector is also likely to see further movement toward vertical coordination of producers, handlers, and processors, through contracting, strategic alliances, and other means. These trends are part of what others have called the 'industrialization of agriculture.'[14] While there is no prospect of most U.S. field crops being absorbed into vertical linkages to the same degree as poultry and swine, the growth of demand for specialized, enhanced-value crops, and desire of processors and food manufacturers for greater control over quality and logistics, will make production contracting more common. Contracting and the proliferation of specialized crops will tend to diminish the role of organized markets (including futures exchanges) as centers of price discovery.

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[14] See Saxowsky and Duncan (1998) for a useful discussion of the choices facing producers and rural communities. They argue that smaller-scale farms may be able to produce for many niche or specialty markets, but that this likely requires specialized knowledge of production systems and marketing.

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FIELD CROP SUBSECTOR STRUCTURE AND COMPETITION UNDER FREE TRADE: CANADA

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INTRODUCTION

The Canadian field crop subsector has suffered through twenty years of wrenching technological and economic changes. Implementation of the Canada-United States Trade Agreement (CUSTA) in 1989, followed by the North American Free Trade Agreement (NAFTA) in 1994 and the Uruguay Round Agreement on Agriculture in 1995, have placed Canadian crop producers in a much more open and globalized economy where they must compete directly with producers in other countries who often have been more sheltered from financial distresses than have Canadian producers. Research on crops, tillage practices and pest control methods have, in recent years, relied more heavily on contributions from the private sector as public support for agricultural research has stagnated. The grain handling system in Western Canada has undergone a rapid restructuring with many low throughput elevators in rural areas being replaced by a much smaller number of modern high throughput elevators situated along major railway lines, resulting in long haulages for the majority of producers and deterioration of many secondary roads. Some deregulation has occurred in the institutions that deal with inspection, grading and transportation of Canadian grains, and farmers have been required to absorb more of the costs of these activities. More highly educated crop producers, taking advantage of the continuing advancements in mechanical technolo-

gies as well as the need for more stable incomes, have responded by finding off-farm employment activities.

Severely depressed farm incomes in the late 1980s and again in the late 1990s have been accompanied by highly charged farm protests, rapid out-migration of farm labour and continued government support of farm incomes, though the level of support has been reduced substantially from what existed in the 1980s. Although the NAFTA promised free trade and a "level playing field," Canadian crop producers have watched in dismay as the levels of government support in other countries (principally the United States) have risen while that in Canada has fallen in recent years. The Canadian Wheat Board (CWB), which has exclusive authority for export of prairie-grown wheat and barley, remains an obstacle to genuine free trade among the three NAFTA countries.

Continuing Economic Pressures On Primary Producers

Many of these trends are expected to continue throughout the next twenty years as economic pressures on the rural economy show no sign of receding. The real prices of grains and oilseeds are expected to continue their slow downward trend due to rapid technological changes and a slowing of the population growth rates in developed (and many developing) countries. The International Food Policy Research Institute (IFPRI) projects the real prices of cereal crops will decline by an average of 17 percent by 2020, though this is a slower rate of decrease than that experienced over the past twenty years due to a slowing of increases in grain yields (Pinstrup-Andersen et al, 1999). An era of free trade would strengthen the forces underlying these trends and cause economic hardships for those producers who can not compete successfully with other domestic and foreign producers. Governments around the world have shown an increased understanding of the deleterious economic effects of massive intervention in the marketplace and, as a result, can be expected to reduce the effective levels of protection of their agri-food industries. Canadian crop producers are likely to experience a world of less stable output and input prices, severe pressure to produce high quality goods as cheaply as possible, and minimal governmental protection against undesirable outcomes from the market place.

Forces Of Structural Change

A large number of forces are likely to influence the direction and speed of structural change as well as the relative competitiveness of the Canadian field crop subsector during the next twenty years. These include imminent developments in international trade, changes in the organization and goals of agricultural research, continuing evolution of agricultural policies in Canada and competing countries, further changes in the institutions that organize and regulate the licensing, grading, inspection, transportation and handling of Canadian grains and oilseeds, the possibility of a new set of regulations (including those related to climate change, use of biotechnology in agriculture, and production methods used on farms), improved opportunities for off-farm employment, and a continuing shortage of capital investment in primary agriculture and the infrastructure surrounding it. These forces will affect the financial livelihood of farm people as well as those who live in rural areas and depend on the success of primary agriculture to support their standards of living. The expected impacts of these forces on the opportunities and constraints that will face the Canadian field crops subsector over the next twenty years are discussed in the following sections.

DEVELOPMENTS IN INTERNATIONAL TRADE

Changes in the pattern of international trade in grains and oilseeds could have vast impacts on the success and financial viability of the Canadian crops subsector. The traditional export destinations of surplus grains were Great Britain and other countries in Western Europe but these markets mostly were lost with the formation of the common market and the astonishing increases in production of grains and oilseeds in these countries during the past three decades. The primary destination of Canadian exports of hard red spring wheat then moved to the Soviet Union and China with barley exports going largely to the United States, China, Japan and Saudi Arabia. Exports of the more recently introduced canola have gone predominantly to Japan, with increasing sales to the United States, Mexico and countries in the European Union (EU). In addition to massive economic, social and political changes that have taken place in China and countries of the former Soviet Union, developments in the EU and the United States will greatly affect the success of the Canadian field crop subsector during the next two decades.

Countries Of The Former Soviet Union

The former Soviet Union still is a large deficit region in grain production. However, continuing fiscal difficulties in most of these countries preclude their ability to import much surplus agricultural production from exporting countries. This situation is expected to change during the next twenty years. IFPRI projects that countries in Eastern Europe and the former Soviet Union will become major net exporters of cereals by 2020 (Pinstrup-Andersen et al, 1999). The enormous agricultural potential of countries in this region, combined with the dynamics unleashed by the switch from centrally planned to market based economies, should spur rapid increases in agricultural production, possibly allowing many of these countries to become competitors in the export market for grains and oilseeds. However, many legal, institutional, and financial problems still must be overcome before these powerful private sector forces can be unleashed.

China

At present, it is unclear whether or not China will become a major importer of grains and oilseeds over the next twenty years. Agricultural productivity in China has improved following the market oriented reforms introduced by Deng Xiaoping in 1978. However, population and income growth have led to an increase in consumption of many agricultural commodities. The United States Department of Agriculture (USDA, 2000) projects modest growth in grain imports by China but admits that considerable uncertainty exists regarding accuracy of available data and future Chinese economic and social policies. In a comprehensive study of China's grain production and consumption, Huang et al, (1997) concluded that China's overall imports would increase modestly, due mostly to increased demand for feed grains as a result of rising consumption of meat. They predicted a rising average income level that will lead Chinese consumers to increase their consumption of meats, vegetables and fruits, and reduce their consumption of cereals, as has occurred in other rapidly growing countries in Asia. If this happens, a larger market for feed grains can be expected.

The United States

Wheat consumption in the United States has rebounded from a historical low of 110 pounds per capita in 1972 to about 150 pounds by the end of the

twentieth century (Vocke, 2000). Much of the increased demand has been supplied by Canadian wheat producers. Since CUSTA was implemented in 1989, Canadian exports to the United States of wheat, durum and wheat flour have increased from about 350,000 tonnes to nearly 2 million tonnes (AAFC, 2001). This increase has been the result of at least three forces. First, NAFTA eliminated quotas and tariffs for wheat trade between the United States and Canada, allowing economic forces to determine movements of the product. Second, the elimination of transportation subsidies in Canada for moving grains and oilseeds to export terminals on the west coast and Thunder Bay has made moving grains to the United States relatively less costly. Third, extensive use of export subsidies by the United States has provided financial incentives for U.S. product to be exported and created opportunities for Canadian producers to supply part of the deficits in the United States.

The United States is the largest exporter of wheat in the world. Increased imports of this product from Canada have annoyed many producers in the United States, especially those in the border states. Suspicions that the CWB is able to use its market power to the disadvantage of U. S. producers run high in the farming communities of these states and continued trade frictions can be expected. However, the proximity of the large U. S. market (especially compared to the vast distances that Canadian grains and oilseeds need to be transported to export terminals on the west coast and Thunder Bay) will continue to provide an attractive market outlet for low-cost Canadian producers. If all artificial impediments to trade were removed, it is likely that a much higher volume of Canadian grains and oilseeds would flow southward into the United States.

European Union

Agricultural policy reforms brought about by the European Union's Agenda 2000 are expected to promote wheat production over other crops (Vocke, 2000). Declining support prices for EU wheat and a lower valued currency already have allowed some EU wheat to be exported without subsidies (Vocke, 2000). The USDA expects that by 2004-5, the EU will be able to export wheat on a regular basis without subsidies (USDA, 2000).

It is likely that the EU will remain a formidable competitor of Canada in the international wheat market during the next twenty years even without significant policy reforms. This could be exacerbated with the entry into the EU of several central European countries, especially Poland, the Czech Republic and Hungary, all of which have very productive land bases and the potential for major increases in agricultural productivity.

Canada's Declining Market Share

The Food and Agriculture Policy Research Institute (FAPRI, 2000) at Iowa State University projects that Canada's grain exports will increase in the next decade, but Canada's market share will go down. They estimated that total world wheat exports will increase by 23 percent by 2010 but Canada's wheat exports will increase by only 4 percent. They predicted that countries in Eastern Europe, Russia and other countries in the former Soviet Union will continue to be small net importers of wheat in 2010. They projected exports of Canadian barley to increase by 7 percent by 2010, but total world barley exports to grow 21 percent by that time.

Despite the uncertain trade outlook for grains and oilseeds, most analysts predict modest growth in Canada's exports. Canada's producers always have been very competitive in international markets and are expected to remain so.

CHANGES IN AGRICULTURAL RESEARCH

Agricultural research in Canada has led to major increases in productivity in the field crop subsector over the past century. Research and technology have allowed primary producers to substitute fertilizer and herbicides for scarce land, machines for labour, and new crops (like lentils) for traditional crops, thereby creating the conditions for the structure of agriculture to evolve into one of bigger, more specialized farms. These trends are expected to continue over the next twenty years. However, major changes in the way that agricultural research is funded and organized, plus the impending revolution in the life sciences, have implications on what it might mean to be a farmer in the future.

Increased Private Sector Funding Of Agricultural Research

Major changes have occurred in the structure and conduct of the agricultural research establishment in Canada. Traditionally, most crop research has been funded by the public sector but the private sector has assumed a larger role in recent years. This trend is likely to continue for at least three reasons (Klein and Kerr, 1995). First, the growing desire within federal and provincial governments to reduce public spending and taxes means less money (at least in real terms) is likely to be available for public sector research. In the 1995 budget, the federal government reduced expenditures on agricultural research by 25 percent but provided an additional fund that required matching funds from the private sector. This Matching Investment Initiatives Program has continued and it (or a like program) is expected to be extended well into the future. The provincial governments have supported some agricultural research and they, also, have required matching funds from the private sector for most of their recent research programs.

The second reason for increased private sector funding of agricultural research is due to the increased development of differentiated food products. The types of research necessary to produce these specialized products creates opportunities for financial rewards from private sector investment in research. The advent of patents on crop varieties (as a result of Plant Breeders' Rights legislation in 1991) has provided incentives for profitable research investments. Already a substantial number of varieties of crops and oilseeds with attractive new characteristics have been developed in Canada, particularly canola. Relatively low private returns from investment in development of new varieties of wheat and barley (Vocke, 2000) indicates that most research on these crops will continue to be done in the public sector while much more research on canola is likely to be conducted by the private sector.

A third reason for more private sector research in agriculture is a growing recognition that a substantial proportion of the rewards from crop research has been realized by producers (Klein et al, 1996). Institutional structures have been set up to collect producer contributions in the form of check-offs on grains and oilseeds sold. The research priorities for these funds are set by committees that represent producers and others involved in the processing and exporting of grains and oilseeds and not solely by the agricultural scientists and their ad-

ministrators. This has led to changes in research directions with a greater emphasis on solving practical applied problems of farmers and less concentration on long term basic research in agriculture.

Revolution In The Life Sciences

It appears that agricultural research will become more integrated with that of the other life sciences, including pharmacological, medical and forestry research. This opens the possibility for many exciting opportunities for Canadian grain and oilseed producers. Improvements will be made in texture, flavour, quality, variety, and shelf-life of food products as a result of research on the interface of plant biochemistry, genomics and human nutrition. Crops will be modified genetically to produce healthier and more nutritious foodstuffs, as well as bio-fuels, building materials, bio-plastics, nutraceuticals, pharmafoods and other desirable consumer products. Crop productivity is expected to increase through selection of higher yielding varieties, increased tolerance of genetically modified crops to herbicides and pests, increased resistance to pathogens, and adaptations to weather, soil and environmental stresses. Genes that affect plants' tolerance to drought, cold, salinity, and other yield decreasing conditions have been identified and can be added to current commercial crops to increase their yield potential under stressed growing conditions.

These products will all be patented, meaning that only those who agree to pay for them will be permitted to use them. Technology agreements with vertically integrated life science companies, already a reality, generally require specific methods of growing and handling, meaning that primary producers will have less influence in decision making. Output decisions increasingly will be made by food processors and other end-users that will seek contracts for production of specific products with farmers. To ensure that the specified quantity and quality of the product is delivered, they will need to monitor the progress of the crop and the activities of the farmer.

While opportunities will be available for farmers to produce higher valued, specialized products, involvement in vertically integrated supply chains will change what it means to be a farmer (Klein and Kerr, 1995). Many will become employees or subcontractors of large firms and part of a "virtually integrated network involving technology providers, input suppliers, growers,

merchandisers, food processors, retailers, and consumers" (Dial, 1999). All the partners in the supply chain will need to work together to produce specialized, high valued products for demanding customers. The genetic material used by farmers will be developed in the laboratory of the input supplier and patented. Farmers will be forced to cede some of their discretion in making production decisions. Furthermore, markets will become less useful as providers of information for decision making. Differentiated products are not sold in spot markets and farmers will have to negotiate prices with individual buyers (Klein and Kerr, 1995). Markets for standardized products will become less reliable as generators of price signals.

The farm and rural community in Canada will be affected greatly by the changes introduced by new developments in the life sciences. Some producers will be able to exploit these new opportunities and may be well rewarded for their entrepreneurial abilities and insights. Others in the rural community, however, may not be so fortunate. The technological treadmill where supply increases more quickly than the growth in effective consumer demand will continue, putting unrelenting downward pressure on farm prices. Those who are unable or unwilling to adapt to the increased competition will feel the financial pain of reduced revenues for producing generic products and, possibly, the humiliation of losing some control in the operations of their farms.

EVOLUTION OF AGRICULTURAL POLICIES

The farm population in Canada has long been able to mount an effective lobby for government support despite the continuing decline in farm population. However, this level of support may not continue as agriculture accounts for a smaller and smaller proportion of the total goods and services produced. The economies of the three prairie provinces have been growing rapidly in the late 1990s despite historically low grain prices. Rampton (2000) quoted Roger Gibbins (President of the Canada West Foundation, a Calgary based think-tank) as stating "This means that city dwellers ... are going to be less and less concerned about the state of the regional transportation system or the health of the rural economy."

Less Government Support

Most Canadian agricultural policies that distorted market signals in the field crop subsector have been eliminated during the last decade. The two-price wheat policy was discontinued in 1989 when the CUSTA was implemented. Subsidized freight rates were discontinued in 1995 following the implementation of the Uruguay Round Agreement. The Gross Revenue Insurance Plan (GRIP), in which inflation-adjusted prices were guaranteed to be no lower than a 15 year moving average (with two-thirds of the money coming from governments), was discontinued in 1996. The current programs include the Net Income Stabilization Account (NISA, in which individual producers set up their own plans based upon whole farm net incomes), crop insurance, and low level, some would say ineffectual, safety nets like the recent Agricultural Income Disaster Assistance (AIDA) program. These programs still contain significant public funding but are much less distortionary than were many of the past programs that made payments on the basis of yields or areas of specific crops. Government support for the crops subsector has been reduced to levels well below those of the United States and the EU.

Governments in Canada, at both the federal and provincial levels, show no sign of reversing the trend to less intervention in the crops sector. Society generally has become much more knowledgeable about the long term counter-productive effects on farm incomes of subsidies, quotas, and many types of regulations. Indeed, the Canadian population has shown a great deal of support for smaller government, lower taxes, and increased integration of the country's industries into the world economy. Annual polls conducted by Maclean's weekly newsmagazine have shown since 1991 that Canadians have embraced free trade in a globalized economy (Maclean's 2000-2001). In the most recent Maclean's/ Global Television network poll, 71 percent of Canadians were in favour of Canada having free trade agreements with many countries. However, the federal government has been unwavering in its support of the CWB, the state trading agency for western export wheat and barley.

Competitive Agriculture — The Goal For The Future

Future agricultural policy is likely to result in fewer market distortions though support for safety nets will remain as the field crop subsector continues to adjust to economic conditions. It is likely that the long term goal of develop-

ing a more competitive and leaner agricultural industry will continue but with an increasing focus on providing agricultural products that are tailored for specific demands anywhere in the world. Governments are likely to focus their efforts on developing institutions that contribute to the competitiveness of their primary producers and encourage value-added agri-businesses that increase employment and value of production. Due to a broader understanding of the impacts of different kinds of transactions costs on overall profitability, governments likely will recommend (or even assist) the establishment of a greater degree of vertical integration and strategic alliances at all stages of supply chains. They may promote new ways of doing business, like new generation co-operatives (that make it easier to obtain additional sources of financing). New generation cooperatives focus on value-added processing as opposed to the traditional cooperative's focus on commodity marketing.

CHANGES IN EXISTING REGULATIONS

The Canadian field crop subsector operates under regulations established by several governmental and quasi-governmental bodies. The most important of these are the Canadian Grain Commission (CGC), the Canadian Wheat Board (CWB), and the Canadian Food Inspection Agency (CFIA). The CGC regulates the crop subsector under authority of the Canada Grain Act, Special Crops Insurance Plan and related regulations. The CGC authorizes elevator tariffs, sets standards for dockage, moisture testing, shrinkage, cleaning, and other grain handling services, administers regulations relating to grades, grading and inspection, licenses grain elevators and grain dealers, and reviews recommendations of grain standards committees. The CWB is authorized to be the sole export agent of western produced wheat and barley. The CFIA, under the authority of the Plant Protection Act, administers regulations that relate to variety registration, plant breeders' rights, seeds, phytosanitary measures necessary for import, domestic, and in-transit movement of grains, and various inspections of grains and grain products.

In recent years, a number of changes have been made that allowed for more flexibility in the production and marketing of grain and oilseed crops. Some services have been privatized and users have been required to pay for at least some part of many regulatory services. However, in at least two areas (the

licensing of new varieties of crops and the state trading agency that markets western Canadian wheat and barley in foreign markets), existing regulations still restrain the Canadian field crop subsector. Canadian producers will need some relaxation in present regulations so that they can take advantage of new opportunities that will arise with a movement towards genuine free trade.

Licensing New Varieties Of Grains And Oilseeds

The most important legislation affecting the introduction of new varieties of grains and oilseeds is the Canada Seeds Act and Regulations. Regulations prohibit the sale (or imports or exports) of seed unless it conforms to the prescribed standard and is registered according to law (Lesser, 1988). The regulations require all new varieties to conform to a single uniform standard, and prescribe that varieties must be registered by the Canadian Food Inspection Agency (Watson, 1993). The legislation is meant to ensure production of standardized, high quality commodities for domestic and foreign consumers.

New cultivars of grains and oilseeds cannot be licensed and made available to Canadian producers until they have gone through three years of cooperative tests where they are grown under the same conditions as previously licensed varieties. Any new variety must fit the Canadian grading system and meet or surpass previous varieties on a wide array of characteristics. Failure to meet any one of the standards results in disqualification of the candidate varieties.

The key decision making body for licensing new varieties of grains and oilseeds in Western Canada is the Prairie Registration and Recommending Committee for Grains (PRRCG). The PRRCG evaluates test data presented by plant breeders and makes recommendations for or against the licensing of prospective varieties. The PRRCG consists of four subcommittees: (1) wheat, rye and triticale; (2) barley and oats; (3) oilseeds; (4) special crops. Each of these has three evaluation teams, composed of experts in each area, to objectively examine test data on the key performance characteristics of agronomic performance, disease susceptibility, and processing quality. There are no economists on these committees and marketing information is excluded from consideration of candidate varieties.

The Canadian licensing system for new varieties facilitates a low cost, effective and safe supply chain for generic commodities that are demanded by consumers who have relatively homogeneous tastes. However, it severely limits the opportunities for developing new varieties that have special characteristics that may be demanded in potentially high value markets. The rules also prohibit promising varieties from being imported, shipped through or used in Canada. In an era of free trade, Canadian producers would be severely handicapped if they are unable to plant varieties that would meet the heterogeneous tastes of high income consumers.

The Canadian Wheat Board — Marketing Wheat And Barley For Export

Enforcement of strict quality standards has provided the basis for marketing efforts by the CWB. All wheat and barley produced for export in Western Canada must be marketed through this state trading agency. The CWB has come under challenge in recent years from primary producers (many of whom want more freedom to market their crops), as well as foreign governments, farm organizations and multinational grain companies that are competitors of the Board (and who accuse it of unfair and anti-competitive practices). The Board has responded to these pressures by becoming a much more flexible marketing agency with offers of price contracts, dedicated marketing channels, forward price forecasts, and more aggressive retailing. It is likely that the marketing of cereals (particularly for the international market) will adjust further to accommodate the increasingly sophisticated demands of consumers in various areas of the world during the next several years.

Regardless of whether or not the CWB survives the many challenges it faces and remains the sole exporter of western Canadian wheat and barley, it seems certain that more aggressive marketing will be undertaken to sell minor or specialized products. Multiagency and multinational business linkages will result in reduced transactions costs, thus making Canadian crop producers more competitive in a globalized economy.

NEW REGULATIONS

While a clear trend of less government intervention in agriculture has evolved in recent years, Canadian crop producers are likely to face several new regulations in the future. Due to concerns about global warming, new regulations designed to reduce the production of greenhouse gasses may well be imposed on the agricultural industry. The Biosafety Protocol that aims to regulate the international shipment of genetically modified foods and food products will have implications for production of grains and oilseeds in Canada. Many commonly used, inexpensive, and effective herbicides and pesticides are likely to be deregistered in response to consumer demands for safer and healthier food products. New regulations will help to ensure consumer acceptability of Canadian food products but will impose higher costs on crop producers.

Labelling Of Genetically Modified Foods

The Canadian regulatory system was developed to supply consumers who had relatively homogeneous tastes with a generic product at the lowest possible cost. However, the existing quality standards severely limit the opportunities for developing new varieties of grains and oilseeds that have special, genetically engineered characteristics for potentially high value markets. The current regulations will not work so well when consumers demand food products with additional characteristics that cannot be incorporated into the existing grading system (Hobbs, 1998) or when agri-food firms wish to market unique, boutique-style food products. The existing regulatory system is the very antithesis of what is needed for the marketing of food products that result from life science research.

To facilitate the production and marketing of grain and oilseed products that are produced by life science research, regulatory changes will have to be made in the licensing, handling and transportation of these products. Increasing consumer concerns about genetically modified foods makes it likely that Canada eventually will have to implement some type of labelling requirements for them. The EU already has imposed mandatory labelling requirements for most foods that contain genetic modifications. Japan has mandated labelling for 29 categories of food products (McCluskey, 2000). Even Monsanto, one of the largest agricultural chemical companies, is on record as supporting more

regulations for genetically modified crops and has pledged never to put human genes into plants used as food (Western Producer, Dec. 7, 2000).

Identity Preservation

Mandatory labelling of genetically modified foods would impose severe production, handling and storage restrictions on crop producers. It would be necessary to impose restrictions on production, such as minimum separation of crops to avoid cross-pollination. Regulations would be required to ensure that each crop is handled and stored separately (all the way through the supply chain) to avoid any mixing of products. This could be done either by methods of crop segregation or identity preservation and both begin at the farm level (Lin et al, 2000). Crop segregation involves cleaning of all equipment, transportation vehicles and storage containers to avoid any mixing with foreign materials during loading, unloading, storage and transportation of the product until it reaches the ultimate consumer. Testing by government (or government authorized) inspectors for genetic content of the food product may be necessary at several stages. Identity preserved systems generally require strict separation and containerization that is maintained at all stages throughout the supply chains.

Identity preserved systems would be more stringent and expensive to implement than would segregated systems. Testing for specific genetic content normally would be conducted prior to containerization. The current system, based on the least expensive method of getting generic commodities to market, will not be suitable in an age of specialized products that fill high-valued niche markets around the world. Much of the volume-dominated system will have to be replaced by a system that handles smaller quantities of specialized products at higher unit costs (Riley and Hoffman 1999).

All product handling will be much slower and thus more costly as a result of product segregation. Grain elevators will need numerous bins to keep the different products separate. Unfortunately, most of the new high-throughput elevators built across the prairie provinces in recent years were designed for rapid and low cost handling of bulk grains and oilseeds and many of the small, multiple binned elevators have been razed. The Canadian grain handling and transportation system is ill equipped to handle the many designer grains and

oilseeds that will need to be strictly separated to allow the agri-food industry to access the markets that increasingly will demand heterogeneous food products.

PART-TIME FARMING

It has become increasingly difficult in recent years to make a satisfactory living on small or medium size farms. The vast majority of farm families now receive the bulk of their net income from off-farm sources. Zafiriou and Smith (2001) noted that more than 90 percent of family income on farms that annually have gross returns less than $100,000 comes from off-farm sources. Even among the larger farms in Canada (those that have gross incomes over $100,000 per year), nearly half of family income is earned off the farm. This has occurred as a result of a number of factors, including availability of larger and more reliable machinery, commercial availability of many farm services, higher levels of education of farmers and their spouses, and strong urban economies. Due to the availability of large-scale specialized machines and buildings, many types of farms can be operated today with minimal labour input. Many specialized operations such as planting, spraying and harvesting, can be contracted if necessary. The key input requiring time is management, and much of this can be provided in the evenings and weekends.

Off-Farm Employment Opportunities

Farmers are much better educated than before, nearly equalling the educational level of non-farm people (Statistics Canada, 1995). More education has increased their opportunities and made it possible to supplement their low and declining net farm incomes. With a strongly growing urban economy, and development of new communication technologies that allow some of the work to be done in remote locations, farmers and their spouses increasingly have taken full- or part-time positions off the farm and have used the net farm income to supplement their family incomes.

This trend is likely to be sustained — and maybe even accelerated — over the next two decades. Continuing technical changes, especially in the emerging life sciences, will provide many opportunities for small-scale production of specialized products that can be accommodated in an increasingly flexible off-farm work schedule. However, the changing pattern of work and

lifestyles among small- and medium- size farmers likely will have repercussions for the rural communities where these people live. This development has not received sufficient study from agricultural economists and rural sociologists.

CAPITAL INVESTMENT

Economic stagnation of the Canadian field crop subsector during most of the last twenty years has led to a deterioration in capital assets in the main grain growing areas. The number of country elevators has shrunk almost continuously from 5,145 in 1965, to 3,658 in 1977 to 1,153 in 1997 to 848 in 2000 (Canada Grains Council). This trend is expected to continue as major grain handling companies continue to rationalize their operations by abandoning the use of relatively small high-cost country elevators in most areas of the prairies in favour of large capacity, high-throughput elevators that are situated on main or secondary railway routes.

The rural infrastructure, particularly the transportation network (including secondary roads and rail beds) has run down due to a lack of investment over many years. The weakened infrastructure has meant increased costs and much less convenience for primary producers, particularly in the prairie provinces.

Grain Handling And Transportation

Abandonment of the subsidized freight rate regime and partial deregulation of the railways has spurred a massive adjustment and consolidation of the grain handling network. The Saskatchewan Wheat Pool has demolished over 350 small country elevators situated along branch lines while constructing 22 high throughput terminals on main rail lines with 100 car loading capacities (Schmidt, 2000). Other grain handling companies, including AgriCore, United Grain Growers, Pioneer and Cargill have followed similar investment strategies.

In some rural areas, major investments have been made in construction of modern grain handling facilities. However, some observers worry that excess capacity has been built into the grain handling system in recent years as grain handlers have vied for market share by constructing high volume elevators. The Saskatchewan Wheat Pool, in particular, has struggled under excessive

debt and has lost market share. The Dominion Bond Rating Service expects that some grain companies will be unable to remain viable (Ewins, 2000).

Rural Infrastructure

There is a critical need to find ways to boost capital investment in rural infrastructure in the prairie provinces and to adjust the taxation scheme to be more in line with use of the infrastructure. Since many attractive investment opportunities continue to be available in urban areas, governments, particularly in the prairie provinces, can be expected to look for new ways to encourage renewed capital investment in rural Canada.

CONCLUSIONS

The Canadian field crop subsector produces low cost, internationally competitive food products that are safe and nutritious but are of standardized, homogeneous quality. Family farms have been under a great deal of economic stress as a result of low commodity prices worldwide, changing technologies and erratic input prices. Commodity prices in real terms are expected to continue their slow downward trend over the next twenty years, increasing the financial pressures on primary producers.

The structure of the field crop subsector in Canada has continued to evolve in response to the opportunities, pressures and constraints it faces. The farm population has decreased both in absolute terms and as a proportion of Canadian population, resulting in much larger grain and oilseed farms. Rural infrastructure has run down, primarily a result of the consolidation of the grain handling and transportation network and lack of government investment in its maintenance and improvement. Fewer country elevators remain where farmers can deliver their grains and oilseeds; secondary roads have seen increased usage by big trucks that are hauling large loads over much longer distances.

At the same time, increasingly well-educated farmers and their spouses successfully have sought part- and full-time employment in urban centres. This has kept the family incomes of most rural-based people at similar levels to those who live in urban areas. With new and improved machines and new

technologies of farming, they have been able to combine non-farm occupations with farm work. This trend is expected to continue during the next two decades.

Several economic, regulatory and international forces will propel the forthcoming changes in the structure of the Canadian field crop subsector. These include expected changes in domestic and international demand for Canadian grain and oilseed products, less government support for primary producers, more private sector involvement in agricultural research, reduced regulations for licensing new varieties and marketing western grains in export destinations, imposition of new regulations that protect the environment and identify genetically modified food products to consumers, and enhanced opportunities for off-farm employment. If genuine free trade emerges among the North American countries, a less regulated, market-oriented structure will be needed if Canada's primary producers are to take full advantage of the many agri-business opportunities that will ensue.

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MEXICO'S BASIC- CROPS SUBSECTOR: STRUCTURE AND COMPETITION UNDER FREE TRADE[1]

Antonio Yunez-Naude

INTRODUCTION

Any discussion of the future structure and competition of Mexico's agricultural sector must acknowledge that, unlike Canada and the United States, agricultural transformation in Mexico is still underway.[2] Currently, small household farms continue to prevail as a major domestic supplier of corn and beans; about 26 percent of Mexicans are still in agriculture and most of them live below the poverty line.

The purpose of this paper is to discuss probable trends for Mexico's major field crop subsector– grains and oilseeds–in the context of overall domestic liberalization and agricultural policies, and of trade disputes between NAFTA countries. The information and arguments presented here are based on

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[1] This paper is the result of ongoing research about the impacts of NAFTA on the economy of Mexico, financed by Mexico's National Council of Science and Technology (CONACYT) and the Ford and Hewlett Foundations. The author wishes to thank Rosa Martha Guerrero and Zulum Avila for their collaboration in the data gathering and Catherine Taylor for her editorial work.

[2] Because of this, and because of space limitations, issues such as the future impacts on Mexico's field crops from the biotechnological and the communications revolutions are not considered here.

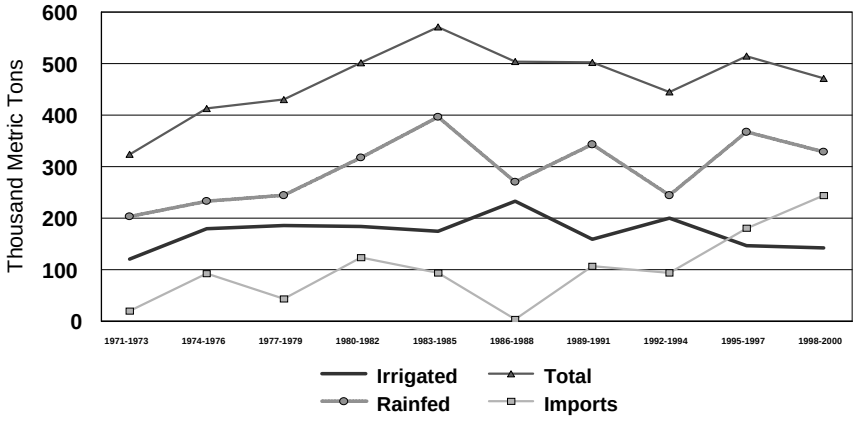
recent changes in Mexico's agricultural policies and on the evolution of its agricultural sector during the 1990s. The paper is divided into five sections. In the next, recent policy changes are summarized, the intended impacts of these changes, and recent trends in Mexico's supply and trade of major field crops are developed. In the third section explanations are proposed for facts that contradict the expected impacts of those policy changes. Then probable future trends for the field crop subsector are presented. Finally, some policy issues are discussed.

POLICY REFORMS AND RECENT TRENDS OF MEXICO'S MAJOR FIELD CROPS

Up to the 1980s, the Mexican State intervened in the production, distribution, and marketing of what it considered its basic crops. Barley, beans, corn, rice, sorghum, soybeans, and wheat have been the most important, both in terms of area planted and because they make up 90 percent of Mexico's agricultural output (Yunez-Naude and Barceinas, 2000). Since 1991, the Mexican governments have been expanding overall market-oriented policies, with reforms that have included trade liberalization, trade agreements with other countries or group of countrie, the abolition of Mexico's major state trading enterprise, CONASUPO (the National Company of Popular Subsistence), and with it, the elimination of guaranteed prices, that is, basic crop producer price supports (OECD, 1997; Casco, 1999).

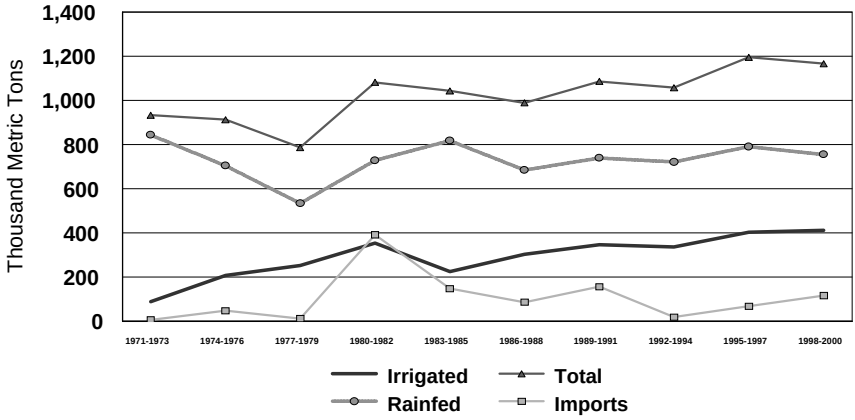
Liberalization began with the anticipation that, with domestic reforms and NAFTA, Mexico's agricultural economy would be transformed rapidly and in such a way as to make it fully and quickly competitive. Such a transformation implied substituting basic non-competitive crops such as corn for more competitive fruits and vegetables. This would decrease Mexico's domestic supply of its basic crops and require Mexico to import these same crops, especially its primary staple, corn, from the United States. In addition, significant rural out-migration was expected.

Figure 1: Barley, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

Figure 2: Beans, Mexico Volume of Production and Imports, 1971-2000.

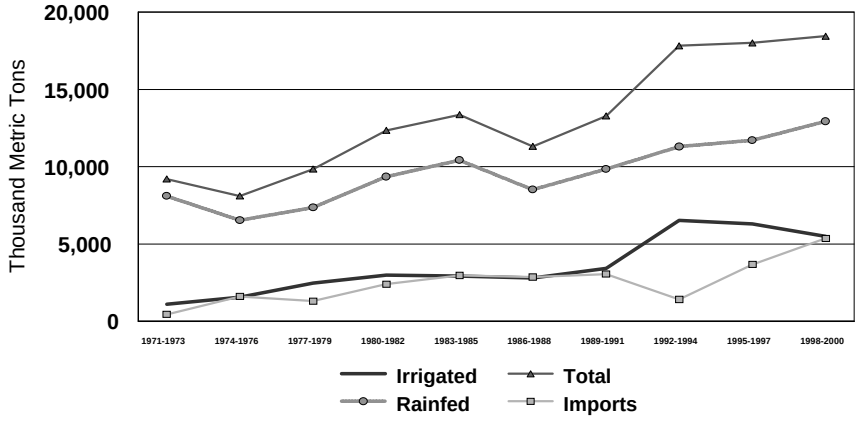


Source: Compiled by the author.

Figures 1 to 7 show that from 1994 to 2000 only soybeans and wheat decreased in domestic production and increased in imports.[3] In contrast, im-

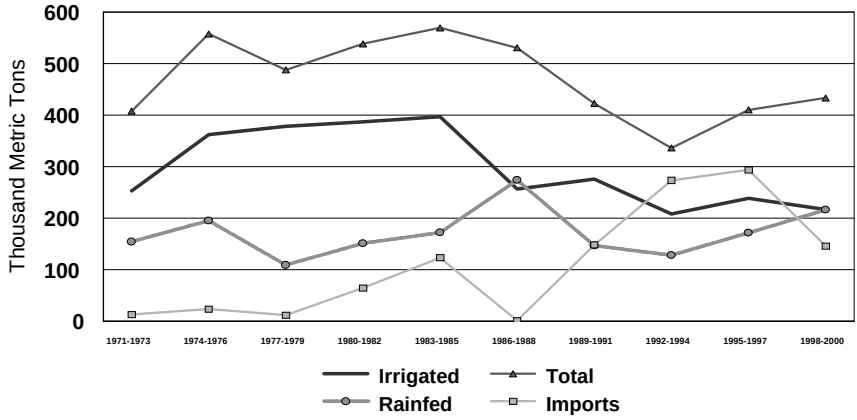
[3] In addition to this, one can argue that the case of soybeans is special, since its supply was hit by a disease beginning in 1995.

Figure 3: Corn, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

Figure 4: Rice, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

ports of barley, beans, corn, rice, and sorghum likewise increased during the same period, but their domestic production also increased.

EXPLAINING THE TRENDS

The crisis that the Mexican economy suffered during 1995 and 1996, and the initial period of NAFTA implementation make it difficult to explain why production of five of Mexico's seven major crops has not collapsed. However, five hypotheses can be proposed (the first two hypotheses are from Rosenzweig (December, 2000).[4]

1 Barley, beans, and corn are still subject to tariff rate quotas (TRQs) under NAFTA and are therefore protected from full competition with Canada and the United States.

2. Despite the abolition of CONASUPO and/or the elimination of guaranteed prices for the producers of basic crops, the Mexican government has continued to support commercial or entrepreneurial farmers producing such crops through the Agricultural Marketing Agency (Support Services for Agricultural Marketing or ASERCA), whose programs are coupled to production.[5] So far, our hypotheses do not explain why the volume of imports of barley, beans, corn, sorghum, and rice has also increased since 1994.
3. The evolution of domestic and international prices in a context of rising domestic demand may explain why imports of basic crops increased while domestic production has not sharply decreased. If the prices of domestically produced basic crops have not differed much from international prices, it would seem that the elimination of guaranteed prices under CONASUPO might not have affected domestic production. At the same time, termination of its role as sole importer of basic crops may have allowed more imports in the

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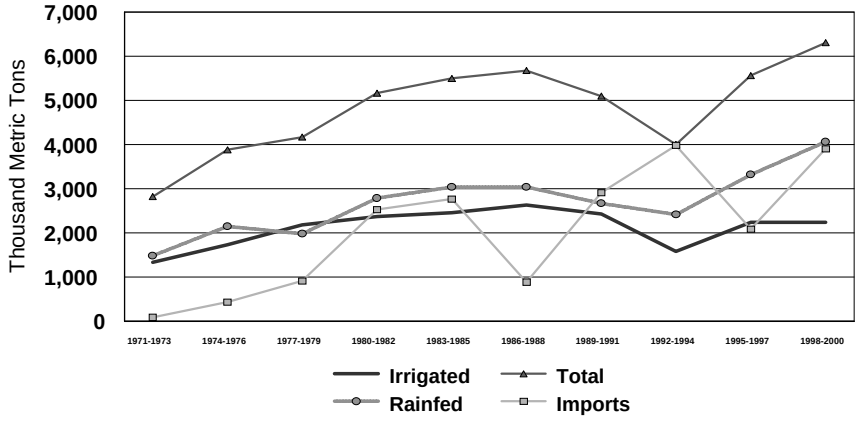
[4] It could also be argued that the devaluation of the peso caused by the macroeconomic crisis of the mid-nineties erased the effects of trade liberalization under NAFTA by increasing the value in pesos of imports, however, this hypothesis ignores the effects of devaluation in the prices of imported inputs for agricultural production as well as the high inflation rates created by a devaluation of the peso.

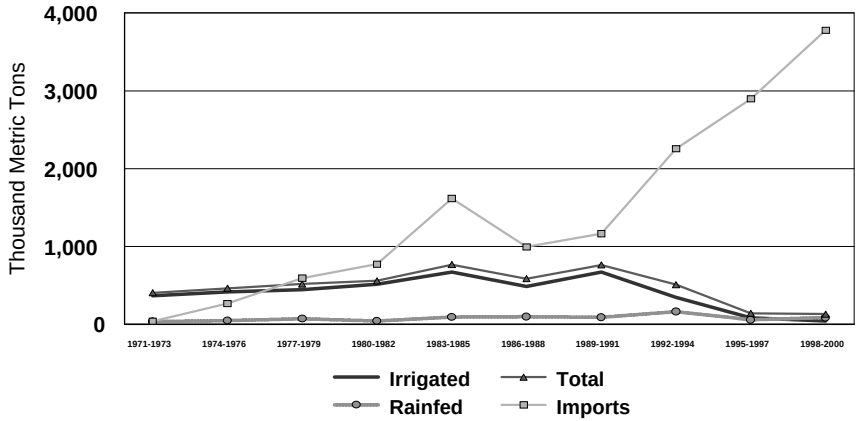
[5] ASERCA was created in 1991 and, together with PROCAMPO (a decoupled income transfer scheme to the producers of basic crops), has been a major component in the actions followed to eliminate CONASUPO. The basic function of ASERCA is to promote the marketing of basic crops. However, its interventions have also included price supports for producers in several regions of Mexico (see Yunez-Naude and Barceinas, 2000).

Figure 5: Sorghum, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

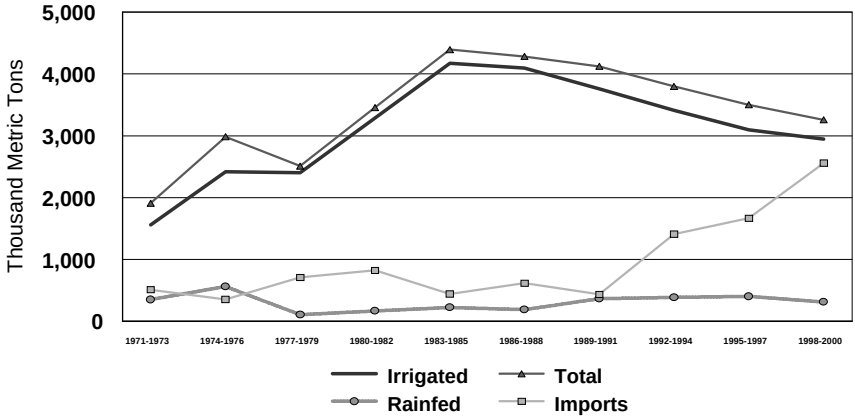
Figure 6: Soybeans, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

context of increasing domestic demand from food processors. Preliminary findings of ongoing statistical research of differences in domestic and international prices for the seven major basic crops show similar trends from 1970 to 1999. If liberalization of the field

Figure 7: Wheat, Mexico Volume of Production and Imports, 1971-2000.



Source: Compiled by the author.

crops subsector of Mexico has meant freer access to imports and yet not necessarily lower prices for the imported crops, this may explain the phenomenon of rising imports and stable or increasing domestic supply.

One characteristic of Mexico's agrarian structure must be considered in any efforts to explain why domestic production of barley, beans, corn, rice, and sorghum has not declined with the domestic reforms and NAFTA. That is the prevailing heterogeneity of Mexico's agricultural sector. This feature–frequently ignored in the literature–is reflected by the coexistence of small household farms with entrepreneurial agriculture. It is difficult to take this fact into account because nationwide data is insufficient to analyze separately the evolution of peasant from entrepreneurial agricultural production. However, the significance of agricultural heterogeneity can be approximated using the official data on basic crops production in irrigated and in rain-fed lands and assuming that entrepreneurial agriculture is conducted mainly in irrigated lands and that medium-sized and small farms are maintained under rain-fed conditions. Figure 1 and Figures 3 to 5 show that production under rain-fed lands explains

the rise in barley, corn, rice, and sorghum production during the seven years of NAFTA implementation.[6]

Two further hypotheses are proposed to explain this latter trend.

4. A portion of the subsector that we are considering here is formed by good lands and rain precipitation and is owned by commercial farmers with medium-sized plots. These farmers have received government supports through ASERCA and the Alliance for the Countryside to continue to produce and even to increase their production of basic crops. [7]
5. A more specific hypothesis since its focus is corn, the basic crop of the Mexican population's diet: a considerable portion of Mexico's supply of this grain comes from small household farms; lack of infrastructure (such as proper roads) and the absence of other institutions required for the functioning of markets (such as financial entities), mean that these producers face high transaction costs; these costs are one reason small farmers produce staples, particularly corn, for their families' own consumption.[8] This indicates that corn prices are endogenous (i.e., determined at the village or regional level), and hence, that small farmers do not face competition with this crop. That is, they do not suffer directly from agricultural price and trade liberalization (see Yunez-Naude, 1998). It could therefore be argued that high transaction costs for small Mexican farms is another reason that domestic production of corn has not suffered after seven years of NAFTA implementation.

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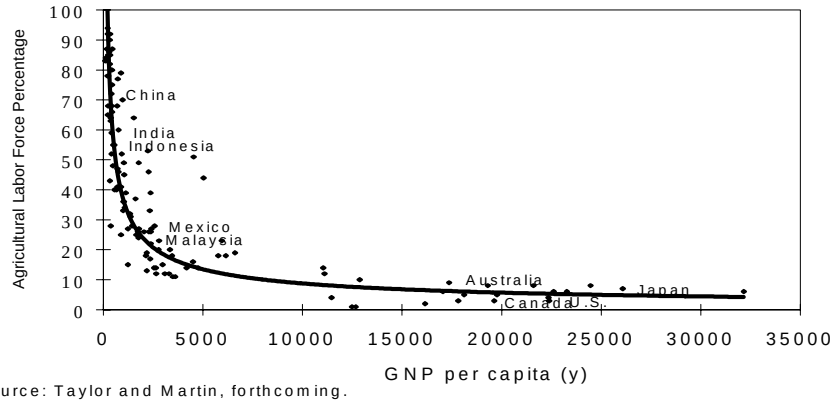
[6] In Mexico, soybeans, and wheat are basically produced on irrigated lands, and their production has decreased substantially (see Figures 6 and 7). As for beans, their domestic production and imports have not radically changed under NAFTA (Figure 2).

[7] The hypothesis is consistent with Rosenzweig's argument about ASERCA (see above), and with the FAO's evaluation of Alliance for the Countryside (FAO and SAGAR, Dec. 2000). Alliance for the Countryside is a program President Zedillo created in 1996 to help "potentially competitive" small- and medium-sized agricultural producers during the economic crisis of 1995 and to promote their technological change and crop substitution.

[8] According to the Agricultural Census of 1990, more than 55 percent of the agricultural units under 5 hectares of arable land produce for the household's own consumption (Hernandez Estrada, 2000).

Figure 8: Agricultural Labor Shares and GNP Per Capita, 1990.



Source: Taylor and Martin, forthcoming.

FORCES OF CHANGE IN THE FUTURE

Mexico's agrarian structure and recent trends in domestic supply and imports of basic crops indicate that the agricultural transformation of Mexico is still underway. This view is also supported by the fact that, contrary to expectations, the Mexican labor force in agriculture remained relatively unchanged during the 1990s (Zedillo, 2000). The argument that structural transformation of Mexican agriculture has not happened yet is also consistent with the evidence shown in Figure 8. In relation to industrialized countries the proportion of workers in agriculture is still very high in Mexico and per capita income is very low.

A discussion about the future of Mexico's agricultural sector and its basic crop subsector can be based both on hypotheses 4 and 5 and by using the results of nationwide General Equilibrium Models (GEMs) that have been applied to Mexico and its agricultural sector. I will focus on the results of those GEMs specifically designed to estimate the potential impacts of NAFTA and domestic reforms on Mexico's agricultural sector (Levy and Wijnbergen, 1992; Robinson, et al., 1991, Romero, J., 1997; and Yunez-Naude, 1992)

For this purpose, the GEMs built during the NAFTA negotiations are adequate models, because they simulate full trade and domestic liberalization. In addition, these models do not consider the heterogeneous character of Mexican agricultural (that is, the models ignore the different conditions under which entrepreneurial agriculture and small farming produce and the existence of high transaction costs for small farmers). Therefore, we can interpret their conclusions about what would happen with the full liberalization of Mexican agriculture and the disappearance of transaction costs (the latter is a plausible medium- to long-run scenario if economic development in Mexico's agricultural sector proceeds as it has in industrialized countries).

Four different nationwide GEMs emphasizing Mexico's agriculture have been built to estimate the possible impacts of NAFTA and domestic reforms (see references above). While the specifications of these models vary, all of their results indicate that NAFTA and/or agricultural liberalization will i) promote efficiency gains in Mexico's agricultural sector, but at the expense of a depression in the domestic production of basic crops; ii) that within this subsector, the farmers producing basic crops (corn in particular) on rain-fed lands will be more negatively affected; iii) that imports of basic crops will increase considerably (especially those coming from the United States); and iv) that rural out-migration (to Mexico's cities and to the United States) will increase substantially.

The model whose specifications are most similar to the thesis of this paper is that of Robinson and associates.[9] This is particularly true for the scenario that simulates the elimination of all tariffs and quotas between Mexico and the United States; abolition of export subsidy programs for U.S. agricultural exporters to Mexico; and elimination of all support programs to Mexican agricultural producers. Under this scenario, Mexico's gross domestic product (GDP) grows, the corn production in Mexico decreases by 19 percent while other basic crops decrease by 21 percent, and imports from the United States of these crops increases by 185 percent and 88 percent, respectively.

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[9] The model, for the Mexican and the U.S. economies, subdivides agriculture into four sectors: food corn, program crops (cotton, feed grain, rice, and wheat), fruits and vegetables, and other agriculture. The model has two limitations: it is static, and it rules out technological change.

The negative impact of NAFTA and domestic agricultural liberalization in Mexico's basic crops subsector is partially compensated for by a rise in the production and export of fruits and vegetables and other competitive agricultural products. Hence, the manufacturing and service sectors explain the growth of Mexico's GDP under NAFTA. Restructuring the Mexican economy as shown in the simulated reforms implies a huge rural out-migration to both urban Mexico and to the United States. According to the results of Robinson and associates, 800 thousand rural workers would emigrate–544 thousand to the United States, either directly from Mexico's rural sector into U.S. agriculture, or indirectly from urban Mexico to the urban United States. The rural sector of Mexico would lose about 30 percent of its labor force.

This simulation shows that the future of Mexico's basic crops subsector could be bleak, especially if the new government decided to eliminate the agricultural programs that support producers of basic crops, if its promise to build rural infrastructure were fulfilled, if Mexican farmers did not adopt technical change, and if investment in agriculture remained low.

FINAL REFLECTIONS AND CONCLUSIONS

Just as we may have to accept the collapse of Mexico's supply of basic crops as a necessary cost consequence of market-oriented reforms, related rural out-migration may also be considered an undesirable event. In addition, domestic food security could become an issue of concern for the government as trade liberalization proceeds. Such concerns could be partially resolved by adopting technical change and crop substitution on medium-sized farms, a process that has been delayed mainly by Mexico's financial crisis during the mid-1990s and its consequences - high interest rates and the lack of credit. Along with the need to solve these financial problems, we must consider the promotion of non-farm activities in the rural sector and investing in the rural infrastructure (see Haggblade, S.; P. Hazel and T. Reardon (editors.), in print).

As for small household farms, even in a context of lower transaction costs, certain options could create incentives for small farms to continue producing the basic crops of Mexico. The design of agricultural policies in Mexico must include these farms for three reasons: small farms produce basic crops for

the Mexican population's diet; members of rural households have a high propensity to migrate; and small agricultural producers maintain the genetic diversity of Mexico's crops. It is necessary to remember that the indigenous population of Mexico forms a considerable portion of small farmers, and a response to their demands for their rights and for better economic conditions has become a national priority.

One option for small farmers (that is, for poor rural households) is related to corn. We have shown in a participatory experiment with farmers in the Sierra Norte de Puebla–an indigenous region, in one of the poorest rural areas of Mexico–that it is possible to increase corn production for farmers' own consumption and for the local market while maintaining the crop's local genetic diversity, and, at the same time, allow farmers to dedicate more land to competitive crops such as coffee (Pita, A. et al., 2000). In addition, demand for quality corn for human consumption in Mexico and in U.S. areas with populations of Mexican origin makes it plausible for small farmers to succeed by selling specialty corn. However, for this to be viable, official support for its commercialization is necessary. Other options include developing regional rural markets for basic crops and creating cooperatives for productive, credit, input acquisition, and/or distribution. Finally, more productive use of the remittances that small Mexican farmers receive from relatives working in the United States could be an important consideration for positive development in rural Mexico (for the case of international migrants from the State of Oaxaca, see Reyes, R. et al., Feb. 2001).

To put into practice policies that promote options for small farmers is more likely now, with the probable break in Mexican State control exerted in rural Mexico through the ejidos and through agricultural programs designed in Mexico City for the purpose of retaining political support. The goals of the current presidency - to allow more independence of the States forming the Mexican Federation in policy design and decision making, to promote regional development, and to resolve the Indian conflict led by the Zapatist Movement of Chiapas - are all signs of potential change. However, the government still has to be convinced that small farms are a viable economic option for at least a portion of Mexico's rural population. Other changes in the economic policy arena of Mexico could arise if the Agricultural Ministry is allowed to partici-

pate more actively in designing agricultural policies. It is observed that before the Fox Administration, decisions about trade and domestic agricultural price policies were dominated by the views of the former Ministry of Commerce and Industrial Development. By empowering entrepreneurial farmers, these changes, together with the government's promotion of small- and medium-sized farms, could extend safety nets to agricultural producers. This, in turn however, could lead to trade tensions between Mexico and its NAFTA partners.

To avoid such tensions in the grains and oilseeds subsector, the Mexican government has to clearly define any modifications to its agricultural policies and its interventions in agriculture. In particular, the government has to convince its North American partners that its interventions are intended to lead to the agricultural transformation of Mexico, as well as to promote the sustainability of small farming. For this to happen, it is essential that Canada and the United States become conscious, and accepting, of Mexico's unique agricultural situation. Communication between the governments of the three North American partners is the key to Mexico's success in its efforts to transit to a more market oriented economy, to fight poverty and to offer to its rural population income options within its frontiers. (Editors note: recognition that the small-farm/household sector in Mexican agriculture requires separate treatment under the free trade agreements has been a recurring theme of our workshop discussions).

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United Grain Growers Ltd.

Blair Rutter[1]

STRUCTURE AND COMPETITION WITHIN THE CANADIAN GRAIN HANDLING SYSTEM

In western Canada[2], we have seen steady consolidation in the grain handling network over the past 35 years. The number of country elevators (i.e., grain collection points) in western Canada has declined from approximately 5,000 in 1966 to about 850 today. We expect the number of elevators to continue to decline to about 400 within the next two or three years. In recent years we have seen several companies build a number of high throughput concrete or steel elevators, replacing old wooden elevators. These new facilities range in size from 10,000 to 50,000 tonnes in storage capacity. These facilities are capable of loading blocks of 50 to 112 cars, usually in an 8 hour shift. The number of these facilities has grown from about 70 five years ago, to 180 today.

The western Canadian grain handling industry is characterized by strong competition from a number of players, both large and small. Table 1 gives a breakdown of the number of facilities owned (excluding port terminals) and the total storage capacity for each of the major grain companies.

Two relatively new players on the scene are ConAgra and Louis Dreyfus. In the past three years, both these companies have made significant new investments in grain gathering facilities. This is a new source of competition which, to some extent, accelerated the rationalization plans of existing players. There are also 28 independents which are a significant source of competition. Nearly half of these consist of large, single-point facilities capable of loading 50 to 100 or more cars.

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[1] The views expressed in these discussion comments are those of the author, and do not necessarily reflect views of United Grain Growers.

[2] The four provinces in western Canada account for approximately 85 percent of Canadian grain production and 95 percent of Canadian grain exports.

Table 1: Grain Companies in Western Canada, August 1, 2000.

Company	*Number of Elevators*	*Storage Capacity (000's tonnes)*
Saskatchewan Wheat Pool	249	2,005
Agricore	242	1,503
United Grain Growers	105	797
Pioneer	83	547
Cargill	54	512
N.M. Paterson & Sons	48	272
Parrish & Heimbecker	23	251
Louis Dreyfus	12	208
ConAgra	4	125
Other	28	539
Total	848	6,759

Source: Canadian Grain Commission, Grain Elevators in Canada 2000-2001

Table 2: Financial Results Selected Western Canadian Grain Companies, Year Ending July 31, 2000.

Company	*Book Equity ($Cdn, Millions)*	*Profit/Loss*
Saskatchewan Wheat Pool	544	(90)
Agricore	378	1
UGG	226	2

Source: Annual reports

The four largest companies (SWP, Agricore, UGG, Pioneer) account for 72 percent market share, in terms of elevator grain receipts. However it should be noted that grain companies handle, in an average year, approximately 60 percent of western Canadian grain production – the rest is either used as feed grain domestically or trucked directly to domestic or U.S. processing plants. As a result, the top four grain companies typically handle between 40 and 45 per cent of total prairie grain production.

In short, farmers have a number of competitive alternatives, among grain companies and among alternate users of grain. Competition is intense, prompting one investment analyst to say there is "too much competition[3]" within

[3] RBC Dominion Securities, Corporate Debt Research report on Saskatchewan Wheat Pool, July 14, 2000.

Table 3: Canadian Grain Production and Net Exports (3 year average).

Commodity	Average Annual *Production 1998–00 (mmt)*	Average Annual Net *Exports 1998-00 (mmt)*	Net Exports As *A percent of Production (%)*
Wheat (exc. durum)	20.3	13.0	64
Barley	13.1	2.3	18
Corn	8.7	(0.5)	(6)
Canola	7.8	3.8	49
Durum wheat	5.3	3.7	71
Oats	3.7	1.5	42
Soybeans	2.7	0.5	20
Dry Peas	2.5	1.6	64
Flax	0.9	0.6	69
Lentils	0.7	0.5	69
Other Crops	1.9	0.7	39
Totals	**67.5**	**27.8**	**41**

Source: compiled from Canada: Supply and Disposition for Grains and Oilseeds (November 27, 2000), and Canada: Supply and Disposition for Special Crops (October 17, 2000), Agriculture and Agri-Food Canada.

the prairie grain handling industry. Profit levels among grain companies tend to support this statement. For those companies that publicly disclose financial results, Table 2 shows their performance in the latest fiscal year. Given the high degree of competition and the low profit margins in recent years, we expect there will be some consolidation in the grain industry in Canada within the next few years.

CANADIAN GRAIN PRODUCTION AND EXPORTS

Table 3 shows the average Canadian grain production and net exports over the past three years. Wheat continues to be our biggest crop, although acreage and production have trended downward in recent years. Exports however, continue to be important, accounting for 64 percent of our wheat production and 71 percent of our durum wheat production over the past three years. In terms of production, barley is Canada's second largest crop. Most of the barley is used in the domestic feed industry. Most of what is exported is used for

malting purposes. Corn is our third largest crop, almost all of which is grown in eastern Canada. In recent years Canada has been a small net importer of corn. Canola is Canada's fourth largest crop in terms of production, second most significant in terms of value. About half of Canadian canola production is exported, in order of magnitude, to Japan, China, Mexico and the United States. Canada also has a mature oilseed crushing industry. The United States is our largest export market for canola oil and meal. Canada also grows significant quantities of many other "special" crops, including dry peas, flax, lentils, mustard and chickpeas. For several of these, Canada is the world's leading exporter.

As noted by Klein, Canada's share of world trade in wheat and barley is expected to decline. Klein cites FAPRI projections that estimate world trade in wheat to grow by 23 percent by 2010, while Canada's growth in wheat exports will be a modest 4 percent. Similarly, FAPRI projects a 21 percent increase in world barley trade by 2010, while the Canadian growth in barley exports is projected at 7 percent. In my view, these are reasonable estimates. If anything the Canadian estimates may be on the high side. Significant growth in Canada's domestic livestock industry together with modest growth in domestic food processing will limit any potential growth in exports, particularly in offshore markets. Having said this, we expect that Canadian exports to the United States of wheat, barley and most other crops will increase over time.

CANADA/U.S. GRAIN TRADE RELATIONSHIPS

Klein notes that Canadian wheat exports to the United States have climbed since the implementation of the Canada-United States Trade Agreement (CUSTA) in 1989. He cites three reasons:

- elimination of wheat quotas and tariffs under CUSTA;
- elimination of Canadian transportation subsidies on grain shipments east and west; and
- the use of the Export Enhancement Program by the United States.

We would concur with these factors, although it should be noted that the U.S. has not used EEP on wheat exports since 1995, so this is no longer a contribut-

Table 4: Canadian Net Exports to the United States, Selected Commodities, Three Year Averages, 1989-91 and 1997-99.

Commodity	*Average Net Exports 1989 to 1991 (Cdn $ million)*	*Average Net Exports 1997 to 1999 (Cdn $ million)*
Wheat	31	327
Durum	48	125
Flour	4	48
Mixes, Doughs, Cereal & Bakery	(4)	193
Pasta	(6)	(37)
Oats	73	209
Barley	51	143
Canola:		
Seed	7	86
Oil	90	329
Meal	51	229
Total Canola	148	644
Corn	(70)	(122)
Flax	56	76
Soybeans	(29)	(44)
Soybean meal	(162)	(234)

Source: Grains and Oilseeds Statistics – December 2000, Agriculture and Agri-Food Canada

ing factor. To the Klein list, we believe the following reasons could be added as contributors to increased exports of wheat and other crops to the United States:

- appreciation of the U.S. dollar against almost all other currencies;
- greater economic integration – U.S. companies are looking to secure access to supplies of grain with certain quality attributes; and
- improved and lower cost rail linkages.

Table 4 illustrates the growth in trade between Canada and the U.S. since the CUSTA was implemented. The value of wheat exports from Canada to the United Sates has increased 10 fold since implementation of the free trade agreement. Durum exports have increased over two times. While this growth is substantial, in my view, these increases are actually less than what we would have seen under a completely free trade environment. That is, for political reasons, the Canadian Wheat Board (CWB) is restricting the amount that it sells into the United States. Absent the CWB, I am convinced exports of wheat

Table 5: Canadian Net Exports to Mexico, Selected Commodities, Three Year Averages, 1989-91 and 1997-99.

Commodity	*Average Net Exports 1989 to 1991 (Cdn $ Million)*	*Average Net Exports 1997 to 1999 (Cdn $ Million)*
Wheat	11	156
Durum	0	2
Barley	2	14
Canola:		
Seed	20	221
Oil	1	7

Source: Grains and Oilseeds Statistics – December 2000, Agriculture and Agri-Food Canada

and durum wheat from Canada to the United States would increase, unless the United States was able to restrict imports through some protectionist measure.

Interestingly, Canada has turned a small trade deficit in mixes, doughs, cereal and bakery products into a significant trade surplus. It would seem that Canada's competitive position in these products has improved over the past decade. We have also witnessed strong growth in the export of oats to the United States. Oats were removed from the jurisdiction of the Canadian Wheat Board in 1989 and are now freely traded under an open market, and produced and transported without subsidization.

The growth in barley exports primarily relates to an expansion of malt barley exports to U.S. maltsters. There has also been significant growth in the export of canola and canola products to the United States Notably, the value of canola exports is nearly twice that of wheat exports. Canola and canola oil compete directly in the edible oil market against soybeans and soy oil. Canada is a significant and growing importer of U.S. corn, soybeans and soybean meal, a trend which is likely to continue.

CANADIAN GRAIN TRADE WITH MEXICO

Over the past decade, Canada has also seen substantial growth in the export of grain to Mexico, in part due to reduced tariffs under NAFTA and

Table 6: Trade Friction Matrix, Canada and the United States.

Commodity	*Open Border*	*Market Distortions*	*Trade Friction*
Wheat	NO	Yes	Yes
Barley	Semi	Minor	Minor
Malt Barley	NO	Minor	Minor
Canola	Yes	Yes	No
Oats	Yes	Yes	No
Flax	Yes	Yes	No
Corn	Semi	Yes	Yes
Flour	Yes	No	No
Mixes, Doughs, Cereals, Bakery Goods	Yes	No	No
Pasta	Yes	No	No
Soybeans and Meal	Yes	Yes	No

Source: compiled by author.

improved transportation and commercial linkages. Table 5 summarizes Canadian exports to Mexico.

RELATIONSHIP BETWEEN FREE TRADE AND LEVEL OF TRADE FRICTION

In examining the Canada-U.S. grain trade relationship, it is apparent that the highest degree of trade friction occurs for those commodities that are least freely traded and/or are subject to a high degree of market distortion. There is virtually no trade friction in those commodities where there is an open border. As shown in Table 6, products that fall into this latter category include canola, oats, flax, flour, mixes, doughs and bakery products, pasta, soybeans and soymeal.

Following is a brief commentary on the trade relationship for each of these commodities:

Wheat (including durum). Unquestionably, this commodity accounts for the greatest source of trade friction in the Canada-U.S. grain trade relationship. Perhaps this should be of no surprise. It is the commodity that is also characterized by the highest degree of government intervention and border control. Wheat is not freely traded. Farmers in western Canada are prohibited

from exporting their wheat (and barley) directly. They must first sell their wheat to the CWB. They are permitted to purchase their wheat back from the CWB and then export, however in such a case, they are viewed in the same manner as any merchant who buys wheat from the CWB for export. Western Canadian farmers who have attempted to sell their own wheat directly to the United States bypassing the CWB, have been convicted and have spent time in jail. Imports of wheat into Canada are permitted, although the relative prices are such that this happens only under exceptional circumstances, and in very modest amounts.

In the United States, wheat is a major beneficiary of public support. The wheat (and durum) market is characterized by a significant degree of market distortion, primarily the CWB control over marketing in Canada, and the marketing loan (LDP) program in the U.S. Again these factors contribute to the trade friction currently being experienced.

Feed and Malt Barley. The export of feed and malt barley from Canada to the United States is subject to the same restrictions that apply to the export of wheat and durum. That is, farmers are not permitted to sell directly and instead, are required to sell to the CWB prior to export. Exports to the United States consist primarily of malt barley – these supplies enter without too much protest. In recent years, some moderate quantities of feed barley have been exported from Montana into the feedlot markets in southern Alberta. Again, this trade has taken place with little friction arising.

Canola is freely traded. Canada is a large net exporter to the United States, although trade is two-way as North Dakota farmers often truck canola to crushing plants in southern Manitoba. This business is growing as American farmers expand their acreage of canola. Canada welcomes this development. The canola market is, however, characterized by a high degree of market distortion. Canola (or to be more precise, canola oil) competes directly with soybeans and soybean oil. In our view, the relatively high support prices for soybeans and oilseeds under the U.S. marketing loan program are leading U.S. farmers to expand soybean, canola and flax acreage. The resulting subsidy induced production is having a depressing effect on oilseed prices. Canadian canola farmers are being caught in the crossfire. In our view, Canada has a

legitimate grievance over this level of market distortion, however given the importance of the U.S. market to Canadian canola farmers, it is not one they are likely to press.

Oats were removed from the jurisdiction of the Canadian Wheat Board in 1989. They are now freely traded. Since that time, Canada has witnessed a dramatic growth in the production and export of oats, with little or no trade friction. The market however is not free of market distortion. The United States continues to import large quantities of subsidized oats from the European Union. These highly subsidized imports are having a depressing effect on prices for both U.S. and Canadian oat producers.

Flax is freely traded in a friction-free environment. The market is subject to the distortion caused by the high oilseed support price in the United States, although this does not appear to be having any adverse impact on the trade relationship.

Corn is freely exported from Canada to the United States, and until recently was exported freely from the United States to Canada. In November 2000, Canada imposed prohibitive dumping and countervailing duties on U.S. corn imported into western Canada. The duties were imposed by the Canadian Customs and Revenue Agency at the preliminary investigation level of a trade action brought by corn growers in the province of Manitoba. The duties were terminated in March 2001 because injury requirements were not met.

Flour, Mixes, Doughs, Cereals and Bakery Products, Pasta. These products trade freely between Canada and the United States. Tariffs are no longer applied and there are few trade irritants.

Soybeans and Soybean Meal. Again, these products are freely traded without engendering any material trade friction. As discussed, the U.S. marketing loan program is however a source of significant market distortion.

This analysis suggests that Canada-U.S. trade friction in the grain sector occurs chiefly in those commodities where there is the greatest amount of government intervention. Those products that are freely and openly traded are

not a source of trade friction. Market distortions are sometimes a factor in trade disputes, although there are some commodities, notably oilseeds and oats that appear to trade without any significant degree of trade friction, despite the presence of some significant market distortions.

CONCLUSION

The Canadian grain industry appears to be characterized by a high degree of competition, although low profit margins are expected to lead to some consolidation. Over the past decade, trade in grain and grain products between Canada and the United States has grown substantially. In particular, Canadian exports of wheat, wheat products, oats, canola and canola products to the United States have expanded considerably. The CUSTA was cited as only one of several reasons for expanded trade. Canadian exports of grain to Mexico have also increased significantly over the past decade, in part due to NAFTA and improved commercial linkages.

The paper also examined the nature of the trade relationship between Canada and the United states, and concluded that trade friction occurs in those commodities that exhibit the highest degree of government intervention. Those commodities that are freely traded are generally not a source of trade disputes, even in the face of significant market distortions.

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There are two key asymmetries between Mexico and the United States/ Canada that should be taken into consideration:

- more than 25 percent of the total labor force in Mexico works in primary agriculture, but in Canada and the United States, the comparable number is only about 2 percent;
- whereas in the United States and Canada poverty exists only in isolated pockets, in Mexico more than 40 percent of rural inhabitants are poor and 25 percent are in extreme poverty.

In other words, rural poverty is pervasive and deep. In this economic and social context, the design of rural policy should be based on three criteria:

1. It is essential that agricultural growth be accelerated, creating a sector offering productive employment to a quarter of the population. A stagnant or declining agriculture has heavy social costs.

2. Given the importance of non-agricultural employment as a source of rural income, a regional development policy is needed that enhances forward and backward linkages, and creates jobs in rural regions.

3. It is absolutely essential to decrease poverty and to attain a better distribution of income.

So, we could ask: *is NAFTA creating conditions to speed agricultural growth, regional development, and to curb rural poverty*? On the basis of research results coming from available models and studies, it is possible to conclude that NAFTA i) will decrease the production and increase imports of grains and ii) increase the production and exports of fruits and vegetables, commodi-

ties in which Mexico has a comparative advantage. *What will be the economic and social consequences of this trade-off*?

Let us examine the case of grains. Yunez has pointed out that Mexican agriculture is very heterogeneous by type of producers and by products as well. Regarding maize, most critics of NAFTA predicted a collapse of production in Mexico and a massive migration of crowded-out, poor peasants to cities or to the United States. Yunez has shown that this has not happened. His explanation of why this has not been the case is, in my opinion, correct. It could be added that around 50 percent of maize producers are either self-sufficient peasants or are not buyers of corn. They will not be affected by a drop in prices due to increased competition of foreign corn in the domestic market.

It is important to note that small peasants producing maize for self-consumption are not really farms in the traditional sense of the word. They would be better defined as complex family units striving for economic and social reproduction. They combine the cultivation of maize with beans and other subsistence vegetables. They have other economic activities and sell their family labor in different markets. They will continue producing maize no matter what its price will be. The commercial producers of maize will be more at risk, particularly those that rely on corn for their only cash income and are vulnerable to price drops. However, the available data show that some of them, cultivating in advantaged rainfed regions, have comparative advantage. Surprisingly, maize yields per hectare have been increasing in the last two decades. Remittances or migration savings are often invested in the land. However, more research is needed to evaluate the future impact of NAFTA on these types of producers.

On the other hand, according to Yunez data, wheat production has declined as a result of liberalization and imports increased substantially. Why has wheat production declined since NAFTA and corn has not? Wheat in Mexico is cultivated in the irrigated plains of northwest Mexico, particularly in Sonora state, by medium-size commercial oriented producers. It is not a competitive crop under present conditions and could be even less competitive if government support policies were abandoned. In order to evaluate its competitiveness two indicators could be used:

1. *producer subsidy equivalent* expressed as a percentage of total value of production, which amounts to 20 percent in the case of Sonora wheat. This means that producers would lose 20 percent of their crop cash income if subsidies and other supports measures were eliminated.

2. the *domestic resources cost coefficient* (DRC) for Sonora wheat, is greater than one, which means that Mexico has to invest more than a dollar to produce wheat domestically, in order to save one dollar not importing wheat.

At the same time, the *effective protection coefficient* is greater than one showing that Sonora wheat is protected from foreign competition, and in the absence of support policies, its competitive position would be weaker. Being commercially oriented producers, it would not be a surprise if Sonora wheat growers continue to reduce wheat production in the context of increased liberalization of Mexican agriculture. This would pave the way to bigger imports from the United States.

The fall of wheat production could have very negative consequences for entire regions. For example, the Yaqui Valley in Sonora would loose its main economic activity. Substitution for wheat by other commercial crops is possible but that takes time to materialize. In the meantime, a regional crisis could take place and social tensions would arise. The task of policy is to reduce the social cost and accelerate the transition.

On the other hand, the increased production and export of vegetables has benefitted producers and created a significant amount of jobs, due to the labor-intensive methods of cultivation employed. However, *to what extent is production and export of vegetables contributing to the alleviation of poverty*? Let's take the example of tomato production and packing, which is the most important agroindustry in terms of exports and employment creation. Most of the laborers employed by the tomato agroindustry located in northwest Mexico, are temporary migrants coming from poverty-stricken regions in southern Mexico, particularly Zapotecas Indians from the state of Oaxaca. Research aimed at estimating the importance of migrant income, concluded that migrant in-

come earned in the tomato fields and packing plants, is fundamental to the basic survival of villages in poor regions. However, this does not provide a solution to poverty alleviation because migrant income is not sufficient to contribute to capital formation in the migrant communities, nor to create conditions for endogenous local development[1].

To sum up, there is no doubt that liberalization and NAFTA are producing efficiency gains and new opportunities to firms and agricultural producers with some comparative advantage. The case of vegetables is very clear. However, for some grain producers, NAFTA could make things worse and, eventually, they could be crowded out creating social costs and tensions. The role of policy is to create conditions for efficiency gain through market participation and, at the same time, reduce those costs and tensions. For the Mexican government, the implementation of farm and economic policies is crucial and unavoidable because its main commercial partners, the United States and the EU, are heavily subsidizing their agricultural producers. The problem for the Mexican government lies in its scanty budget and its institutional weakness.

[1] M.A. Barróón and F.Rello, "The Impact of the Tomato Agroindustry on the Rural Poor in Mexico." *Agricultural Economics*, 23 (2000) pp. 289-297.

Structural Change Under Free Trade

Structural Change Under Free Trade: Hogs/Pork

Environmental Concerns. The principal problem of the hog industry is that it has lost favor with the general public and environmental groups. It appears that environmentalists simply do not want hog production. Environmental groups are very efficient and effective in communication including extensive use of the Internet. The hog industry cannot afford to let these issues go unanswered. Answers need to be factual and based on NAFTA. A third party audit system is being developed to deal with environmental issues. It is difficult to move into new areas of production within both Canada and the United States, and production could be driven out of the United States to Mexico and, potentially, to Brazil. The Mexican hog industry is growing very rapidly. Brazil is the lowest cost producer in the world but has animal health problems.

Structural Concerns. It is not generally recognized how integrated the hog industry has become. Less than 20 percent of the pork in the United States is traded on the spot market and 57 percent is tied to the spot market. This means that about 75 percent of the hogs are priced on 20 percent of the market. Another basis for pricing must be found.

Displacement of small hog producers is substantial. Older farmers are simply retiring. Another segment is moving into larger integrated operations as laborers. This turns out to be good skilled laborers who do better economically in this capacity than as hog producers. The remainder simply will drop hog production and become grain producers.

Structural Change Under Free Trade: Beef/Meat

The transformations that have occurred and are occurring in the beef industry have not been caused by NAFTA. They are the result of basic economic forces that are occurring throughout the agriculture sector. But NAFTA has allowed these changes to take place in a relatively unimpeded manner.

However, free trade has not yet been achieved. There are specific persistent impediments, including no harmonized grading system, no free two-way exchange of disease-free animals across the borders, and trade actions resulting from claims of dumping. In reaction the following observations were made:

- It is anticipated that private branding will displace USDA beef grades.
- Mexico's beef/meat sector is highly influenced by climate and consumer preference. The Mexicans raise cattle and cut meat differently than either the United States or Canada. This results in differences in concentration, marketing, and pricing.
- Disease-free animals will continue to be a major goal since food safety is a priority concern, yet there is a need to be able to move disease-free animals both ways.
- U.S. feed subsidies contribute to a significant unlevel playing field in livestock production.
- An interesting additional trade barrier involves the requirement that U.S. school lunch components or major ingredients must be of U.S. origin.

There were supposed to be an ongoing process for negotiating removal of such continuing problems. These objectives have not been realized. Again the point was made that antidumping actions make no sense in agriculture where sales of raw commodities frequently are made below costs when prices are very low. The only remaining defense ends in these actions is the issue of economic harm, which frequently ends up being a political call.

Country of Origin Labeling. There was considerable discussion of whether country-of- origin labeling was a positive or negative factor. The consensus was that it was a negative strategy. The added cost was viewed as being a major concern. In addition, there was a concern that a constant process of policing would occur over whether the origin, in fact, was as specified. This is particularly the case since live animals move back and forth across borders.

Future of Research. The expectation was that private sector animal science research will gradually replace public sector research.

Structural Change Under Free Trade: Crops

There appear to be differences across the three countries regarding the impacts of NAFTA on structure of crop farms. Related observations include:

- The United States impacts have probably been relatively small partly due to the size of the U.S. crops sector and partly due to the level of subsidization since 1996.
- The Canadian impacts have been substantially larger because of major reductions in crop subsidies. The big change is in terms of diversification, with major changes occurring in consolidation as well.
- In Mexico the big adjustments have been in terms of shifts from crops to fruits and vegetables, and from livestock to crops in marginal areas.
- Privatization of railroads (realized in Canada and potentially in Mexico) has major importance from a trade perspective.

NAFTA gets the blame for many economic adversities and adjustments for which it is not responsible. Consolidation within agriculture is the long-term phenomenon resulting in reduced farm numbers. The root of the problem may not be with NAFTA, however, it is an excuse repeatedly used. If there were full free trade (without distortive subsidies) under NAFTA, greater specialization within countries should be anticipated. For example, Canada could be expected to produce a larger share of the wheat, the United States a larger share of the corn and soybeans, and Mexico a larger share of the fruits and vegetables.

There is need to include analyses of the costs associated with externalities in the effects of NAFTA. For example, displacement of farms is clearly a cost. There has been substantial displacement, but there is a big issue of how much is due to NAFTA.

Conflict Resolution. Going to full free trade would be expected to lead to a number of unanticipated consequences. For example, it is quite possible that freer trade gives an advantage to larger producers and to large and multinational corporations. It was pointed out that resolving conflict "is 80 percent process and 20 percent content". More attention needs to be given to the process, an important component of which is involvement of the stakeholders.

Section 5

Role of Government In Facilitating Change

This section examines policies and programs in relation to consistency with full free trade, and changes required to achieve that objective

POLICY OPTIONS FOR FACILITATING CHANGE AND MAINTAINING COMPETITION UNDER CONDITIONS OF FREE TRADE WITHIN NAFTA

Ronald D. Knutson, R.M.A. Loyns and Rene F. Ochoa

INTRODUCTION

The first six workshops in this PDIC series have described existing policies and programs in the NAFTA countries, and analyzed their contributions to trade disputes (Loyns, et al.editors, *Workshop Proceedings, 1995-2000*). This workshop has taken the opposite approach and projects how agriculture and food would be organized under a genuinely free trade environment, then indicates what trade stress and disputes might arise. The first five papers and discussion comments in this workshop were designed to produce that information.

This paper examines the policy, program and institutional changes that would be required to achieve "free trade" in the agriculture and agri-food industry within the NAFTA region. Three basic questions are addressed:

- what agricultural policies would the three NAFTA governments pursue if they were starting over under conditions of free trade?
- how do the current policies, programs and institutions of the three countries compare with this norm?

- what actions would be required in each country to achieve harmonization with free trade principles?

Much of the discussion is directed toward cattle/beef, hogs/pork and grains, although it can be generalized to the broader agri-food sector. The discussion is limited to policies that are closely related to agriculture and, due to space limitations, is not designed to be all encompassing. For example, monetary and fiscal policy impact agriculture and arguably require harmonization across the NAFTA countries, but are not discussed in this paper.

AGRICULTURAL POLICIES UNDER FREE TRADE

The most basic role of government involves providing the framework for achieving and maintaining order as the ultimate authority for conduct of the states business. Order and authority are basic to the smooth operation of markets. Regardless of the level of competition, rules of the game are required for markets to perform well. Trade associations, voluntary agreements and convention contribute to rules of the game for conduct of business but, in the end, government must set the basic rules and enforce them. In addition, government is responsible for establishing overall social objectives and priorities, and for ensuring that conduct of business fits within fundamental public goals.

Free trade agreements (FTAs) are interesting in this context. This role of government encompasses the issue of national sovereignty. Entering a free trade agreement is both the exercise of national sovereignty and the transferring of some sovereignty in the belief that economic gains will exceed the domestic costs. This point is important in the debate about free trade being above international and domestic law. A FTA does not usurp sovereignty, as growing numbers of anti-free traders argue. A FTA extends the authority of government to terms of trade covered by the agreement throughout the region. In practical terms, a FTA plays an important role in standardizing conditions of trade within the FTA area, and in providing adjudication of dispute resolution mechanisms at both the micro and the macro level of business conduct. These contributions are important to the maintenance of competitive market functions. In fact, it will be argued that a true free trade agreement may be absolutely essential to the maintenance of competitive market functions within the free trade region.

There are two other basic rationales that justify government involvement in market-oriented economies, derived from economic theory of market externalities:

- provision of public goods; and
- prevention of market failure.

Public goods are those products or services for which use/consumption by any one market participant does not reduce the amount available to other participants (Samuelson, 1954). Included are socially desired goods that would not be available unless provided by government. Examples of public goods include much basic and applied farmer-oriented agricultural research, extension, economic information, grades and standards, plant and animal protection, and food safety standards.

Market failure means that prices and quantities are not established in a manner that takes into account all of the factors considered important by society as a whole (Bator, 1958). In part, government intervention to reduce market failure can be viewed as a process of moving the market in the direction of achieving the advantages of purely competitive markets. Examples include competition policy and improved information on markets. Some would argue that the protection provided by intellectual property rights induces innovation. On the other hand, there are monopoly elements associated with intellectual property rights. Certainly there are externalities which occur because purely competitive markets do not match marginal costs to social values in production or distribution. The usual example for this form of market failure is environmental degradation.

POLICIES CONSISTENT WITH FREE TRADE

The above rationales lead to a set of agricultural and food policies that can be made to be consistent with concepts of free trade. While no taxonomy is completely pure or mutually exclusive, this set of policies can be classified into the following three categories:

- ***policies that facilitate progress, growth, trade and commerce*** are basically public goods in that they would not be available unless the government provides them. Included are agricultural research and

extension, economic information and outlook, grades and standards, and trade policies;

- ***policies that regulate how business is conducted.*** These policies are a mixture of public goods and a result of market failure. Included are competition/antitrust policies, food safety policies, plant and animal protection policies, and environmental policies; and
- ***policies that intervene with the functioning or distribution of returns*** among market participants to achieve social or economic objectives on the basis of either public goods or perceived market failures. Included are disaster payments and subsidized insurance, government sponsored credit arrangements, price supports, marketing boards and orders, safety nets, and food assistance programs.

Policies that Facilitate Progress, Growth, Trade, and Commerce

Agricultural Research and Extension. An effective agricultural research and extension system is an important public good for maintaining the competitiveness of modern agriculture. It is also important to maintaining a level playing field across farmers of different sizes having different resources. Conducting most production and marketing research is beyond the means of the majority of farm and small agribusiness operations. A research and extension system must focus on the current and future needs of the nation's agriculture, including a widespread understanding and acceptance by farmers of the relevance of the research and extension system to their economic health (Knutson 1986; Knutson and Outlaw, 1994).

In developed economies, the public agricultural research component needs to be a combination of basic and applied activity. In an era of increased private sector involvement in research, with the conference of private property rights for the discovery of new processes and life forms, it is important that the public sector maintains its independence, objectivity, and neutrality as a research body. While intellectual property rights are expected to foster research and development, they also confer limited monopolies to the private sector. Public support for basic and applied research that is diffused across universities and government reduces the potential for the development of monopolistic/monopsonistic conditions by continuously infusing new technological in-

novations. This process also deals with the wide diversity in agriculture by making innovations more readily available to all segments of a highly diverse agriculture. To take advantage of these innovations both research and extension must have production, marketing and management components to serve the needs of an increasingly business-oriented agriculture. In this regard, the role of extension is twofold:

- to improve farmers productivity and profitability, through the use of science-based knowledge; and
- to reflect the researchable problems facing farmers back to the research community (Knutson, 1986; Knutson and Outlaw, 1994).

Economic Information. One of the basic requirements for competitive, well-functioning markets is accurate and timely information, uniformly available to all market participants. Like usable research results, information generation is costly. Consequently, the value of information may exceed its costs for all but large farmers and the agribusiness sector. This situation in itself is a form of market failure, and asymmetry of information may be a source of market power (Henderson et al., 1983).

The key information concerns prices and production (historic, current and outlook), availability of supplies/stocks, and conditions such as weather, income, global demand and supply likely to affect the production and distribution of agricultural products. Information on market conditions, such as local bid prices or basis, are also important to decision making but the diversity of this information makes its provision much more costly and, therefore, more responsibility is placed on the capability of individual decision makers.

Grades and Standards. Agricultural products are not homogeneous in quality. Therefore, competitive agricultural markets require a system of established product standards based on use value or quality. Price reporting is meaningful only if product quality is known, and transactions costs are reduced when established, dependable product standards are available (Nichols, 1983).

Standards of quality should be determined by the factors that would be rewarded in a competitive market. A grading system can fulfill this need if it is

well designed and if all market participants know its terms. Therefore, meaningful standards must be drafted in a manner that reflects the needs of market participants, allows inspectors to accurately and consistently determine grades, and provides for effective communication of this market information. To participate in international markets, grades and standards must also be consistent with the terms and conditions established by Codex Alimentarius, which is designed to facilitate and encourage trade by avoiding the establishment of sanitary and phytosanitary barriers to trade.

In establishing a product standards system, it is important to know and reflect the purpose for which standards are being developed. Grades and standards may be developed for commercial market transactions (among farmers and merchants), between retailers and consumers or both. Ideally the grading system nomenclature should be a simple Grade A, B, and C or 1, 2, and 3 that is understandable to all market participants. "Extra" and "Fancy" and similar promotional nomenclature is typical of some commercial standards such as fruits and vegetables, and masks more than it reveals to producers and consumers (Nichols, 1983). The terminology must also be consistent with Codex Alimentarius convention in order for products to be accepted in international markets.

The other form of standardization involves conditions of trade-the legal framework of contracts, weights and measures, labeling, licensing, bonding, recourse, etc. This form of standardization is important because it provides for contract enforcement and reduces transaction costs. This function is often taken for granted in domestic markets because it is part of business convention. However, when trade occurs in other countries, conventions change and transaction costs may rise. (Burfisher, 2000; Furtan, 2000; and Thompson, 2000)

Trade Policy. An important role of government is negotiating trade agreements to move national and international policies in the direction of freer trade. As indicated above, by entering a trade agreement some of a nation's authority is transferred to the rules of trade defined by the agreement. Therefore, the agreement governs some of the country's policy options and responses to internal and external forces. Nations do this willingly with the expectation

that the aggregate gains in economic activity, incomes and citizen welfare will exceed adjustment costs and losses. Economic policy principles suggest that this trade-off could involve compensation to those who would be clear losers from freer trade.

Expanding exports is a goal for most counties because it provides a means by which governments can raise prices (without providing direct farmer subsidies) and earn foreign currency. To the extent that international markets are dominated by state trading competitors and multinational trading companies, one might assert that there is a market failure. Maintaining production at a level that assures products are available for export might also be asserted to be a food security strategy, although it is inconsistent with free trade if exportable production results from price and income subsidies.

Infrastructure. Governments provide infrastructure and services in many ways and for many reasons. Roads and highways, bridges, port facilities, canals and internal water systems, irrigation and railways are examples of infrastructural public goods at some or all points in the economic development of the NAFTA countries. Their role as public goods may change with the level of economic development; consequently, what was not a subsidy may become one if public funding continues when alternative services become available. Services and facilities for grading, health and safety responsibilities including inspection, customs, export certification, and the legal system are required for the market to function. Like bridges and highways, these facilities and services may not be available without government support.

Economists tend to treat transportation as "just another fixed cost." However, an outdated and low-capacity transportation infrastructure in a country can lead to excessive transaction costs, defeating in this way the benefits of freer trade. When dealing with international trade transactions, a harmonized transportation system, expeditious border inspection, and seamless regulations across the countries should facilitate and enhance trade by diminishing administrative and transaction costs.

In dryland areas, a public interest may exist in developing and maintaining irrigation infrastructure. There may also be a public interest in the allocation of water rights and establishing mechanisms to encourage water conser-

vation, all of which may impinge on highly-valued private property rights. Other land and water reclamation activities may be justified for government as a public good where it is in the national interest to expand arable land, and where reclamation expenditures are so large they are beyond the means of private farmers or even groups to acquire and maintain. How the public services are priced out in use is important to market neutrality of the services. Of course, all of this may be in conflict with conservation and environmental objectives; hence this function will usually overlap with environmental regulation.

Regulatory Policies

Competition/Antitrust Policy. Agricultural markets are frequently characterized by imperfect competition. Input markets typically include only a few sellers and product markets, a few buyers (MacDonald, 2000). Commodity and product markets not only tend to be highly concentrated horizontally, but also are increasingly characterized by vertically integrated structures. Free trade supposedly fosters competition by broadening the market and introducing import competition, but that may have a limited effect because multinational firms dominate many agricultural input and product markets. Marketing boards, orders, and cooperative enabling legislation were originally introduced to provide countervailing power to the imperfect competition faced by farmers in input and product markets (Armbruster and Jeese, 1983; Babb et al., 1983). In particular instances, agricultural markets are sometimes dominated by marketing boards and orders which may also limit competition. Free trade implies a less intrusive role for such institutions and, perhaps, their elimination. With this confluence of opposing forces, assessment of the need for competition/antitrust intervention has become increasingly apparent.

Intellectual Property Rights. Another role of government, justified by its contribution to technical progress, is the provision of proprietary rights to innovation via intellectual property rights (IPRs). Patents, plant breeder rights, copyrights and industrial design are the major IPRs, and recently the issue of patenting life forms has become a major social debate. Like many other forms of government intervention, IPRs can be a double-edged sword. While they may stimulate innovative effort (the economic evidence on this proposition is far from definitive), they also provide limited monopolies on

processes and products dependent on the patented process. Therefore there are issues of competition underlying application of IPR policy.

Plant and Animal Protection, Public Health, and Food Safety. Protection against diseases and pests is an accepted regulatory role of government. In the agri-food sector this role extends to plant and animal diseases, public health, and food and water safety. This function includes specification of the rules, administration and inspection procedures for control, treatment, and eradication of potentially epidemic-communicable plant and animal diseases, especially those involving human health hazards. To be effective, these regulations must include an inspection/quarantine system for animal and plant imports, particularly those intended for breeding purposes. A single common set of regulatory rules could be applied across the three NAFTA countries.

A widely accepted and increasingly important mechanism that has been developed for food safety is the hazard analysis and critical control point (HACCP) procedures in the production, marketing, and processing of agricultural products. A farm-to-table HACCP system provides a basis for improved confidence in the food supply both domestically and in trade. Plant and animal disease prevention, and HACCP procedures, are justified as a government function because competitive pressures, buyer beware cautions, and legal remedies have not been sufficient to avoid incidents of market failure. At the same time, country regulations in the disease/inspection/HACCP arena have become a major focal point for sanitary and phytosanitary barriers to trade. Assuring food safety is becoming increasingly complex in a more complicated world. Research and inspection to assure food safety at all levels is part of this function. Public and consumer confidence will exist only if compliance is known to be effective. Science-based rules may prevent build up of undesirable trade barriers.

Conservation of Natural Resources and Management of the Environment. The basic resources of soil, water and air are essential for agricultural production. As recognized in the last quarter of the twentieth century, these resources have competing uses and are fragile. Left to the market, profit-maximizing incentives exploit these resources to the point where current, private marginal costs and revenues tend to equate regardless of any adverse public consequences. This is a classic case of market failure. Research

has indicated that changes in the value of land seldom compensate for reductions in its productive value due to the lack of sound resource conservation practices (McConnell, 1983; Gardner and Barrows, 1985). Neither the effects on the environment nor the right to use these resources in the public interest are protected without government involvement.

In addition, modern agriculture uses both chemicals and fertilizers as a means of maintaining and expanding yields to feed and clothe an increasing population having higher incomes and expectations (Smith et al., 1991). Modern animal agriculture produces odor and effluent in large volumes[1]. Because of the toxicity of some chemicals and effluent, and the water and air quality considerations associated with crop and livestock production, governments develop, administer, and enforce environmental standards for agricultural production. Monitoring, compliance, and prosecution in relation to environmental standards are probably among the highest of public priorities in agriculture today.

As in the case of soil erosion, market incentives to pollute result from the reality that externalities are not considered in market prices and/or costs. Government programs may prohibit the use of certain products, regulate the quantities used, compensate farmers for the regulatory costs imposed (often referred to as green payments), and/or internalize the cost to society into farmers' cost structure through taxes or prescribed management practices. Whereas in the agribusiness sector government policies have generally favored the internalization of externality costs, farm programs have leaned in the direction of regulation of management practices (which may have some of the same effects) or green payments.

MARKET INTERVENTION

The role of government in price stabilization and income transfers is the most controversial of the functions performed by agricultural policy. There

[1] Readers should understand that we do not intend to imply that only crop and animal agriculture, and only large-scale producers, create environmental risks. Most of agriculture, like most of human behavior, has some potential for air, water and soil degradation if activity is not managed in a sustainable manner.

are two general forms of subsidization - indirect and direct. Market intervention is often justified on three grounds (Knutson et al., 1998):

- the structure of agriculture is highly diverse. With substantial economies of size, smaller and moderate size farms find it very difficult to compete and survive. Price and income stabilization programs are recognized to help larger farms more than smaller farms, but governments find it difficult to effectively target benefits. Therefore, assistance is provided to all farmers, regardless of size;
- agricultural production involves high risks, many of them uncontrollable by producers. The vagaries of nature combined with the highly inelastic supply and demand result in an unacceptable level of price volatility. Farmers, particularly small and moderate size farmers, find it difficult to cope with these high levels of risk, thereby justifying programs to protect and stabilize farm income; and
- there is an overriding public interest in food security that translates to assured domestic supplies of certain commodities and products. This rationale denies that international sources of food can be relied upon to fulfill all gaps between domestic needs and domestic production, and that a FTA, properly designed, reduces food security risks. Domestically, the food security objective is designed to ensure that vulnerable segments of the population receive a sustainable level of nutrition.

To be consistent with free trade, price and income programs must not be production nor trade distorting. In reality, achieving market neutrality is very difficult.

Disaster Assistance. Because agricultural production is highly subject to vagaries of weather and other natural conditions, some disasters occur for which there is no, or inadequate, private coverage. As a consequence, government assistance is provided in several forms to make up for the lack of protection on farm production and assets from adversities like floods, drought, pests, fire or disease. Coverage/compensation is often arbitrary (as in animal slaughter for disease outbreaks, or crop land flooding), or predetermined by rules such as payments sufficient to cover their cash (variable) production costs, if their production falls below some percentage (say, two-thirds) of “normal”

levels. Three main options for financing this form of indirect subsidization include:

- payments can be provided out of the national treasury. This alternative can lead to market distortions, such as uneconomic production on marginal lands, and is subject to various forms of abuse;
- insurance programs, on either a voluntary or mandatory basis, can be provided to cover the risk of natural disasters. Crop insurance programs are operated by government agencies with producers covering part of costs, by private insurers with government underwriting and contribution to costs, or through government participation/cooperation with private insurers; and
- financial inducements to set aside a certain percentage of their net or gross incomes in normal years. These funds plus government contributions may be held in interest-bearing accounts from which farmers may draw out funds in adverse years, or cash-out at retirement.

Agricultural Credit. Modern farming requires large amounts of purchased inputs as well as investment in land, buildings, and animals. Agricultural production is characterized by time lags, and product sales may require carrying significant unsold inventory. If commercial markets fail to provide dependable, reliable agricultural credit at reasonable interest rates, governments step in to assure adequate credit for agriculture. If government pays part of the costs of agricultural lending, this is another form of indirect subsidization. This may be accomplished by four general approaches including:

- the government may provide credit, at market or subsidized interest rates;
- the government may guarantee repayment of loans made by the private sector to farmers who would not otherwise be able to borrow from commercial sources. The default rate on such guaranteed loans is frequently high with substantial political pressure being exerted not to foreclose against farmers who are in arrears;
- the government may assist in the establishment of a farmer-owned cooperative credit system having borrowing authority and a credit rating that is comparable to that of the government or only slightly above; and

- the government may provide appeal mechanisms, debt review, and alternative repayment mechanisms to prevent immediate dissolution of farm enterprises.

Public disaster insurance and agricultural credit usually involve public contribution to defraying administration costs. These programs often underwrite risk, which is another form of subsidization.

Price Supports and Safety Nets. These are the direct forms of public support received by producers when prices fall below politically acceptable levels. Price supports, income enhancement, and the 1990s term for these programs, safety nets, come in many shapes, sizes and political flavors (Knutson et al., 1998). In this discussion, marketing boards and orders with significant regulatory powers are included in this category since they are different only in the mechanism and delivery of support. The major forms include:

- price raising mechanisms which include classic forms of price support achieved by limiting production, diverting product to alternative markets, or storage, government loan or buy-up activities, and product disposal;
- direct government payments made to farmers when market prices do not achieve program targets (deficiency payments);
- commodity insurance-type programs that combine producer and government contributions, used to supplement returns when market prices fall below threshold levels, often paid out at retirement. Commodity insurance programs may be applied at the aggregate level but they may also be tailored to individual farm accounts. Because they are commodity specific and involve public expenditures,
  they are likely to be production and trade distorting to some extent, and are not likely to pass the trade-green test; and
- whole farm stabilization funds combine producer and government contributions and are drawn on when farm revenue falls below a threshold or at retirement. Whole farm stabilization is farm (not commodity) specific and should be the least resource and trade distorting of available programs.

The latter two forms may perform dual roles as disaster programs. They may also act as a safety net. Price supports and deficiency programs create several

economic problems including production and trade distortions. In addition, they are blunt instruments in that they are not effectively targeted. Despite these characteristics they exist in NAFTA country policies.

Food Assistance Programs. Food assistance programs have their origin in the dual objectives of expanding the demand for domestically produced food and dealing with issues of hunger, malnutrition and poverty. Child nutrition has been determined to be an important factor in the development of a healthy adult population. An important dimension of child development is prenatal nutrition and health care. These needs leads to the extension of food assistance programs to low income and single parents.

OVERVIEW OF CURRENT POLICIES

This section reviews the status of agricultural policy in the three NAFTA countries according to the categories identified above. The purpose of this review is two fold:

- to identity major policies and determine the extent to which they are in harmony across the three NAFTA countries. Stated differently, this purpose involves determining if the agricultural playing field is reasonably level; and
- to determine if policies are consistent with principles of free trade.

POLICIES THAT FACILITATE PROGRESS, GROWTH, TRADE AND COMMERCE

Agricultural Research and Extension

United States. In the United States, agricultural research and extension is a cooperative federal-state program. USDA's Agricultural Research Service (ARS) operates agricultural research stations located throughout the country. These stations emphasize basic and applied research that is of national importance. The federal government also supports land grant university research through a system of formula funding. In addition, it manages a competitive grants program that is open to scientists within and outside the land grant system, including USDA scientists. Generally, federal support accounts for 20-30 percent of land grant universities' agricultural experiment station budget, the remainder is from state and private sources (OTA, 1986, 1992).

Private source funding of state programs has increased in recent years since the conference of patent rights on the discovery/development of new life forms.

There is no USDA extension counterpart to ARS, although formula funds are provided to land grant universities to support 20-30 percent of extension activities at land grant universities (OTA, 1986). Again, the states provide the bulk of funding for their extension activities, which includes agents at the county level and specialists at the state/regional level. In real terms there has been some slippage in the level of federal funding for agricultural research, with an increased proportion coming from state and private sources.

Canada. Education, including extension, is a responsibility of provincial governments in Canada. The federal government conducts and commissions about twice as much agri-food research as the provinces, some of it through universities. Consequently, there is a jurisdictional gap between much of the research conducted and educational/extension activities. This situation is partly addressed by federal-provincial agreements and other institutional arrangements but it remains a weakness of Canadian agri-food research and extension. Further, agricultural research, education and extension in Canada do not receive the priority that they do in the United States, and there has not been federal support like the land grant system in the United States. There are few, if any, extension positions in universities in Canada. Federal and provincial support in real terms for research at universities has declined substantially over the past decade, and since 1995 federally sponsored research must be matched by private funds (the Matching Investment Initiatives program).

The federal government has a network of agricultural experimental stations across the country that conduct basic, applied and some development research, targeted at regional commodities and practices. These research stations are the source of many of the innovations in crop and livestock genetics and practices, and they undoubtedly have some 'demonstration' impact for production technology. Provincial governments have a limited role in experimental research. Partnerships between federal research entities and the private sector are promoted by federal/provincial research and development policy. Federal research entities, in some circumstances, now compete for public and private research funds. Klein's paper earlier in this publication provides more

detail on the status of agricultural research in Canada. Another summary (Agri-food Research and Technology Transfer Capacity in Canada, 1998) indicated:

- total research expenditures were C$679 million in 1996, compared with C$560 million in 1991;
- total technological transfer expenditures were C$186 million in 1996 compared with C$190 million in 1991;
- total research and development spending was C$883 million in 1996 of which 35 percent was by the federal government, 24 percent by universities, 22 percent by the private sector, and 19 percent by the provinces;
- universities are the largest research force and remain constant in strength. However, AAFC support has declined but partnering maintains research capability;
- provincial research activity has declined in Ontario and Quebec but increased in the other provinces, especially Alberta; and
- research and technology transfer activities have moved toward enhancing "sector competitiveness".

Mexico. Agricultural research in Mexico has been provided and facilitated mainly by the federal government through the Ministry of Agriculture. Currently, the official organization to carry out agricultural research is the National Institute of Agricultural, Livestock and Forestry Research (INIFAP). This institute works through its own network of experiment stations and, until the last administration, used to depend almost solely on appropriations from the federal government. During the Zedillo administration, following a federalization trend and pressed by shrinking budgets, a new scheme of agricultural research was implemented by incorporating producers into the formula through the state-based PRODUCE Foundations (SAGAR, 1995). These producer-driven foundations consolidate and administer funds from the federal and state sources, as well as some producers' contributions. The objective is to support applied research, which is focused on and directed by producers achieving an automatic extension purpose. This effort has produced uneven results due to its nature and management by different and diverse local administrators across the Mexican states.

The agricultural development plan includes extension and training in agriculture, preferably directed toward small producers. However, there is not a specific agricultural extension organization other than isolated government programs (SINDER, PEAT, GGAVATT, etc). Similarly, there is no coordinated research-extension system so that there is no domestic parallel to the U.S. land grant system. As a result, few state universities have a solid funding base for a continuous research effort, and their involvement in extension has been non-existent. With the new producer-oriented research scheme, state universities are playing a more important role in local research while participating in the modest competitive research grants established by the local Produce Foundations. This approach should lead to more producer-oriented results that facilitate technology transfer.

INIFAP continues supporting mid-level basic agricultural research through a handful of discipline-oriented research centers. International research institutes, such as the International Center for Improvement of Maize and Wheat (CIMMYT), have made important contributions to agricultural research in their commodity areas.

Economic Information

United States. Domestically, cooperative federal-state programs provide monthly forecasts/estimates of crop production throughout the cropping season, targeting accuracy within 2 percent. These programs also provide estimates of inventories of livestock and poultry, placements, and slaughter of all livestock and poultry. Milk production estimates are aided by mandatory reporting through the federal order system. Many fruit and vegetable orders provide flow to market information on a mandatory basis. Price reporting for central spot and futures markets is extensive, although local market reporting is less impressive. Likewise, there has been historic controversy associated with the reporting of meat and poultry prices. There is no reporting of increasingly important contract production prices.

Internationally, USDA maintains an extensive market intelligence network, the core of which is the agriculture counselors located in the major agricultural producing, exporting and importing countries throughout the world.

Mandatory reporting of export sales of grain was instituted following large purchases by centrally planned economies in the 1970s.

A Task Force of the American Agricultural Economics Association (AAEA) indicated two basic weaknesses in much of the economic reporting in agriculture (Commodity Costs and Revenue Estimation Handbook, 1993):

- differing definitions, measurement, and reporting of the same phenomena. A central purpose of the Task Force was to provide a Handbook which information compilers and reporters could use to reduce this problem; and
- cash versus forward and contracted pricing of inputs and commodities was identified as a central concern.

Canada. A combination of federal and provincial agencies report agricultural information. Agriculture and Agri-Food Canada (AAFC), Statistics Canada (Agriculture Division), the Canadian Grain Commission (CGC), and Canadian Dairy Commission (CDC) are the primary federal agencies that provide historical and current data. Official outlook information is a scarce commodity in Canada with periodic, limited releases from AAFC (mainly near term forecasts), and limited annual outlook meetings in some provinces. What outlook analysis is done now appears to be more a policy/public administrative tool than a contribution to private decision-making. The Canadian Wheat Board (CWB) appears to be the most significant analyst of international conditions, however, this function relates directly to the Board's role in wheat/barley sales. Statistics Canada (Census of Agriculture) and AAFC analyses of taxfiler data are available for broad performance assessments of the sector. Much of the information in Canada is now available only on a cost-recovery basis, also a 1990s development.

The absence of information on current selling prices of CWB grains, hog prices in some provinces, the increase of forward contracting in grains, oilseeds, hogs and cattle, and lack of sound, publicly available outlook information represent significant deficiencies in availability of agricultural market information in Canada.

Mexico. Production information (yields and total production) became more prevalent in the agricultural sector in Mexico throughout the Zedillo administration. At farm level, there is an effort by FIRA (the agricultural arm of the Bank of Mexico) in collecting cost of production data from its clients in the main producing areas. This effort is carried out mainly for the staple or basic crops (FIRA, 2001). After the elimination of CONASUPO, marketing mechanisms were locally implemented by the agricultural development program through the ASERCA program to allow improved collection of marketing data (SAGAR, 2000). ASERCA is intended to provide economic information on:

- futures markets for the main agricultural commodities;
- domestic prices for wheat, corn, sorghum and soybeans;
- hedging costs for wheat, corn, sorghum, soybeans, cotton, and orange juice;
- transportation costs;
- international market price for fruits, vegetables, livestock and cut flowers;
- weather conditions; and
- other market news.

Although there is no mandatory price-reporting program, implementation of a complete marketing information system would provide more accurate and reliable information for producers' decision-making process. Available economic and production information does not reflect any trends or future projections of the economic and financial behavior of the agricultural activities. As in Canada, there is a lack of outlook information which would facilitate producer decision-making and support agricultural policy analysis.

Grades and Standards

United States. The United States has an extensive grade standard system that, except for beef, is largely designed to facilitate trade at the farmer, wholesale and international market levels. Beef grades are the only ones that are legitimately consumer-oriented. Grain grades have been subject to substantial criticism because they do not consider protein content and are based largely on inert material and damaged grain. Fruit and vegetable grades are largely based on external appearance as opposed to their internal quality.

Canada. There is no grade equivalency in beef grades between the United States and Canada, although Canadian grades have moved toward those of the United States in recent years. There are even greater differences between grades and standards on Canadian and U.S. grains, especially wheat and barley. These differences reflect Canadian rules on crop diseases and purity requirements (kernel bunt and other diseases, admixtures of other wheat and grain), kernel visual distinguishability (kvd) and licencing requirements, all of which have the effect of restricting potential movement of grains from the United States into Canada. The Canada Seeds Act (CSA), the Canadian Grain Commission (CGC) and the Canadian Food Inspection Agency (CFIA) are the authorities under which grain imports into Canada are regulated and inspected. They also significantly influence the nature of exports, and many domestic production and marketing practices. The rationale for the regulation, initiated in the early 1920s, is to differentiate Canadian wheat (and other grains) in export. There are stringent grade standards with strict licensing of varieties (kvd), and rules to prevent mixing of grain[2], and spread of disease which are used to protect the integrity of Canadian grains. One result of this regulation is a very high cost marketing system in Canada. Another result is that reciprocal access does not exist for Canadian and U.S. wheat and barley (US/Canada Joint Commission on Grains, 1995).

Mexico. The government of Mexico has been responsible for setting product standards, labeling and certification policy although the private sector has had input into the development and implementation of these standards. Mexico revised and upgraded its Federal Law on Metrology and Standardization in 1997. In general, Mexican standards are based upon, and follow, general international standards. In fact after signing the NAFTA agreement, some Mexican standards have incorporated U.S. and Canadian standards when there was disagreement with international benchmarks (USDS, 1999). In adopting international agricultural standards, the State of Sonora (immediately south of

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[2] A recent example illustrates this point. A fusarium resistant wheat variety was developed by AAFC scientists at the Winnipeg research station. It could have replaced conventional wheat and barley, subject to serious fusarium damage in the south east region of the prairies, especially for hog feed providing a major economic benefit. The variety was refused licencing in 2000 because it was not visually distinguishable from HRS samples.

the Arizona border) is probably the most advanced in establishing a beef grading system similar to the one used in the United States.

A debated issue on Mexican grades and standards is that only Mexican producers or importers are eligible to obtain a NOM certificate (the official certification that a certain product complies with a specific standard), which prevents any foreign entity from obtaining the same level of certification for its exported goods. The Secretariat of Commerce has initiated a process to revise the existent certifications and standards policy in order to make the official certification accessible to partners in other countries with which Mexico holds trade agreements (USDS, 1999).

Trade Policy

United States. There are five basic dimensions to U.S. trade policy that are not necessarily internally consistent:

- the United States provided leadership for the establishment of the General Agreement on Tariffs and Trade (GATT) and the World Trade Organization (WTO) and the goal of moving in the direction of freer trade;
- the United States maintains two programs having the effect of curbing imports under specific circumstances. The International Trade Commission (ITC) under the auspices of the Trade Act of 1974 provides "temporary protection for import sensitive industries" including the levying of countervailing duties (CV). This Act also prohibits unfair trade practices such as dumping with the demonstration of injury to the affected industry, in which case the President may limit imports;

In 1998/99, a U.S. cattleman's association (R-CALF) initiated an anti-dumping (AD) action through ITC against Mexico, and AD and CV actions against Canadian live cattle exports (Loyns et al., 2001). These were serious and expensive applications of TRL. The existence of these actions did not fit either the level of market integration that has been achieved in cattle/
beef under NAFTA or the economic evidence presented by R-CALF to support the allegations. In addition, there have been eight separate actions against the Canadian Wheat Board since 1988. On the basis of the use of these powers over many years, Stiglitz (1997) concluded that misuse of TRL enables counterpro-

ductive harassment, rent seeking, and protection of domestic producers by limiting trade;

- of lesser importance is the Agricultural Marketing Agreements Act, which allows application of the same grade, size, maturity and quality requirements for imported fruits and vegetables covered by marketing orders as for domestic products under the so-called golden rule of marketing orders;
- imports of dairy products and sugar are severely restricted by tariff rate quotas for the purpose of protecting the operation of price support programs.

While the 1996 Farm Bill would have eliminated the dairy price support program in 1999, this provision was subsequently rescinded. The sugar program is mired in controversy with the Commodity Credit Corporation (CCC) acquiring stocks that cannot be readily stored under a program traditionally touted as having no government cost. With high U.S. sugar price supports, candy imports from Canada, and the threat of sugar imports from Mexico, have been a persistent irritant, caused by the sugar program; and

- the United States has a number of programs designed to promote and expand exports.

The most robust of these is the Export Enhancement Program (EEP) and the Dairy Export Incentive Program (DEIP), which provide export subsidies to protect market shares in traditional U.S. markets targeted by other exporting countries. Mexico has been a primary beneficiary of the DEIP program. These programs, which run counter to the principles of free trade, have been limited by WTO both in terms of amount of subsidies and quantities exported. U.S. food aid programs under P.L. 480, established after World War II, and the Food for Peace program are designed primarily as a humanitarian food aid program. However, P.L. 480 sales at concessionary prices and repayment terms frequently are criticized for being subsidized exports that undermine the competitive position of other countries. USDA's Commodity Credit Corporation provides export credit to potential country buyers of agricultural products both directly on a short-term (six month to three year) basis and guaranteed for longer time periods. USDA also operates a number of market development, education and promotion programs through its embassies and consulates. Producer and agribusiness organizations generally are cooperators in these programs with the costs being shared.

Canada. Before NAFTA, Canada protected its fruit, vegetable, wine production, and associated processing sectors. These sectors that were opened to freer trade have fared very well (Sporleder and Martin, 1998). The field crops sector (grains, oilseeds and 'special crops' in Canadian parlance) has been open except for the large component (about sixty percent of all Canadian field crop production) represented by wheat and barley controlled by a federal marketing board, the CWB[3]. There is a provincial producer wheat marketing board with restrictive selling powers in Ontario, but it is gradually deregulating from within. Prior to NAFTA, processors using board regulated grains enjoyed significant protection but most of that protection has been eliminated. The cattle/hog/meat industries have always been relatively open except for health standards.

Supply management in Canada operates what are fundamentally self-sufficiency, cost-of-production pricing schemes with mandated trade levels and high domestic prices for milk and poultry products. As a result, imports of milk, poultry and their products are severely limited (but at the same time assured) by tariff rate quotas. In sugar, Canada for decades has welcomed raw sugar at world prices into a highly concentrated processing sector. Canada's trade remedy law, the Special Import Measures Act (SIMA) is administered by Canada Customs and Revenue Agency, and the Canadian International Trade Tribunal. The legal framework is very similar to that in the United States but it does not have the Presidential intervention counterpart (section 301), and it appears to be applied much less aggressively in the agri-food industry. Finally, except for supply management, the federal government and most provinces have reduced support to agriculture, particularly on programs that may be trade distorting, since NAFTA was implemented.

Identifying a trade negotiating position out of this melange could be difficult. The policy position historically put forward in world trade negotiations is the so-called "balanced approach." In effect this position means low

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[3] The Canadian Wheat Board does not control imports and is not, a priori, a form of subsidization as so many U.S. critics are prone to argue. Prairie grain farmers who deliver Board grains finance its operation and in terms of trade with the United States, if any trade limitations occur, they are almost certain to reduce exports to the United States. (Loyns and Kraut, 1995; Loyns, Knutson and Ochoa, 2000).

protection and low support for all but the supply-managed sectors for which high protection is provided today in the form of multi-stage tariff rate quotas. The position, enhanced by extremely strong rent-seeking activity and national unity considerations, has been justified on the basis that supply management is allowed by WTO, and on the argument that these sectors do not contribute to agricultural surpluses or trade. This position appears to reflect current trade policy.

Mexico. The federal administration directs programs to support and enhance exports. These programs are carried out directly by the Ministry of Agriculture or jointly with BANCOMEXT, an export supporting and development bank (Claridades Agropecuarias, 2000). The components of these programs in 1999 included:

- an export support and enhancement program for fruits and vegetables;
- providing advice and awareness of exportable opportunities for fruits and vegetables;
- promotion at international events; and
- agricultural and commercial sector linkage programs for buyers and sellers of products and services for the agricultural sector.

In 1993, legislation eliminated most non-tariff trade regulations and established trade remedy laws to face unfair trading practices, such as export subsidies and dumping. Together with the elimination of import licenses, the Mexican Customs Service was also automated and modernized to eliminate inconsistencies at different border crossing points in an effort to expedite trade (USDS, 1999).

Since 1992, Mexico has actively pursued the development of trade agreements with a number of countries. The expected benefits of these trade agreements include (Topicos Empresariales, 2000):

- to gain preferential access to the most important world markets through the gradual elimination of tariffs;
- to simplify imports and exports procedures;
- to increase the availability of high-quality inputs and raw materials at better prices in order to increase the competitiveness of products manufactured in Mexico;
- to increase job availability in Mexico; and
- to promote the transfer of leading-edge technology and strategic alliances.

In this commercial expansion effort, trade agreements have been established with Chile (January 1992), Canada and the United States (January 1994), Venezuela and Columbia (January 1995), Costa Rica (January 1995), Bolivia (January 1995), Nicaragua (June 1998), European Union (July 2000), Israel (July 2000), and Honduras, El Salvador, and Nicaragua (January 2001). Currently, Mexico is negotiating trade agreements with the Mercosur bloc (Argentina, Paraguay, and Brazil) in South America and Singapore in Asia. The trade agreement for a European Free Trade Area (EFTA), negotiated and authorized last November, is pending certification and final authorization by the Mexican Senate and the legislative bodies of the EFTA countries.

In its initial days, the new Fox administration has shown an even greater commercial expansion and open markets approach. During his campaign and after his election, President Fox proposed very ambitious social and commercial integration to the NAFTA countries. He also proposed a common development and commercial bloc extending from Central Mexico to the whole Central America region in his PPP (Puebla to Panama Plan) program.

Infrastructure Policy

United States. Roads have historically been a shared federal, state, local responsibility. The interstate highway system, initiated in the 1950s, provides an efficient system for transporting agricultural products by trucks to Canada and Mexico. However, restrictions on Mexican trucks and drivers entering the United States constitute an antagonistic barrier to trade (Harrison, 2000; Prentice and Wilson, 1998; Prentice et al., 2000).

The delivery of utilities to farms has been facilitated by rural electric cooperatives that were established with highly subsidized credit. Likewise, the federal and state governments have been involved in a series of large water projects that have provided electricity, irrigation water and fertilizer at highly subsidized prices. Of particular note is the western states water and irrigation projects as well as those of the Tennessee Valley Authority (TVA) in the southeast. However, increased competition for urban uses has resulted in more competitive pricing of these important agricultural inputs.

Canada. The two national railways in Canada are, today, fully privatized subject to limited regulation except in the grains area (Prentice et al., 1998). Subsidized freight of export grain was removed in 1995, but much of the regulation related to CWB operation and the Canadian quality system persists in grain transportation. Highways in Canada are provincial responsibilities. Federal involvement in highways is limited to transfer grants in some provinces, and limited contributions to the Trans-Canada highway, a continuous highway from sea-to-sea. There has not been a federal presence in highways in Canada like that in the United States, which produced and maintains the Interstate Highway system. With the exception of the United States/Canada jointly funded Seaway System (of declining importance to trade for both countries), waterways in Canada are of significance only in the case of the Great Lakes. Similarly, publicly supported irrigated land in Canada is found only in southern Alberta and a small amount in Saskatchewan. Pockets of irrigated production exist across the country because of the ready availability of water in Canada but they are components of individual farmer production systems and usually receive no direct public support. Overall, irrigation is a very small factor in Canadian agricultural and food production affecting mostly some grain and livestock production in southern Alberta.

Telephones and electric power were originally developed in many provinces as public utilities, and elsewhere as regulated private monopolies. For much of their life, these utilities practiced urban-rural, business-private, and long distance-local cross subsidization in rates and service. Some of that remains but most of these utilities have now been privatized and operate on commercial principles.

Mexico. The transportation infrastructure in Mexico is outdated. Both road and rail transportation systems in Mexico present the characteristics of century-old systems. The railroad was an important source of transportation until the rapid growth of the trucking systems, starting in the 1950s. Since then, the importance of the railroad system has been left to handling the cargo that cannot be moved by trucks, such as U.S. grain imports. These systems have been overloaded with the expanded trade resulting from the NAFTA agreement (Link and Zahniser, 1999; Harrison, 2000; Prentice et al., 2000). During the last two administrations, Mexico has made major efforts to upgrade the

transportation infrastructure, through building and improvement of the highway systems and through privatizing the government-operated railroad system. Also, expanding and upgrading seaports has been a priority, under the expectation of expanded ocean trade with NAFTA countries and the European Community (Link and Zahniser, 1999; USDA/ERS, 2001).

For NAFTA trade, specific problems are the bottlenecks created at the U.S./Mexico border on both the railroad and highway systems. The railroad system faces logistics and equipment challenges. Potential economic savings with the increased southbound grain trade will not be fully realized until more cargo is shipped back north to avoid the cost of moving empty cars. On the other hand, containerized cargo handling should make the transportation of agricultural commodities more efficient and economical (Prentice et al., 2000).

Modifying and updating the whole country's railroad infrastructure will take a great effort in terms of time and financial resources. Following the privatization of the Mexican railroad system, private investment should help the upgrading process of this transportation system. Truck transportation is affected by differences on weight and length regulations between the United States and Mexico and by the reciprocal bans of trucks on both sides of the U.S./Mexico border, justified by claimed excessive road deterioration and safety issues. Other issues creating border bottlenecks and transportation backlogs are the short-haul or drayage requirements for moving trucks across the border and the inadequate facilities to handle drug and INS inspections. A major trade irritant has been the U.S. unilateral postponement of the NAFTA agreement, allowing free transit of Mexican trucks in the U.S. territory (Harrison, 2000).

There are opportunities to lower transaction and administration costs by expediting border crossing. Changes to expedite current border traffic and to accommodate future growth suggested by Harrison (2000) and USDA/ERS (2001a) include: expansion of crossing facilities, expansion of personnel and working hours, application of new cargo-checking technologies, automation of import/export paperwork, and the creation of free trade/buffer zones into the countries, as far North as San Antonio and as far South as Monterrey and Chihuahua City.

REGULATORY POLICIES

Competition/Antitrust Policy

United States. Farmers have played an important role in fostering U.S. government antitrust intervention from its implementation over 100 years ago (Knutson, 1983). Then the major concern was the market power of railroads. Subsequently concerns arose over the market power of milk processors and meat packers, the latter resulting in the enactment of the Packers and Stockyards Act administered by the USDA. In addition to restrictions on monopoly and monopolistic practices provided by the Sherman Antitrust Act, the Clayton Act placed tight restrictions on mergers, and the Robinson-Patman Act placed restrictions on price discrimination among competitors. In the 1980s, merger and price discrimination concerns gave way to a primary emphasis on price fixing and overt use of monopolistic market power. Recent concerns revolve primarily around the market power of meat packers, food retailers, seed/biotechnology companies, and multinational grain companies. Particular concern has arisen over the amount of control exercised by market integrators over producers.

There are serious questions about how much has been achieved by U.S. antitrust policy. In the food industry, this concern arises from the apparent inability of antitrust policies to deal with the development of concentrated-integrated structures that are common in the industrial sector of the U.S. economy. This stems, in part, from the reality that antitrust policy deals primarily with market conduct and has little direct authority to deal with structure.

Canada. The Competition Act is the basis of competition policy in Canada (Robertson et al., 1997). Historically there has not been much analytical strength in the Competition Bureau in relation to the food industry and less in agriculture reflecting government attitudes toward competition issues. For example, all marketing boards in Canada are excluded from competition policy except for 'intervention status' in public hearings. Most of the Bureau's recent activity in agri-food has been in relation to mergers and acquisitions but the overall impact is likely small. Neither has there been much academic interest nor research output on competition in Canada's food industry.

There is a cross-border impact of U.S. antitrust action which is worth noting. Two years ago when the Case-IHC and Ford NewHolland merger was under investigation in the United States, large-tractor production was identified as a competition bottleneck. There were only three large- tractor manufacturers in the western world, and annual sales are in the low thousands of units in good years. The Ford NewHolland tractor plant was the original Versatile plant in Winnipeg, Manitoba. The FTC imposed takeover requirements which included selling off the plant. A local entrepreneur purchased the plant, ostensibly to provide competition for Case-IH (Fargo N.D.) and John Deere (Iowa). A protracted labor-management dispute has severely altered the viability of the plant and virtually removed the competition potential created by the FTC.

Mexico. The widespread Mexican privatization movement that followed the signing of NAFTA made it necessary to establish a regulatory agency to prevent monopolistic and other trade-distorting practices among the many firms that resulted from the process. Mexico introduced legislation to improve competition conditions in 1993. The Mexican Federal Competition Commission (Comision Federal de Competencia-CFC) was created by this legislation in an effort to promote fair competition by limiting monopolistic behavior and to restrict unfair trading practices (CFC, 1998; USDS, 1999). Since its inception, Mexico's CFC has researched and handled approximately 500 cases per year. One of the most important steps taken during the time of operation has been the issuing in 1998 of the Code of Regulations which allows the implementation and application of the Federal Law on Economic Competition (CFC, 1998).

Intellectual Property Rights

United States. The United States was one of the first countries to extend patent rights to new life forms. Prior to this policy change, much of the plant and animal technological improvement was the result of land grant university genetic breeding research that was made available to the private sector without cost for development and introduction. While seed producers and seed companies captured rents, the fact that the genetic stock was freely available resulted in low barriers to entry and a large number of competitors with relatively little market power.

The conference of property rights to new life firms substantially changed these relationships. Both private firms and universities immediately began to patent the results of their genetic research. Contractual research agreements were signed giving private firms proprietary rights to the results of university research that they financed. Seed companies became the target of buyouts and mergers leading to a rapid consolidation of market power within the industry. As the pace of technological change accelerated, vertical contractual relationships between producers and seed companies increased in importance. These structural changes and the resulting redistributions of rents were unanticipated by policy makers. Only recently have serious questions arisen about the monopolistic effects of these policy changes. However, it is generally assumed that the pace of technological change will be sufficiently rapid that innovation will dissipate monopolistic rents.

Canada. Canada has been an outsider on the development and application of IPR for decades. Canada has historically been backward in R&D, dependent upon foreign parent companies for innovation. This approach to R&D had its drawbacks but it did save public money and provided for reasonable technological progress because of heavy foreign ownership. The Canadian patent system for years had "compulsory licensing," which allowed domestic manufacturers to "work" patents in Canada if the patent holder was not producing the product in Canada. That was a primary reason for lower cost pharmaceuticals in Canada for many years. Canada's IPR legislation was changed with CUSTA, but still 'lags behind' developments in the United States. For example, Canada passed its first Plant Breeders Rights legislation in 1991; there is no definitive policy on patenting life forms, and policy and rules on application of genetically modified (GMO) materials and testing are far from clear.

A recent court decision, similar to the Harvard mouse case a decade ago in the United States, appears to allow life form patenting, but policy and regulations are not clearly defined. In the grains sector, genetically modified canola has been accepted (promoted) and is produced in significant volume with no rules beyond variety registration; and it is widely used commercially and exported. On the other hand, as efforts to distribute genetically modified wheat become a reality, there appears to be considerable system resistance. In

neither case is there science or agri-food policy to assess which way to go. There are no labeling requirements in Canada for GMO products.

Mexico. Trade-Related Aspects of Intellectual Property Rights (TRIPs) is an advanced and comprehensive IPR agreement from WTO that supplements the basic World Intellectual Property Organization (WIPO). The implementation of the policy guidelines has become a challenge for developing countries, requiring enabling legislation in new areas, such as biotechnology and origin specification (IATP, 2001a). Mexico is a member of the main international organizations that regulate the protection of IPRs including WIPO, the Paris Convention for the Protection of Industrial Property, and the International Convention for the Protection of New Varieties of Plants (USDS, 1999). Mexico also adopted a regional standard based on the North-American style IPR legislation because of its linkage to NAFTA. Upon signing the NAFTA agreement, the Mexican Government changed its patent law allowing patenting plant varieties to provide plant, animal, and micro-organism protection. This policy prohibits patents on biological processes for production, reproduction, and propagation of plants and animals (IATP, 2001b).

Even under strong controversy over the use of transgenic corn, research institutions in Mexico, such as INIFAP, Center for Research and Advance Studies (CINVESTAV), and CIMMYT are carrying out biotechnology research. This research is focused on improving plant and animal productivity in an effort to enhance producer competitiveness. However, the use of transgenic seeds and other GMOs do not seem to benefit the small producer whose production system is based on the use of native germplasm that can be used year after year.

Another controversial issue has been the use of transgenic corn for human nutrition. However, reports show that up to 34 percent of the tomatoes produced in the country are transgenic. There are some indications that both corn and soybeans in the market may contain a large amount of GM material and that as much as 100,000 hectares may have been planted with transgenic cotton, soybeans and tomato (Carlsen, 2001). Under these findings, issues such as biodiversity preservation, food security, public health, and international trade will tend to heat the political environment even more.

Plant and Animal Protection, Public Health and Food Safety

United States. The United States has extensive regulations of imports of live plants and animals that are designed, primarily to protect against the spread of pests and diseases that have the potential for jeopardizing production. Within NAFTA, the main concerns have existed with respect to the spread of pests and diseases in fruits, vegetables and livestock from Mexico.

One of the major disease and pest concerns has been protecting livestock herds from the threat of diseases such as bovine tuberculosis, brucellosis, and hoof and mouth disease. The incidence of diseases like these is a serious threat to the U.S. livestock industry, as recent outbreaks of disease in Europe demonstrate. For example, in 2000, five U.S. beef herds were under quarantine for brucellosis (McLeod, 2000). Since 1985 numerous tuberculosis cases have been confirmed in dairy herds (3,000 to 10,000 cows per herd) in the El Paso milkshed. The Texas Animal Health Commission reports testing more than a million animals and the elimination of more than 2,000 head of cattle. Many of these positives come from the El Paso area (McLeod, 2000). In 2000, an outbreak of bovine tuberculosis in U.S. dairies near El Paso has resulted in a U.S. government mandate for the depopulation of herds at an estimated cost of $42 million (USDA/APHIS, 2000). Bovine tuberculosis is known to exist in Mexico, Texas, and Michigan. U.S. livestock herds were scheduled to be declared free of bovine tuberculosis in 2003 (USAHA, 1999). U.S. authorities continue to concentrate their eradication efforts in farmed cervidae and wildlife populations.

The U.S. tuberculosis eradication programs was established in 1907 (Essey and Koller, 1994). This surveillance program was based on skin testing surveillance procedures, herd depopulation, and the provision of indemnity for owners of animals destroyed. During the first 50 years of the program, the incidence of tuberculosis decreased from 5 percent to less than 0.3 percent. At this level of incidence, the skin test-based surveillance programs are of limited effectiveness (Bleem et al, 1993). After the 1960s, the eradication programs turned their emphasis to slaughter surveillance and backgrounding of positive individuals. Despite these efforts cases such as those in Michigan and Texas from time-to-time erupt. The main deterrents to tuberculosis eradication in the United States have been the cost of indemnity and the incidence of this disease

among wildlife and zoo species (Bleem et al, 1993; Essey and Koller, 1994; Walker, 1996).

Following the Jack in the Box *E. coli* hamburger contamination incident in 1992 and several subsequent incidents, since 1996 HACCP procedures have been required for all meat and poultry packing and processing operations (Knutson et al., 1998). Comparable procedures are now being considered for fresh fruit and vegetable packing operations. While the inevitability of HACCP for processed products have existed for a long time and now appears to be generally accepted for fresh products, the issues of traceback to the farm level and the use of irradiation are much more controversial. Irradiation encounters the same set of issues as GMOs in that there are both phytosanitary and labeling concerns that potentially impede free trade, although these concerns appear to be greater outside NAFTA than within.

Canada. The Canada Food Inspection Agency (CFIA) was created in 1997 to combine the activities of four departments and many regulatory functions as Canada's federal food safety, animal health and plant protection enforcement agency. CFIA is responsible for border inspections for foreign pests and diseases. CFIA promotes the implementation of HACCP certification for most forms of food processing in Canada, and reasonable progress is being made in that objective. It is claimed that the Agency allows Canada to meet its commitments to science-based trade regulation. Some, if not most, of the Agency's activities are self-financed.

Some plant diseases are quality factors in the grain grading system. The Canadian Grain Commission and CFIA are involved in monitoring, testing and enforcing these disease standards. Other plant diseases are monitored by CFIA alone. Livestock diseases are also the responsibility of CFIA. Canada was declared free of bovine brucellosis in 1985, and is near complete eradication of bovine tuberculosis in cattle and farmed bison (CFIA-ACIA, 1999). Brucellosis and blue-tongue risks have been used by Canada to keep feeder cattle out of Canada for several years but a new program, initially known as the Northwest Pilot Project, has allowed feeder cattle from specific western U.S. states into western provinces since 1998. Hogs are allowed into Canada only from pseudo-rabies free states.

Wild game breeder stock, mainly buffalo and elk, are usually sourced in the United States and are also subjected to CFIA health testing. Discovery of a BET (the elk form of mad cow disease) positive animal in an elk herd in Saskatchewan in early 2001 lead to slaughter of the herd and animals that had been sold outside the herd. There is an ongoing case of a water buffalo herd on Vancouver Island that will either be sent back to Denmark or slaughtered due to the same risk. On balance, Canadian animal health standards have a small effect on imports of U.S. animals and a larger impact on European sourced animals. HACCP procedures are at a reasonably advanced state in cattle and meat and poultry processing, and initiatives are underway to develop traceback procedures in grains and oilseeds.

Mexico. Both brucellosis and bovine tuberculosis exist in Mexico. There have been a few cases of bovine tuberculosis positives among slaughter cattle that have been traced to imports from Mexico. This has led to some proposals for banning importation of Mexican steers by the United States. However, there is no evidence suggesting that Mexican cattle have played a substantial role in transmitting this disease to the U.S. domestic cattle (Bleem et al, 1993; Essey and Koller, 1994; USAHA, 1999). Mexico instituted a national bovine tuberculosis eradication program in 1993, which included veterinary training, surveillance and skin testing. Currently the Northern States of Mexico (along the Mexico/U.S. border) and a few other states in the Central and Southeast part of the country have achieved significant levels of eradication.

Fish-processing is the only activity that is currently required to operate under HACCP standards and regulations in Mexico. The livestock and crop subsectors are in the process of implementing Best Management Practices (BMPs) programs in their pre-harvest operations. However, more pressure on these sectors to adopt HACCP standards will result as Mexico's trade increases within NAFTA.

Conservation of Natural Resources and Management of the Environment

United States. Under the Clean Water Act, the U.S. manufacturing/processing sectors (including food processing) have been under a zero or near zero water pollution discharge policy since 1972 (Knutson et al., 1998). The

effect of this requirement is to internalize the cost of externalities. Recently announced Environmental Protection Agency (EPA) regulations have much the same effect for control of animal wastes from confined animal feeding operations. Crop and range agriculture have received a reprieve in that they are treated as "nonpoint" sources of pollution. Crop and range agriculture are facing increasingly severe constraints on the use of pesticides. There is intent expressed by EPA to eliminate the use of all inorganic chemicals in crop production, most of which fall into the category of organophosphates and carbamates. Generally, these chemicals are farmers' most effective means of controlling the major pests in crop production.

Population pressures have reduced the availability of water to agriculture from major rivers and water projects, particularly in the West and Southwest. In an increasing number of cases, farmers have sold all or a portion of their water rights to cities and development projects. While water rights have traditionally been a state policy issue, it is easy to see the federal government becoming more involved in the establishment of water policy, an issue that should be anticipated by NAFTA.

Canada. The federal government has three recent legislative instruments which are designed to conserve environmental resources and minimize public health risks caused by environmental degradation and pollution. The Canadian Environmental Assessment Act was implemented in 1995; within AAFC, the Environment Bureau has responsibility for coordinating with the overall agency in charge. The Canadian Environmental Protection Act (2000) emphasizes pollution prevention and sustainable development. A Species-At-Risk Act is expected to be passed in 2001 to protect and maintain species deemed to be at risk.

Much of the agricultural environmental regulations on animal waste, use and transport of hazardous products and waste disposal are provincial jurisdiction. Local governments often have jurisdiction over site requirements including location. As intensive agriculture increases in importance, these jurisdictional issues take on increased significance, and conflicts among local and provincial or interest group goals become issues in economic development. Similarly, regulations are not consistent across provinces. Quebec ap-

pears to have been an early, and probably the most stringent in regulating environmental aspects of agriculture.

Mexico. During the last administration, the Secretariat of Environment, Natural Resources and Fisheries (SEMARNAP) managed the issues of environmental and natural resources. The focus of this secretariat was set on preservation of natural resources and wilderness. Major achievements were the growth in budget (approximately 14 times in real terms from 1995 to 2000) and the growth in national protected areas, from 10 to 14 million hectares in the same period. (SEMARNAP, 2000). Although there has been some enforcement of environmental laws through this administration, a more voluntary approach was followed by programs such as Conservation and Regional Sustainability where soil management was involved. Water quality, utilization and conservation programs were administered from this agency through the National Water Commission (CNA). Again, monitoring and awareness development of water utilization and quality was more prevalent than enforcement of environmental laws.

The functions of the federal administration have been shifted and changed with the recent political changes in Mexico. The Fox administration has moved fisheries to the new Secretariat of Agriculture, Rural Development, Fisheries and Nutrition (SAGARPA, formerly SAGAR). According to an announcement by the Fox administration, a large reduction in personnel is planned for the National Water Commission. The role of implementation, surveillance, and compliance on new and existing environmental programs is still uncertain.

A multi-ministerial commission, Intersecretariat Commission for Registration, Control and Use of Pesticides and Toxic Substances (CICOPLAFEST), is in charge of registration, control, transportation, and management of pesticides and other toxic agricultural inputs. The commission involves the ministries of agriculture, commerce, environment, communications, health and labor. However, there is no specific entity that deals with enforcement of the SPS regulations. The private sector, through those companies involved in the marketing of pesticides (Mexican Association of the Phytosanitary Industry - AMIFAC), has joined the government efforts in its promotion and awareness of BMP's. Greater improvements have been achieved in Mexico's SPS regula-

tions and standards since the inception of the NAFTA bloc. Currently, all registered pesticides in Mexico are approved for use in the United States.

MARKET INTERVENTION

Disaster Assistance

United States. Government crop insurance costs averaged $1.4 billion over the period 1995-99 (FCIC, 2000) but some of these costs are not subsidies to farmers. To a degree, crop insurance is a public good that would not be provided in the absence of government support. Moreover, there are issues of distribution of benefits of these expenditures between the insurance providers and the farmers (GAO, 1997). However, to the extent that premiums are not actuarially sound and substantially eliminate producer risk, government assisted crop insurance has price and trade distorting effects like other subsidies. To emphasize this point, the U.S. government also has a history of providing direct disaster assistance to farmers in the event of widespread crop failure, which most frequently occurs in high-risk areas.

Canada. Comprehensive government crop insurance has been in place for Canadian farmers since the early 1960s. Originally this protection was low-end coverage, shared between producers and the Canadian government, with the provinces covering the cost of administration. The crop insurance program remained largely unchanged until 1990 when it was tied to GRIP (the Gross Revenue Insurance Program, a combination of market and production risk coverage) for five years. That connection was terminated by 1996, but some of the federal money from GRIP was used to increase coverage, and decrease producer costs of crop insurance. Today crop insurance is in transition to increased coverage with somewhat more federal and provincial contribution. On the prairies this transition was reflected in producers paying about 28 percent of the total premium in 2000 (Manitoba Crop Insurance Corporation, 2000). The percent of cropped acres insured was 81 percent in Manitoba, 61 percent in Saskatchewan, 49 percent in Alberta, and just over 50 percent in Ontario and Quebec. Hail insurance is available from private firms on a commercial basis or, in some provinces it can be added on to crop insurance.

In response to low grain and crop prices, and severe flooding in southwestern Manitoba/ southeastern Saskatchewan in 1998, the federal government

and some of the provinces instituted the Agricultural Income Disaster Assistance Program (AIDA) in late 1999. The program, funded 60 percent by the federal government and 40 percent by the provinces, targeted farmers who suffered a severe drop in their farm income for reasons beyond their control. The program was not intended to affect capital purchase or production decisions. The total amount of funds paid out for 1998 and 1999 was $1.78 billion. Like most other Canadian disaster programs, AIDA paid out until September 2000 for losses in 1999, suggesting that there would be little or no production response in applicable years. This program has been extended for three years under the name Canadian Farm Income Program (CFIP) with $5.5 billion of federal and provincial support over the three years. These funds are applied across provinces by formula and not by injury. With these and all other public programs, Canadian grain producers receive between 10 and 12 percent of their returns from public sources.

Mexico. Crop and animal production disaster assistance is administered through the government National Agricultural Insurance System (Agroasemex) and other private insurance companies. This insurance works with a wide array of protection mechanisms. Insurance coverage includes life, investment expenses, transportation, livestock and other risk factors. The federal government provides a subsidy by directly paying up to 30 percent of the cost of the insurance premium. For the fiscal year 2000, the working budget for Agroasemex was about 400 million pesos or $US40 million (Diario Oficial, 3/15/2000). Similar to many other government programs, there are limitations on general use of these funds, i.e., provisions exist to apply at least half of the appropriations towards the insurance of basic or staple crops and giving preference to low-income producers.

Use of agricultural insurance has recovered since the 1994-95 financial crisis. The amount of cropland insured has increased from 905 million hectares in 1995 to 1,698 million hectares in 1999. In the livestock subsector, the number of animals insured grew from 847 thousand to 5,168 thousand, during the same period. The total subsidy amount grew from 237 million pesos to an estimated 400 million pesos 2000 (SAGAR/CEA, 2000).

FONDEN is a fund that is designated for national disaster assistance. Although this fund is intended to provide aid to the general population under natural catastrophes, it has provisions for minimal aid to small farmers, defined as less than 20 hectares or less than 25 animals on dryland operations only. This fund is applied in the event of natural catastrophes such as floods, hail, severe drought. Under FONDEN provisions, in the event of a natural catastrophe, the federal government would pay up to 70 percent of the indemnity to affected producers, the rest would be provided by state or local governments (Diario Oficial, 2/29/2000).

Agricultural Credit

United States. The U.S. government has a history of providing credit directly to farmers, but in recent years it has reduced these programs. During the Great Depression, the Farmers Home Administration (FmHA) was established to supply subsidized credit directly to farmers and to serve as a lender-of-last-resort. Today, FmHA is largely a credit-guarantee agency. The U.S. government, as another post-depression program, underwrote the Farm Credit Administration (FCA), and the farm credit cooperative banks that it regulates. While the FCA banks enjoy interest rates that approximate those obtained by the U.S. Treasury, this does not involve a direct outlay from government. Of course, if U.S. agriculture were to again experience the sharp decreases in land prices, as in the early 1980s, there would be substantial outlays in support of both FmHA and FCA.

Canada. Farm credit in Canada rose from C$ 30.3 billion in 1997 to C$ 35.2 billion in 1999 (Statistics Canada, 21-603E). The private sector (banks, credit unions and input suppliers) provides about 73 percent of this amount; the federal Farm Credit Corporation (FCC) and provincial agricultural lending agencies provide about 24 percent, and government guaranteed advance payment programs provide about 2 percent. In 2000, there was an increase of advance payments funding made available to facilitate spring seeding credit needs. Advance payment loans represent a small level of subsidization, far less than their share of overall lending because public support usually applies to only part of the advance payments. All lending policy in Canada (private and public) treats quota value in the supply managed sector as an asset for lending purposes. Consequently, in addition to its market value determined by eco-

nomic rent accruing from regulated prices, quota has asset value for credit purposes, which facilitates quota accumulation. This is one of the deterrents to eliminating supply-management programs.

In general in Canada, the level of public financial contribution to agricultural debt service costs is small, and much of the public contribution is to ensure accessibility of credit to farmers. Except for some limited provincial credit and commodity advance payments schemes, lending is at market rates. FCC and the provincial agencies may have a small borrowing advantage in some instances because they have government backing. However, when the size of Canadian banks is considered, it is an open question as to whether the private or public institutions (excluding credit unions which tend to be small and local) have borrowing advantage. Transfer from the public to private sources to producers may occur on loans that are in trouble or default where debt review agencies have postponed dissolving the specific operation. But this is the small tail of the lending curve, and the cost would most often come out of lender reserves. In Canada, farm credit does not deviate much from the competitive norm even though public institutions are involved.

Mexico. Agricultural credit has been provided by private banks and from the government development banks such as National Bank of Rural Credit (Banrural) and FIRA (a second-tier development bank and the agricultural arm of the Central Bank-Banco de Mexico). Private banks and the agricultural development bank were the main customer-service banks, while FIRA had been supporting the credit lines through discounts and credit guarantee until the financial crisis in Mexico. Since the 1994-95 financial crisis, the level of agricultural credit has been depressed in Mexico. Loan defaults, debt restructuring and refinancing were major problems that plagued most of the Zedillo administration. The severity of the problem has caused a severe reduction in direct investment from the private banks in agriculture. Otherwise even when resources have been available through government development banks, producers are very reluctant to borrow money under the ghost of past crises and under the tight monetary policy kept by the federal government in an effort to control general inflation (Banco de Mexico, 2000a,b).

According to information from Banco de Mexico (2000c), loan defaults for the agricultural sector (including crops, livestock, forestry and fisheries) rose from 5,681 million pesos in January 1994 to as high as 27,593 million pesos in September 1998. Loan default levels have decreased since then to 13,291 million pesos in August 2000. The interest rates for 28 day Treasury Certificates have decreased from 40.99 percent in January 1996 to 15.88 percent in October 2000.

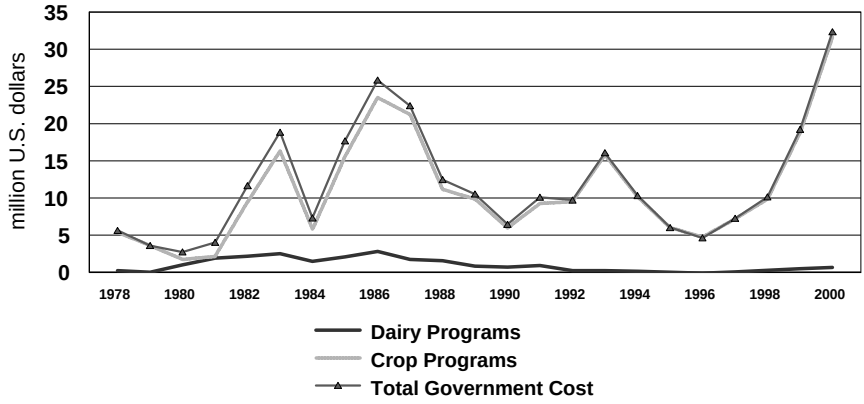
Price Supports and Safety Nets

United States. Figure 1 indicates the level of aggregate farm program subsidies to U.S. farmers from 1978 through to the latest ERS estimate for 2000. At the time of its enactment, the 1996 Farm Bill was viewed by its political proponents as providing a transition of government out of agriculture. It provided for lump-sum decoupled payments that were not tied to price, eliminated set-aside production controls, and gave farmers virtually complete flexibility to produce alternative crops. The 1996 Farm Bill turned out to be neither decoupled nor a transition of government out of agriculture. When implemented the policy was modified to include a combination of lump-sum payments, production flexibility, marketing loan, market loss supplemental payments, disaster payments, price supporting commodity purchases, and Conservation Reserve Program (CRP) payments[4]. In the context of this paper, these subsidies have had three primary economic impacts:

- they have maintained the aggregate level of U.S. farm income at or near the 10-year average of $45.3 billion over the period of 1991 to 2000. In the process, they have helped foster record levels of production of corn and soybeans, which has been a contributing factor to low commodity prices;
- they have maintained the level of production and the volume of exports in the face of a strong U.S. dollar; and

[4] It can be argued that CRP payments should not be included in this set because CRP retires marginal and environmentally sensitive lands. While this is the case, these lands represent direct payments to farmers by the government to keep land out of production, which has much the same effects on variables such as land values as other Farm Bill subsidies.

Figure 1: Cost of U.S. Government Programs, FY 1978-2000 (millions of U.S. Dollars).



Source: Economic Research Service, USDA, Agricultural Outlook, AGO-275 (October 2000) p.49 and back issues.

- their benefits have been capitalized into the price of land, which has increased in both nominal and real terms since 1992 (USDA/ERS, 2000). As a result, both agricultural land prices and rental rates likely are above the levels that can be sustained under current commodity market prices. The effect has been to increase U.S. production costs relative to both Canada and Mexico (Karst, 2001; States, 2001; Stone, 2000).

Canada. Safety net protection has evolved through several stages since 1976. The Western Grain Stabilization Program was replaced by the Gross Revenue Insurance Program (GRIP) in 1991. GRIP was abandoned by 1996 and now only the Net Income Stabilization Account (NISA) and the three year CFIP program (replacement for AIDA discussed above) remain. NISA is an all-farm program whose costs are shared by the federal and provincial governments and producers. NISA is designed to achieve some long term income stability rather than provide traditional farm price support. Producers can deposit up to 3 percent of eligible sales (to a maximum $250,000 of sales) into an individual account, which is matched by the federal government and by participating provinces. Account limits are set at 1.5 times five-year average eligible sales. Withdrawals are triggered by gross margin or family income failing to

meet specified threshold values. Supply-managed production does not qualify for financial support under NISA or AIDA.

The value of NISA accounts nationally at the beginning of 2000 was approximately C$3.0 billion, of which about 50 percent was public money. The limits on NISA accounts are restrictive to large farmers (a good 1500 acre prairie grain farm will sell more than C$250,000 in a good year especially if it has livestock, and grain farms are quickly moving beyond this size). Payments are not tied to commodities unless the operation is a one or two commodity operation, which is very unusual in Canadian agriculture. Finally, like most Canadian stabilization and safety net programs for decades, NISA payouts are not accessible until after probable revenue can be measured; for most production that means even longer after production resources are committed. Consequently, program effects on production are likely highly diluted or non-existent.

There does not appear to be any empirical evidence on the production effects of crop insurance on the prairies, and the AIDA program is too new to have been analyzed. Because of the ex poste nature of AIDA, effects on production are likely small. In the last half of the 1990s, as the PSE's show, farm support in Canada overall, and to the crops sector particularly, have dropped significantly. Excluding supply management, level of public support in Canada is well under fifteen percent of farmer receipts, and less than ten percent of cattle and hog receipts. What remains should have little impact on overall resource allocation or trade. Supply management production maintains much higher levels of support.

Mexico. Immediately following the signing of NAFTA, the Mexican government observed the need to establish income and price stabilization support programs to protect its agricultural sector from the strong competitive forces imposed by the NAFTA trading bloc. These programs were intended to offer an adjustment period for the less competitive sectors in the country. The main subsidy programs used by the Mexican government in agriculture are Procampo and Aserca.

Procampo direct payments are an income support subsidy administered by the department of agriculture, SAGAR. Payments are directed, preferably to small producers, on a cropland utilization basis. Eligible crops for this support are corn, dry beans, wheat, sorghum, safflower, soybeans, cotton and barley, although this program is also applied to some livestock, forestry and conservation activities (Avalos-Sartorio, 1998; Casco, 2001). Because of its nature, Procampo has become a social program used to support the lower-income-end of agricultural producers. For 1999, it provided payments to 77 percent of the cropland planted with 24 annual and perennial crops. It supported 4.2 million production units, of which 63 percent were smaller than two hectares. In nominal terms, the payments have increased from 400 to 700 pesos per hectare from 1995 to 1999. Direct payments to producers are generally used to purchase inputs, to finance the investment on facilities and machinery, and to pay for labor. Another modality has been the transfer of payment rights to financial institutions to obtain early financing, and to input suppliers for the exchange of goods and services (Claridades Agropecuarias, 2000). For fiscal year 2001, the program will extend payments to those producers with less than one hectare. Also, for those producers who plant less than 5 hectares and have been in the program for the last three years, no proof of crop planting will be required to receive the program payments (Diario Oficial, 31/12/2000).

Aserca is a series of marketing support programs to compensate agricultural producers during adverse economic conditions and to enhance and support the modernization of the supply chains in agriculture. The ultimate goal is to integrate agricultural producers to the marketing systems in the country (Claridades Agropecuarias, 2000). The programs provide support to cotton, wheat, sorghum, corn, soybeans, safflower, and rice producers. The program pays these producers the difference between the target price and market price. This mechanism was modified to include the process of regional commodity auctions setting the market prices. Rice producers have been receiving direct payments from this program. The plan encourages and supports crop contracting and hedging as part of its risk management program options to reduce volatility and uncertainty in commodity prices (Claridades Agropecuarias, 2000; Casco, 2001).

Overall, the level of public support to agriculture is small in relative terms to that in the United States, and state trading has been terminated since the creation of NAFTA.

Food and Nutrition Programs

United States. In the United States, a major social initiative has been linked to the agriculture and post-farm sectors to increase demand for farm and food products. The Food Stamp Program which began in 1961 provides food and nutrition to needy families. Food Stamp allocations peaked in 1995 with 26.6 million participants receiving an average $71.26 in benefits per month, from total outlays of $24.6 billion dollars. In 1999, the outlay was $17.7 billion on 18.1 million participants (USDA/FNCS, 2000). The School Lunch Program was initiated in 1946 and continues to increase in use, measured by outlays. In 1999, 6.8 million school lunch, breakfast and special milk allocations were registered, for a total federal outlay of $7.38 billion (USDA/FNCS, 2000).

The most effective of the U.S. food assistance programs is the Women, Infant, Children Supplemental Food Program (WIC) which integrates health care, nutrition education, food distribution, and food stamps into a comprehensive health and nutrition program (Knutson et al., 1998). Emphasis is placed on providing high-quality protein to pregnant and nursing mothers, and young children.

Canada. There has been intense debate over "food policy" in Canada since about 1976, and sporadic identification of the need to improve nutrition. However, Canada has produced neither and is no closer to policy on these issues than three decades ago. Agricultural policy is commodity-related and split between relatively open-market philosophy versus supply management. At the federal level, child poverty (a major contributor to nutrition problems) was identified as a national priority in 1994 and again in 2001, but there have been no significant policy developments to date. Provincial governments and local governments are the major welfare donors, and in food, voluntary local food banks are the source of food for needy recipients. Contributions are often voluntary and uncoordinated. There may be limited provincial, local and voluntary "mothers" and school breakfast programs available but they certainly can-

not be identified as significant components of food and nutrition policy. There is no formal nor financial link in Canada between the agricultural sector and nutrition or food programs.

Mexico. Before NAFTA, Mexico used price controls on some agricultural commodities and/or universal subsidization of some others as its social government policy. General subsidization on staple food basket (Canasta Bßsica) items included corn tortilla, eggs, milk, dry beans, rice, sugar, corn flour and some others. The extinct CONASUPO was a major player in the days of universal or general subsidization channeling resources through its subsidiaries LICONSA (milk) and DICONSA (dry goods), created in 1965 and 1972, respectively. Since 1984, FIDELIST, a trust fund for the liquidation of the tortilla subsidy operated several programs targeting nutritional aspects of low-income families. At one point, the Secretariat of Agriculture managed some of these programs. In 1995, the management of some of these programs was transferred to the Secretariat of Social Development (SEDESOL). Another important player since 1972 has been the program for the Integrated Development of the Family (DIF) that provides nutrition programs for low-income families, such as Food Rations Programs, School Breakfast Programs, and Food Assistance to Families Program, among others (Gundersen et al., 2000).

The Zedillo Administration changed the rules and revamped the social government programs in the National Development Plan 1995-2000. The main objective was to help communities under extreme poverty by breaking the vicious circle of intergenerational transmission of poverty. The chief modification to social policy was the move from general or universal subsidization to food assistance programs. LICONSA, DICONSA, FIDELIST, and DIF programs were revamped to focus on direct food assistance to low-income families in the country. The Program for Education, Health, and Nutrition (PROGRESA) was established in 1997 to provide grade-increasing scholarships and financial support for children from third to ninth grade, basic free health, and direct food assistance. This program has achieved an important growth since its inception. In 1997, PROGRESA reached about 400 thousand families in 10 thousand localities and 456 municipalities. In contrast, during 1999, the program served 2.3 million families and its benefits extended to more than 51 thousand locations in 2 thousand municipalities (SEDESOL, 2001).

PROGRESA is an innovative and more efficient program than its predecessors. It considers poverty distribution in the country and it further targets eligible low-income households. It also accounts for gender biases on the distribution of its benefits. Poverty in Mexico is more concentrated in the rural areas, where the native and more economically depressed populations are generally confined. The highest benefits are provided in the rural areas among those states with the highest poverty indexes, which are located in the central and southern regions of the country. Through its educational component, the program provides larger scholarships to girls, because they present the highest dropout rate among youth. On the other hand, the program's benefits are only provided to the female head of the families. Although, by using geographic targeting, PROGRESA presents "undercoverage" problems; this approach has been shown to reduce administrative costs.

Problems arise when trying to assess the effectiveness of these programs. Comparing the effectiveness of these programs to the ones used in the United States, shows that Mexican programs do not reduce the poverty rate in the country. It was found that the benefits as a percentage of income are lower in Mexico. Results also showed a lower participation of eligible households in the Mexican programs than the participation achieved in the U.S. programs (Gundersen et al., 2000).

INSTITUTIONAL AND POLICY ADJUSTMENT FOR FULL FREE TRADE

The leading results of the forgoing analysis, for each of the three policy areas are summarized in Table 1, by country. Conclusions are also summarized in relation to:

- policy areas where major conflicts exist which, in the judgment of the authors, are required to be remedied across the NAFTA countries if free trade is to be achieved; and
- policy changes required to achieve harmonization and free trade under NAFTA.

The remainder of the paper summarizes these results for each of the policy areas.

Agricultural Research. No major conflicts were found to exist, although there are gaps which need to be filled. There is a skewed playing field in terms of resources available and institutional support for conduct of agricultural research. In particular, the relative absence of strong university agricultural research programs in Mexico and, to a lesser extent, in Canada limit research output. This situation results largely because of relative lack of federal support. In addition, there are opportunities for increased specialization in research programs, and more coordination across the region to maximize on resources that are available. In each country, there are doubts and uncertainty, and some negative experiences, regarding how far and how fast to go with biotechnology and genetically modified agricultural and food products. These issues are important to marketability and may have food safety implications. There would appear to be an overriding need and opportunity to collaborate within NAFTA on research in this important area. Collaboration and expanded use of the research instrument have the important and desirable characteristic that they are 'trade neutral'.

Agricultural Extension. No major conflicts were found to exist. However, there is also a skewed playing field here, as well as many opportunities for sharing specialist expertise. Having extension as a federal government function, as in Mexico, runs the risk of losing objectivity in the programs conducted, their content, and reduces delivery capability. On the other hand, having extension divorced from federal research initiatives as in Canada, results in delivery voids. Ties among academics, researchers and extension services are critically important for maximizing progress. Like research, enhancing extension capability and delivery is trade neutral.

Economic Information. There are serious gaps in information availability in several sectors and some of these lead to trade stress. In Canada, lack of selling prices for export wheat and barley is a perennial trade issue with the United States. Hog price reporting is disappearing from Canada and will likely produce similar market problems that have plagued poultry, cattle and hog markets in the United States. Evolution towards more forward contracting and less cash sales in all three countries is reducing publicly available, useful market information and the problem will only grow without concerted federal efforts to reverse the reporting dearth. Market information in Mexico, and out-

Table 1: Comparison of Agricultural and Food Policies for NAFTA Countries, 2001

POLICY AREA	UNITED STATES	CANADA	MEXICO	MAJOR CONFLICTS	POTENTIAL HARMONIZATION
FACILITATE GROWTH AND PROGRESS					
Agricultural Research	Strong federal/state programs Universities well funded	Weak federal/provincial ties Limited university funding	Federal function, producer input	No, but level of activity widely different	Yes Trade neutral
Agricultural Extension	Federal/state and universities	Provincial function, very limited university contribution	Federal, isolated extension programs	No, leveal of activity widely different	Yes Trade neutral
Economic Information	Comprehensive federal/state programs	Limited outlook and policy analysis information	Lacks market, outlook, policy analysis information	No, level of activity widely different	Yes Trade neutral
Grades and Standards	Comprehensive, generally not consumer/market oriented	Reasonably consumer/quality oriented. Grain standards ridgid	Grades limited to Mexico's own products	Yes, particularly in grains and beef	Standardize/Harmonize on market-oriented basis
Trade Policy: WTO	Active conditional supporter. Domestic policy contradictions	Active supporter Domestic policy contradictions	Active supporter, significant moves toward compatability	Yes. Dairy, Sugar, Poultry, Wheat	Implement compatible programs, support guidelines and process
Trade Policy: Trade Remedy Laws	Actively utilized Strong political support	Actively utilized Weak political support	Increasing use. Prohibits unfair trade practices	Source of trade tension and disputes	Replace with NAFTA protocols and process
Trade Policy: Tariff Rate Quotas	Dairy and Sugar	Dairy, Poultry and Eggs	Seldom utilized	Yes Dairy, Poultry and Eggs	Eliminate. Implement compatible programs
Trade Policy: State Trading	None Active	Export Wheat and Barley. Some dairy products	None	Yes, particularly the CWB	Convert CWB to a coop or CCC-type agency
Infrastructure Policies	Strong federal/state support, particularly road and waterways, irrigation; border clearance delays	Primarily provincial roadways	Upgrading, border clearance conflicts	Yes, between US and Mexico	Reduce US support

REGULATORY POLICIES					
Competition/Antitrust Policy	Reduced enforcement. Limited structural remedies	Lacks in enforcement. Limited structural remedies	New instrument, lacks in enforcement and structural remedies	No Some collaboration	More collaboration More structural remedies
Intellectual Property Rights	Major trade policy issue Aggressive application	Policy void, slow to develop Tentative application	Follows international conventions	Not at present, but potential exists	Develop NAFTA protocols
Plant and Animal Protection	Complete program Implementation problems	Extensive programs, some enforcement problems	Lacks effective eradication programs and enforcement	Yes, significant trade stress	Establish harmonized standards and process
Food Safety	HACCP in meats and processing	HACCP in cattle and meat processing. Working on grains.	HACCP in fish processing only	Yes, could be significant	Establish harmonized standards and process
Environment: Livestock	Advanced federal/state programs, CAFO point pollution	Mostly provincial/municipal regulation. Wide variability	Largely voluntary	Not at present, could be significant	Implement harmonized regulations
Environment: Pesticides	Federal testing and registration Advanced compound bans	Federal testing and registration Some compound bans	Follows US, but null enforcement	Yes, expecially registration and prices	Harmonize testing and registration
MARKET INTERVENTION					
Disaster Assistance	Large insurance and disaster subsidies	Significant federal/provincial crop subsidies	30 percent insurance premium subsidy	Yes Unlevel field	Implement compatible insurance programs
Agricultural Credit	Credit guarantees with private risk sharing	Private and public agencies at near-commercial rates	Limited government lending	No	Reduce US support
Price Supports and Safety Nets	Large expenditures Commodity price support	Supply management price support. Whole-farm income protection	Primarily support to small farmers	Yes High US support	Adopt compatible domestic programs and support
Food and Nutrition Programs	Major programs, greater than 50 percent of USDA budget	Provinical/municipal/voluntary contributions. Small impact	Extensive programs, but limited benefits	No, widely different support	Standardize programs Trade neutral
PSE Levels	High: grains, oilseeds, dairy Low: livestock, poultry, fruit and vegetables Overall: relatively high, skewed	High: supply managment Low: all others Overall: moderate, skewed	Overall Low	Yes Supply management, dairy, grains and oilseeds	Standardize support across commodities and countries

Source: Compiled by the authors.

look and policy analysis information in Mexico and Canada are lacking. In more general terms, the reason for these PDIC workshops is to produce economic information to help reduce policy/trade stress and disputes.

In addition, there would appear to be many opportunities for creating common databases, sharing information, and conducting joint and shared studies on important market and policy issues. Again, this is trade neutral activity.

Grades and Standards. There appear to be substantial differences across the three NAFTA countries in grades and standards for agricultural and food products, and in their application. The result is an unlevel playing field not only in terms of commodity coverage but also in the criteria used to establish grades. Since comparable standards are critical to trade, price and buyer decisions, decisive moves need to be made to develop more compatible grading systems which facilitate, rather than impair, trade. Canadian grain and U.S. beef grades are the most sensitive in relation to trade stress and are important because of the magnitude of trade. These areas could be a good starting point for harmonization of standards and trade relations. Buyer-oriented grade standards make sense in a market oriented system, and the inspection system must ensure that the grade standards are met.

World Trade Organization. There has been, and there remains, the potential for major conflicts within WTO. While the three NAFTA countries are members of WTO, the fact that there are disputes among the NAFTA partners indicates the need for moving toward policies that are oriented toward freer trade. It would be in the interests of the NAFTA countries to establish a common, agreed-upon agenda for negotiations involving all trade agreements. Reduction in trade stress and disputes within NAFTA would appear to strengthen the NAFTA bargaining position externally. A first step here, as in many other of the areas that we have identified for increased collaboration and analysis, might be to establish a common policy analysis, research, data/information body within NAFTA to work on common issues, problems and procedures, including common negotiating stances for outside-NAFTA consultations.

Trade Remedy Laws (TRLs). TRLs are part of domestic trade policy in each country and are a major sources of conflict within NAFTA. They

were not designed for, nor are they suited to agricultural and food markets. The use of trade remedy law to achieve self-interest or political motives, and as harassment mechanisms, is totally contrary to the spirit and intent of free trade. The transaction costs associated with this vehicle for dispute resolution are often high, the process is extremely disruptive to markets, and all of this should be avoidable if there is a commitment to, or reasonable rules for, free trade. In addition, TRL as it is applied does not account for the inherent volatility of farm prices, nor the fact that prices, at times, fall below cost. Many other of the criteria applied in dumping and subsidization decisions simply do not fit agricultural markets. Consequently, perverse decision are made, and trade disputes are not settled, but are sometimes aggravated.

There are strong reasons for their elimination from within-NAFTA trade, particularly since NAFTA protocols apply only if TRL decisions are appealed by a loser. In a revised format, they might be applied with the same objectives and procedures as competition policy. There is a need for administration of trade remedy instruments to be separated from political pressures, as is competition/antitrust administration, in order to avoid political and interest group influence on selection of cases and outcomes. TRL originated in competition policy, and the CUSTA negotiations included consideration of returning them there but those discussions were suspended pending negotiation of the NAFTA. This step was not taken (Robertson et al, 1997) [5].

An alternative role of TRL was proposed by Loyns, Young and Carter (2001) arising from their review of R-CALF, and separately by Furtan and Fulton (2000)[6] proposal.. Many dumping and subsidization cases go directly to domestic TRL. NAFTA protocols become involved only if a loser uses the appeal mechanism (NAFTA, Chapter 19) or if governments choose to refer issues to

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[5] Another version of this situation is that the United States Congress would not consider giving up TRL, and the compromise was a Chapter 19 provision of oversight for TRL applications. The NAFTA Secretariat which has a unit in each country, administers appeals but only after domestic TRL has worked its course.

[6] Furtan and Fulton (2000) suggested the way to reduce disputes between Canada and the United States was to implement identical programs in the two countries, refer all disputes to a NAFTA panel, and eliminate state trading in wheat and durum. Our conclusions are fully consistent with this.

Chapter 20 of the agreement, both of which are administered by the NAFTA Secretariat. This process appears to be backwards. The suggestion is that disputes should go first to a NAFTA dispute resolution mechanism, then upon adjudication, if the particular country has a strong case to use its own legislation, it should be applied as a last resort. The science-based analogy for SPS disputes might usefully be applied in a economics-science based approach in dumping and subsidization cases. There are currently no provisions within NAFTA that would provide for these forms of dispute resolution.

The Policy Disputes Information Consortium will devote over half of its 2002 workshop to the problems and issues associated with trade remedy law as it is applied within the NAFTA region. Contributors, including officials from the NAFTA Secretariat, will discuss options for reducing trade stress and tensions from this source.

Tariff Rate Quotas. The use of tariff rate quotas, and the institutional framework they support, are a major source of conflict within NAFTA. At a minimum, there should be a near-term leveling of their application across commodities so that TRQs do not effectively act as quotas. Ultimately, they should be eliminated among the NAFTA countries. Accomplishing this objective would require a change in several domestic programs as discussed below.

State Trading. State trading is incompatible with free trade. This incompatibility goes well beyond the matter of transparency in pricing or business conduct. It is an issue of the state being involved in a private enterprise activity competing with other private entrepreneurs within NAFTA. Organizations like the Canadian Wheat Board and the U.S. Commodity Credit Corporation receive much of the state trading enterprise interest but there are many lesser marketing boards, orders and government supported business conducted in all three countries.

At the same time it needs to be recognized that elimination of state trading may produce some unintended effects which may be as unpalatable as the perceived original offense. For example, when the Western Grain Transportation Subsidy was eliminated in Western Canada in 1995, there was increased

pressure to ship prairie grains and oilseeds south. U.S. farmers should not be surprised if more wheat and barley flow into the United States if they get their wish to have the CWB removed from grain markets. The important question then becomes: will the increased volume from Canadian farmers be treated as 'dumping' on the U.S. market?

Infrastructure Policies. Infrastructure, particularly transportation rules and regulations, are a major source of conflict. The focal point of this conflict is between the United States and Mexico as reflected in the incompatibility of truck transportation rules and regulations, and there are major differences in the quality of roads and railroad beds. The railroad issue can probably best be solved by privatization, which is underway. Improved roads will require greatly increased government investments, some of which might be captured through tolls. There is also an important issue of who should pay for the cost of utility connection and delivery in rural areas of Mexico, where required utility investments can be very substantial.

Public sector contributions to irrigation systems, waterways and highways in the United States create an imbalance in terms of trade in agricultural and food products with both its NAFTA partners because these infrastructural components are significant contributors to production and distribution.

Competition Policy. No major conflicts were found to exist although there is serious question about the ability of existing laws to deal with many of the structural issues that are evolving. Free trade should be inherently competition-enhancing in that the size of the market is broadened to include the three countries. To be effective, the antitrust laws would have to be compatible across the free trade region and they have to be consistent with emerging competition conditions that may arise from the free trade environment. It is unclear that existing competition/antitrust laws can deal with the increase in vertical integration, and horizontal and vertical linkages that are occurring in agricultural and food markets. Neither is it clear that freer trade will necessarily provide the market discipline to avoid abuse of market power as firms grow in size and influence within NAFTA. A single NAFTA antitrust body may have merit. There are many research and market questions that a single agency would be best suited to handle. There is also an important link between competition/

antitrust policy and developments in intellectual property rights, especially in relation to the biotech sector.

Intellectual Property Rights. The United States and Mexico appear to be on similar paths in terms of policy and granting these rights. Canada has not as clearly defined it's policy position. There are important issues in relation to enforcement, in the extent to which the structure of agriculture might be affected, and the impacts upon competition. As indicated above, these are closely linked competition policy issues. They are also public policy issues that require serious research effort.

Plant and Animal Protection. Major conflicts can be expected to continue between the United States and Mexico regarding the dangers associated with migration of plant and animal diseases. While the United States and Canada have made substantial progress in eradicating diseases such as brucellosis and bovine tuberculosis, these diseases exist in Mexico. Comprehensive uniform monitoring, testing and eradication programs are essential to protecting plants and animals in the three countries. The EU experience with lack of uniform policy regarding BSE clearly indicated the costs of not establishing a comprehensive uniform policy.

The experiences with BSE and hoof and mouth disease in Europe in 2001 have highlighted the importance plant and animal disease control procedures around the world. As a consequence, the PDIC workshop in 2002 will include a day on the status of control and procedures in animal and plant diseases, and in food safety, within NAFTA.

Food Safety. The application of HACCP is evolving in all three countries. Across the board application to all food handling through at least the wholesale market is an essential goal for the pursuit of free trade. Conflicts can be expected to be prevalent in fresh fruits, vegetables and trace-back. Canada appears to be making more progress on trace-back than the United States, where particularly strong resistance can be expected from cattlemen. The BSE developments in the EU and continued E. coli incidents in the United States spur movement toward increased regulation. Science-based rules appear to be the

strongest means to effective regulation without generating undesirable trade barriers.

Livestock Environmental Regulations. Confined animal feeding operation (CAFO) environmental regulations in the United States have progressed to the point where virtually all such farms are treated as point pollution, although enforcement is still spotty. In Canada, federal policy in agriculture is still searching for direction, and the provinces and local governments have most of the power and rules. In Mexico regulations are pursued largely on a voluntary basis. The range of environmental rules and enforcement have the potential to generate serious trade stress.

Environmental costs can be substantial, and the costs of meeting environmental safeguards can be large. With increasing public awareness and participation in environmental decision making, and considerable scepticism within NAFTA countries and across the region about effects of agriculture, it is important that there be a coordinated NAFTA effort to achieve uniform policies, and to ensure that they are effectively enforced. NAFTA leadership in this important area could facilitate progress in the three countries, and perhaps across the world.

Pesticide Regulations. The United States has moved to eliminate inorganic chemicals such as organophosphates and carbamates from pesticide lists. Canada has followed the same basic path. If Mexico is to export into the United States and Canada, it must do likewise, although the principal problem is that of enforcement. A level field in pesticide regulation is more important to the pursuit of free trade than uniform CAFO regulation. Differences in testing and registration, and probably considerable misinformation, are important sources of conflict between Canada and the United States. These differences need to be worked out.

Disaster Assistance. Internationally, when there is a disaster, governments usually come to the aid of the people, often multilaterally. This principle is recognized under GATT. The risk in relation to free trade is that disaster assistance becomes an umbrella for subsidies. Disaster assistance may also encourage production in high risk areas, disadvantaging producers in the more

productive areas. Therefore the need is for compatible disaster policies across the region which provide acceptable protection without distorting markets. This likely means similar levels of support which may be very difficult to achieve.

Agricultural Credit. No major conflicts were found to exist. However, there is an unlevel playing field, particularly in Mexico, due in part to monetary and fiscal instability. Generally, credit subsidies do not appear to be a significant factor in allocation of this input.

Subsidization and Safety Net Programs. The array of support programs in the three countries produces the most divergence from free trade conditions of all public intervention. Subsidization is the source of much of the policy and trade tension within the NAFTA region producing widely divergent levels of support for producers within and between countries. It is also one of the most costly elements of agricultural and food policy, second to food programs in the United States. If level of public support, directly and indirectly, is a measure of economic disequilibria from the competitive norm, then high levels of public support indicate substantial levels of excess resource use, production, and probable trade distortion. Internal differences in levels of support also indicate domestic distorted markets.

For agricultural public support policies to be harmonized requires the same general programs delivering the same level of support to producers. This is a major departure from the status of subsidization and safety nets as they exist in the NAFTA region today, and within each country. A starting point for consideration could include the following options:

- a whole-farm revenue insurance program designed as a safety net to cover economic (market) and weather (production) adversities;
- individual whole-farm tax deferred savings accounts of the (Canadian) NISA-type designed to encourage voluntary risk management;
- removing compulsory acquisition and selling powers from marketing boards and orders that now have those powers; and
- development by the NAFTA partners of an agenda to standardize support among commodity groups.

It is proposed that the revenue insurance and deferred savings account programs could be modestly subsidized without large production and trade distorting effects. Accomplishing the level of deregulation implied above would not be easy. In particular the special program status held by many commodity groups - dairy producers in each country, supply managed producers in Canada, sugar, tobacco, and peanut producers in the United States, and the Canadian Wheat Board - would have to be modified. In Mexico special consideration would need to be given to the small ejido producers and any poverty alleviation initiatives. The logic of free trade suggests that buyouts of various types may be required to deal with change of this magnitude. Compensation payments were made to U.S. farmers as a result of Farm Bill changes in 1996, to Canadian prairie grain producers when the Crow subsidy was dropped in 1995, and is currently under consideration for tobacco producers in the United States.

Food Assistance and Nutrition Programs. In addition to expanding the demand for food, these programs buy substantial goodwill from the non-farm constituency. They may be particularly useful in dealing with social issues, whether recipients are poor and undernourished in Mexico, United States, or Canada. They can be made to be effective when combined with more comprehensive health care assistance targeted at low-income, single parent families, and pregnant women. The United States and Mexico have a well-established base of these programs. Canada, within the scope that our analysis was conducted, has none. Development and harmonization of programs in food assistance and nutrition could be made trade neutral.

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Agriculture and Agri-Food Canada

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The paper of Knutson, Loyns and Ochoa provides a very good side-by-side comparison of each of the NAFTA partners programming, and how differences could (or do) lead to trade disputes. As demonstrated in their Table 1, most of the programs are targeted at production agriculture establishing the regulatory and support framework within which production has to operate. Our understanding of how this framework functions, plus an understanding of the internal drivers that each country must deal with and the external drivers resulting from either within NAFTA or outside it, provide the context which allows us to assess the probability that trade disputes could arise (or why current ones exist) between NAFTA partners. This is a subjective exercise and I have no reason to dispute the conclusions drawn by Knutson et al.

In some traditional areas (those in Table 1) a degree of comparability exists among the three partners which should greatly reduce the potential for conflict to arise as a direct result of government programming. Areas of potential problems have been highlighted, areas where the three countries have been less successful in moving toward common programming or policies. It is important to understand why this may be the case, and also that a much broader view of potential problems must be developed.

First, it is important to remember that the NAFTA (and other trade agreements) move countries forward on the path toward trade liberalization. But they have not achieved this goal, in part because agreements tend to address only the instruments used by governments that can disrupt the flow of goods, services and people between countries; they do not address the causes that have given rise to protectionist demands. It is also important to remember that often the formal trade agreement only codifies what has already changed (or will change); they don't often break new ground. Agreements do not necessarily move the system toward the eventual objective, but may prevent back-

sliding. This is why it is often very difficult to quantify the impact of a trade agreement as more often it is reactive in nature, not proactive.

The NAFTA is not much different when it comes to the agricultural sector. Border measures that were really minor irritants were phased out, paths leading to greater harmonization already were reinforced, and difficult and sensitive areas were ignored. One may ask, ... why this result? One explanation may be that the NAFTA partners are responding to different internal and external forces and thus are at different distances along the path to "freer trade". The extent to which some level of "freer" trade is an actual national policy goal, compared to the position where trade policy is simply another tool of domestic policy, may still fundamentally separate the NAFTA partners at this time. As long as the second view dominates, i.e., trade policy including the trade agreement is only a component of domestic policy, especially in the United States, then the objective of free trade will remain beyond reach and trade disputes should be expected. Truly free trade demands more fundamental change than simply trying to harmonize border measures.

The United States is central to this assessment. Due to its size in NAFTA and its degree of exposure to world agricultural markets, it can better insulate itself from the forces that might otherwise cause it to adjust its use of protectionist or distorting policies. Compared to Canada, the United States is much less dependent on trade for most commodities, and given the fact that for the agriculture and agri-food sector over 80 percent of Canada's exports head south, Canada often has to react to U.S. policy changes that could have a dramatic impact on trade and the economy. The converse is not true.

"Free trade" will not arrive until such time that all member countries have to equally consider the implications of their actions for their trading partners as for themselves. Until that situation is obtained, one can expect trade disputes to continue as producers on one side of a border will see differences between policies that apply to them vs. those that apply on the other side of the border, and will from time to time demand protection from what is perceived to be a playing field that is not level. To achieve "Free Trade" implies a level of harmonization and policy convergence that does not exist at this time. In certain commodities where the export market is critical, Canada must now take

this type of view. In the short to medium term, I do not foresee the United States adopting this type of behaviour where it would place the trade interests of other countries at the same level of its domestic policy agenda. Therefore I am not sure how much additional progress toward reducing the potential for trade disputes can be made.

There are non-traditional areas of policy emerging in all countries that could make the progress toward reducing frictions at the borders much more difficult. In fact some emerging issues may prove to be more disruptive than we have experienced to date as the issues often affect those far beyond the farm gate or processing plant. Varel Bailey earlier put together a useful list of emerging factors and many of them have been raised more than once during this meeting. They are:

- the environment (climate change, biodiversity, water, biotechnology);
- rural-urban issues and concerns about labour mobility;
- food safety issues (risk, precautionary principle, loss in faith of scientific domain, GMO's);
- social and cultural issues (multifunctionality, animal welfare);
- science policy and relationship between regulatory bodies and industry; and
- expansion of trade issues beyond current confines (production and process methods, labour, intellectual property, north-south issues)

The list is meant to be illustrative and many more factors could be added. However, one thing is certain: there is no certainty that governments today have the capacity, knowledge, institutions or frameworks to deal with these issues, nationally or globally. They have enough problems dealing with the issues at hand. For example all signatories to the Kyoto Protocol are trying to determine how they might individually and collectively meet the commitments made in 1997 to achieve targets set for 2008-12. If countries choose differing paths that fit their specific situations related to GHG emissions, a whole new host of different policies and programs may be created affecting the agricultural sector of all countries in direct and indirect ways that vary considerably from their trading partners. For example, how countries deal with emissions trading and the role of soil sinks may be just one example where producers on one side of a border feel they are being treated differently than those on

the other side, which may give rise to a new round of protectionism as stakeholders try to use trade barriers to offset policy differences.

It is critical how countries will co-operate over the coming years to find global solutions and mechanisms that will not change relative comparative advantage through policies, therefore triggering an increase in trade related actions and a possible movement away from free trade. Many of these would be in the form of non-tariff barriers and the world's success in dealing with these types of barriers has been much more limited than dealing with tariffs. For example, in moving to consumer orientated marketing chains it may prove difficult to determine exactly what consumers want and to what degree policy should be used to ensure they receive what they are demanding.

CONCLUSION

My principle concern is not that we cannot figure out better ways to obtain greater harmonization and convergence for the areas of concern laid out in Table 1 in the Knutson et al paper. We largely understand these issues and the possible mechanisms that could be used. For the most part the trade disputes that they give rise to represent relatively small irritants between the NAFTA partners given the overall size of agricultural trade.

The 'emerging issues' are of greater concern. Lacking any real formal combined policy making process or institution within NAFTA, it is unlikely that policy convergence across the three countries would occur on these emerging issues. Given the potential for structural change that could arise due to these internal and external pressures, and the tendency that governments have shown to try and reduce the costs of change and transition within the agricultural sector, new policies and programming have the real potential to vastly increase tensions giving rise to the greater use of protectionist trade measures. Whereas today the trade disputes tend to be minor, they could become much more pervasive in responding to these emerging issues. Governments, hopefully lead by academics and other reseachers, need to get out in front of this phenomenon and seek ways to obtain greater domestic policy convergence within NAFTA to avoid the possible spillover impacts that could arise.

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Role of Government in Facilitating Change and Transition

Sharing the Cost of a Common Policy. The point was made that if there were to be a common policy, there would need to be a sharing of the cost of carrying out the policy among countries. It was noted that the NAFTA agreement provided for compensation of affected parties in adjusting to forced change.

Picking a Policy That Works. The issue was raised as to what type of policy might work. Specifically, would consideration of a whole farm support policy make sense? A perspective was provided that substantial cost/efficiency savings could result from a whole-farm approach as a result of writing fewer insurance policies and providing fewer insurance subsidies. Insurance companies in the United States would strongly resist a whole farm approach. As a general principle, there would be strong commodity group resistance to a major change in policy involving substantially reduced levels of support.

Inclusion of CWB in Harmonization. There was a question as to why the Canadian Wheat Board (CWB) needed to be eliminated, as a component of free trade policy, when it is realized that if CWB were eliminated there would be greater movement of wheat into the United States. This would result in greater trade and border friction. It was, however, recognized that if we are to move toward free trade, all institutions that distort markets must be up for discussion. This includes all marketing boards and orders as well as all subsidy programs.

NAFTA Secretariat. If there are to be positive and progressive next steps in the NAFTA process, there must surely be a role for a Secretariat that is continuously pushing and monitoring progress. This Secretariat must have ways of concretely measuring progress – scoring the gains and losses. Economists have an important role to play in developing this scoring process. Such a Secretariat could have a series of special working groups to provide advice, facilitate dialog and ease the transition.

The Secretariat idea raised a number of related issues about how it is assured that progress will continue to be made. For example:

- How is public support for NAFTA and continued policy change to be accomplished?
- How is the issue of sovereignty protection to be handled?
- What policies can be pursued to aid in the transition?
- How are the losers to be compensated?
- How are the macroeconomic and social issues to be handled?

All of these imply that there is a research and policy development role to be performed at the NAFTA level. These functions are not available in the present form of the agreement, but they do exist in other trade agreements.

Trade Remedies. A rational policy must be developed with regard to trade remedies. Antidumping laws as they are presently administered makes no sense in agriculture, but there will always be rent seekers will exploit the domestic opportunities in them. Countervailing application of policies are sometimes the only means of dealing with disputes. They cause countries to think twice before acting. How then, do we get trade remedy laws applied in a rational manner without them becoming a rent seeking game, with the winners being primarily lawyers and economic expert witnesses?

Food Safety. Getting control of the food safety issue is a very important agenda item for NAFTA. This requires a bloc-wide initiative that is carefully planned. Eradication programs need to be a part of this initiative with a sharing of costs across the NAFTA countries.

Special and Differential Treatment. The issue of special treatment for developing countries is a major issue. For example, what special access concessions should be given to developing countries under WTO and a Free Trade Agreement for the Americas (FTAA)? Some of the countries are seriously poor and special treatment is one of their only hopes under freer trade. Arguably, there are sub sectors and regions of sub sectors where Mexican farmers should have special treatment.

Need For Education. Education and communication are seriously needed in relation to making trade agreements work. There must be a better basis for getting sound information out to the stakeholders on the effects of NAFTA. Substantially more progress has been made than is generally known or even indicated in this workshop. But if this is to be done, the data must be available that allows quantification of the impacts of NAFTA.

Multi-functionality. Justifying farm subsidies on the basis of their ability to deal with various social causes and issues (multi-functionality) is becoming a major problem area, which many U.S., Canadian, and Mexican farmers may support. For example, green payments, organic agriculture payments, environmental payments and small farm payments have the potential for causing major distractions because they have intuitive appeal to many stakeholders.

Bloc Benefits from FTAs. There is need to look at NAFTA from the perspective of the entire bloc of three countries, and how it's implementation can be more effectively used to improve the standard of living, economic stability, prosperity, growth, and food security for citizens of the three countries. There is a strong tendency to look at the trade issue from the perspective of the individual and self interest, as opposed to the group/bloc as a whole. There is also a need to eliminate the squabbling among signatories and move beyond narrow political and interest group demands. Trade agreements achieve their benefits for citizens in a milieu of economic trade-offs and market forces. Benefits are constrained by rigidity of government policies and programs, and by continuation of protected self-interest conditions.

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Other Workshop Publications

1995 - ***UNDERSTANDING CANADA/UNITED STATES GRAIN DISPUTES.*** R.M.A. Loyns, Ronald D. Knutson, Karl Meilke (editors). University of Manitoba, Texas A&M University, University of Guelph. April.

1996 - ***UNDERSTANDING CANADA/UNITED STATES DAIRY DISPUTES.*** R.M.A. Loyns, Karl Meilke, Ronald D. Knutson (editors). University of Manitoba, University of Guelph, Texas A&M University. December.

1997 - ***HARMONIZATION / CONVERGENCE / COMPATIBILITY IN AGRICULTURE AND AGRI-FOOD POLICY: CANADA, UNITED STATES AND MEXICO.*** R.M.A. Loyns, Ronald D. Knutson, Karl Meilke, Daniel Sumner (editors). University of Manitoba, Texas A&M University, University of Guelph, University of California (Davis). October.

1998 - ***ECONOMIC HARMONIZATION IN THE CANADIAN/U.S./MEXICAN GRAIN-LIVESTOCK SUBSECTOR.*** R.M.A. Loyns, Ronald D. Knutson, Karl Meilke (editors). Texas A&M University and University of Guelph. December.

1999 - ***POLICY HARMONIZATION AND ADJUSTMENT IN THE NORTH AMERICAN AGRICULTURAL AND FOOD INDUSTRY****.* *R*.M.A. Loyns, Ronald D. Knutson, Karl Meilke and Antonio Yunez-Naude (editors). Texas A&M University, University of Guelph and El Colegio de México. February 2000.

2000 - ***TRADE LIBERALIZATION UNDER NAFTA: REPORT CARD ON AGRICULTURE*****.** R.M.A. Loyns, Karl Meilke, Ronald D. Knutson, and Antonio Yunez-Naude (editors). University of Guelph, Texas A&M University and El Colegio de Mexico. January 2001.

2002 - Look for ***KEEPING THE BORDERS OPEN*** scheduled for December 2002.

These publications and early releases are on Farm Foundation's web site:
http://www.farmfoundation.org/policysystems.htm

This is the seventh in a series of annual workshop proceedings designed to produce economic information on NAFTA trade and policy issues in relation to the agricultural and agri-food industries. The workshops are conducted with the objective of contributing to reduction of trade and policy disputes among the NAFTA partners. The 2001 workshop dealt with “Structural Change as a Source of Trade Disputes Under NAFTA”. The publication contains a detailed description of market structure and structural changes with NAFTA countries, analysis of farm and industry structure and competition under genuine free trade, analysis of structure and competition in the livestock and grains subsectors, and concludes with a paper comparing existing government policy and programs with those which would be required to produce full free trade.

This workshop was held in March, 2001 and like earlier programs, was attended by academic and government economists, and industry and interest group representatives. The publication is intended for readers with a general interest in the North American agricultural and food sector, in the effects of trade agreements on markets and trade, and the nature of agricultural trade disputes among Canada, Mexico and the United States. The material is also intended to be relevant to decision makers at all levels of the food chain to inform on economic relationships and market reality as a means to reducing trade and policy stress.

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