South Dakota's Agricultural Economy In PERSPECTIVE

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FOREWORD

Economic Development for South Dakota has been a focal point of Governor Mickelson's administration during the past year. Basic to successful implementation of development programs are knowledge of the current status of development and some indication of future expectations. The SDSU Economics Department staff early this year decided they could make an important contribution to economic development by providing a comprehensive overview of South Dakota's agricultural economy: its past and present and a glimpse into the future.

The result is this publication, a culmination of the efforts of all members of the Economics Department staff, whether their primary function is research, extension, or teaching. Authors analyzed strengths, weaknesses, and opportunities for agriculture based on long-term trends and outlooks. The result is a document that will not become rapidly dated.

We hope to communicate essential information about the structure and future of South Dakota agriculture both to urban and rural policy-makers and private decision-makers. Because this is the Centennial of the South Dakota Agricultural Experiment Station, we also have included a special emphasis on current and future research in the Department.

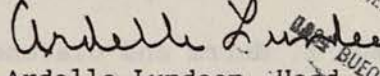
A departmental committee was formed to organize and expedite the preparation of the publication. The committee proposed tentative topics for coverage. However, as far as possible, each author's autonomy in development of topic and content was preserved.

At least three subject matter reviewers read each Chapter. Final editing was done in the Economics Department and at the Agricultural Communications Department.

The opinions expressed are those of the authors and do not represent the views or policies of the Economics Department or South Dakota State University.

The Economics Department wishes to acknowledge the assistance of the staff of the SDSU Agricultural Communications Department and Rod Kappes, Economics student. We are grateful to Deans Bryant and Sword, who aided in funding this endeavor. The assistance of outside reviewers both from other departments and the ranks of Economics Department retirees is gratefully acknowledged. Further, without the services of the Economics Department's dedicated and capable secretaries, this publication could not have been produced.

As Department Head, I wish to express my sincere appreciation to the entire staff who contributed Chapters and assisted with reviews--all of which was done under severe time constraints and with little complaint. Above all, my thanks go to Drs. Don Taylor, Larry Janssen, and Brian Schmiesing, the department committee that guided the publication from its inception onward. Speaking for all of us, our sincerest wish is that the information contained herein will prove useful to you, the reader.



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INTRODUCTION

This publication contains 21 Chapters divided into six sections:

1. Trends in South Dakota's agricultural economy;

2. South Dakota in the national and international economies;

3. Farm commodity production and marketing;

4. Agricultural production resource management;

5. Legal issues facing South Dakota producers; and

6. Economic planning for the future.

Most sections of this publication, either explicitly or implicitly, deal with changes that have been or will be occurring in the South Dakota agricultural economy. The focus of this Introduction is on some of the basic forces propelling these changes.

In an article on the changing structure of agriculture in South Dakota, Janssen and Edelman (1983) list six major forces leading to agricultural economic changes: economic development, technological change in agriculture, income and population growth, increased reliance on farm exports, federal government farm policies, and monetary and fiscal policies.

Economic development is inextricably interwoven with **technological change**. Through technology, animal and subsequently mechanical power have been substituted for human power. Chemical fertilizers and feed additives are other technological forces that have contributed greatly to increased productivity since the 1950s. Agriculture has changed from a labor-intensive to a capital-intensive industry as more purchased inputs have been used.

Economic development resulted when increased agricultural productivity enabled the release of people from food production. The released labor could then be used to produce other goods and services leading to economic growth for the entire nation.

Two important effects on the structure of agriculture have resulted from technological change: (1) an increase in the size of farms with an associated decrease in numbers, and (2) more specialization. These changes were precipitated by the adoption of mechanical power as less labor was needed to produce more output. Concurrently, new varieties and the use of chemicals increased yields. As machines became larger, one operator could handle more acres more efficiently by specializing in fewer crops. Also, the high cost of mechanical equipment provided incentive for farmers to cultivate more acres and lower per-unit production costs.

Future technological gains appear likely. Scientists point out that we are now entering the biotechnology and information technology era (Phillips and Sundquist, 1987). The availability of computers has led to development of information systems to help managers make sound production and marketing decisions.

In biotechnology, scientists are genetically engineering new strains of plants and animals. Phillips and Sundquist indicate illustrative areas in which biotechnology can be expected to have impacts. Biological organisms resistant to disease are being developed to lessen the use of chemical pesticides. Embryo transplants are being used commercially to produce superior animals. A current and controversial biotechnology is the bovine growth hormone with potential for increasing milk output per animal by as much as 25%.

The Office of Technology Assessment concludes that new technologies could significantly increase animal and plant production. With most likely technology, corn yields are expected to increase by 1.2%/year and milk production by 3.9%/year (Phillips and Sundquist, 1987).

The implications of technology for the structure of agriculture are not certain. Some observations can be made, however. If demand does not keep pace with the increase in supply, prices for farm products will decline. One result of the competitive cost-squeeze is the expansion of farm size when marginal producers leave agriculture.

Most new technologies are labor-saving and capital-using. This likely will be true of the future. Displacement of workers may not be as great as in the past, but there will be a need for more highly trained workers (Phillips and Sundquist, 1987).

Population growth has increased demand for most farm products. Income growth has increased demand for foods with moderate and high income elasticities such as meat and fruit. The most rapid growth in consumption goods demand is for convenience foods and restaurant and fast-food meals.

Extensive discussions of these and other factors affecting structural change in agriculture are found in the first six Chapters of this publication. The Chapters in the remaining four sections have a more micro-agricultural producer and agribusiness-person orientation.

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Trends in South Dakota's agricultural economy

Continuous and rapid change characterizes South Dakota's number-one industry, **agriculture**. Key economic and structural trends in South Dakota's agriculture and agribusiness sectors are reviewed in these two Chapters.

Structural trends addressed by Larry Janssen are declining farm numbers and increasing farm size, farm land ownership and tenure patterns, and increased farm sales volume and concentration. The nature and implications for South Dakota citizens of long-term trends in South Dakota farm financial conditions, farm income, and off-farm income are presented and discussed.

Employment trends in South Dakota and the U.S. from 1970 to 1987 are presented in the Chapter by Brian Schmiesing. Changing employment trends in South Dakota agribusiness input, processing, wholesale, and retail trade sectors are discussed within the context of South Dakota and U.S. employment trends. Implications for expansion of agribusiness in South Dakota are presented.

STRUCTURAL CHANGES IN SOUTH DAKOTA AGRICULTURE: IMPLICATIONS FOR OUR CITIZENS

Larry L. Janssen

We are living in times of rapid changes in agriculture and in rural America. Many people today are concerned about the future of agriculture, family farms, and rural communities. The purpose of this Chapter is to present and analyze trends reflecting changes in rural life and the structure of agriculture in South Dakota. Specific structural trends addressed are declining farm numbers and increasing farm size, land ownership and tenure patterns, increased sales volume and concentration, and farm financial and income conditions. Major implications of these trends are discussed.

DECLINING FARM NUMBERS

Farm numbers in South Dakota peaked in 1935 at 83,000. A declining trend has persisted since then (Table 1). In 1987, there were 35,000 farms, 58% fewer than in 1935. The most rapid farm exodus occurred from 1935 to 1945 when a net reduction of 14,600 farms took place (a 2.8% annual rate of decline). Since 1945, rates of decline in farm numbers have varied with changing national and farm economic conditions.

Rates of decline in farm numbers have varied substantially by region over time in South Dakota. From 1964 to 1982, for example, farm numbers in western counties declined at one third the annual rate (0.7%) of that in eastern counties (2.0%) and at one half the annual rate for the state's central counties (1.5%). The situation was reversed in earlier periods when farm numbers declined more rapidly in western and central South Dakota (Janssen and Edelman, 1983).

The primary explanations for the long term decline in farm numbers are technological changes in agriculture and national economic prosperity which have led to rapid growth in nonfarm job opportunities. The rate of technological change in U.S. agriculture since the early 1960s has been more rapid in crops, livestock-feeding, and dairy enterprises than in rangeland agriculture. The higher rate of farm consolidation in eastern South Dakota is a result of the faster pace of technological change in the east's farm enterprises. The financial stress in agriculture since 1982 also has hastened the pace of South Dakota's farm consolidation.

Actual changes in farm numbers are determined by the numbers of farmers entering and leaving agriculture. Most farm operators start between 20 and 34 years of age. In the 35-44 year age group, the numbers of farmers entering usually exceed the number leaving. The net effects of changing occupation, retirement, disability, and death gradually reduce the numbers of farmers more than 45 years old. Declines after 65 years of age are rapid.

More young people entered farming in the 1970s than at any time since the early 1950s. The annual entry rate of South Dakota's young farmers in the 1970s was 780 families compared to fewer than 560 families in the 1960s. Higher incomes and growth prospects during the 1970s encouraged many young people to enter farming during this period. Farm financial stress in the 1980s has likely reduced the numbers of young people who either consider or enter farming. The stress has also increased the exit rate of young and middle-age farmers who have liquidated their operations.

Future trends in farm numbers are sensitive to the age distribution of current farm operators and socio-

economic conditions that determine the entry rates of younger people into farming. In 1982, 22,600 farm operators were 45 years of age and older; most will retire from farming by the year 2,010 (Table 2). However, there are only 14,500 farm operators less than 45 years old to replace those older operators.

INCREASED FARM SIZE

Since 1935, the total amount of land in South Dakota farms has remained about the same, the number of farms has decreased, and average size of farms has increased. For example, the average South Dakota farm has increased from 626 acres in 1945 to 1,250 acres in 1987 (Table 1). The smallest farms are found in southeastern counties where average farm size is 300-600 acres. In most western South Dakota counties, average farm and ranch size varies between 2,000-6,000 acres.

A dual trend in farm sizes is emerging in all regions of South Dakota. Increased average farm size is accompanied by an increased number of large acreage farms, an increased number of very small acreage farms, and decreased numbers of all other (medium size) farms. From 1964 to 1982, the number of farmers operating less than 140 acres has actually increased by 33% (Table 2). These small farms account for 18% of all South Dakota farm operations. The number of farm and ranch operations exceeding 1,000 acres in eastern South Dakota, 2,000 acres in central South Dakota, and 5,000 acres in western South Dakota also has increased.

LAND OWNERSHIP AND TENURE

More than two thirds (69%) of South Dakota's agricultural land is owned by farm and ranch operators. South Dakota is one of the top states in the percentage of farm and ranchland owned by farmers and ranchers, with the average for the U.S. being 56.5%. A majority of agricultural land in the U.S. and South Dakota is owned by people 55 years of age and older. Established farmers who already own and rent farmland have been the principal buyers of farmland during the past 30 years.

Table 1. Farm numbers and average farm size, South Dakota, 1935-1987.

Census year	Thousands of farms	Average acres per farm
1935	83.3	445
1945	68.7	626
1954	62.5	719
1964	49.7	917
1969	45.7	997
1974	42.9	1,074
1978	39.7	1,123
1982	37.1	1,179
1987 est.	35.0	1,250

Source: USDC (1964 and 1982).

Table 2. Selected characteristics of farm operators, South Dakota, 1964 and 1982.

Characteristic	Thousands of farms		Percent of farms	
	1964	1982	1964	1982
Acres operated				
Less than 140	5.1	6.8	10.3	18.2
140-499	23.5	12.0	47.3	32.4
500-999	11.1	8.2	22.3	22.1
1,000-1,999	5.8	5.7	11.6	15.4
2,000 or above	4.2	4.4	8.5	11.9
Total	49.7	37.1	100.0	100.0
Land tenure[a]				
Full-owner	13.2	14.8	29.3	39.8
Part-owner	21.5	16.4	47.7	44.2
Tenant	10.4	5.9	23.0	16.0
Total	45.1	37.1	100.0	100.0
Operator age (years)				
Less than 35	7.7	8.3	15.4	22.2
35-44	12.2	6.2	24.6	16.7
45-54	13.2	8.0	26.6	21.7
55-64	10.6	9.3	21.3	25.2
65 and over	6.0	5.3	12.1	14.1
Total	49.7	37.1	100.0	100.0

[a]Small farms with sales of less than $2,500 were excluded in 1964.

Source: USDC (1964 and 1982).

Land tenure involves the issue of who operates (controls) the land resource. Since World War II, part-ownership has become dominant. Part-owners generally operate larger farms than full-owners or tenants and are the major buyers of farmland. Part-owners are typically middle-aged operators with moderate-to-large sales volumes and the greatest reliance on farm income for meeting family living expenses.

Since 1964, full-owners have slightly increased in number (Table 2). Typically, they are older farmers with lower farm product sales volume. Tenants--generally younger farmers with moderate sales volume--have rapidly declined in number and as a proportion of all farmers.

Trends in land tenure are greatly influenced by other land market and financing trends. See Chapter 13 for a fuller discussion of these issues.

INCREASED SALES VOLUME AND CONCENTRATION

Average gross sales per farm in South Dakota have greatly increased over the past two decades--from $12,600 in 1964 to $38,700 in 1974 to $66,700 in 1982. (Gross farm sales is the total dollar volume of farm product sales before any expenses are deducted.) The main reasons for increased sales per farm are inflation and economic pressures for increased farm size to maintain acceptable profit and net cash flow.

Distribution of farms by sales class reveals increased sales concentration and widening disparity of farms by size. Large farms with sales of $250,000 or more numbered 3.3% of South Dakota farms in 1982 and accounted for 30% of the total dollar volume of farm product sales (Table 3). At the other extreme, small farms each selling less than $40,000 of farm products numbered 54% of South Dakota farms and accounted for only 13% of farm products.

Larger farms are rapidly increasing in number and proportion of sales volume, while small farms are declining in numbers and proportion of sales volume. Medium-size farms have maintained their share of farm numbers and sales volume but their operators are experiencing the greatest adjustment pressures. Many of these farms are not large enough to generate adequate net incomes, yet they are large enough to prevent farm operators from assuming off-farm employment opportunities.

Sales concentration has increased for South Dakota and U.S. farms. Almost all of the increase in sales concentration has been generated by the largest 10% of South Dakota farms and ranches (Table 4). Meanwhile, the smallest 50% of farms have dropped from generating one fourth of farm product sales in 1959 to one ninth of farm product sales in 1982.

Concentration has increased rapidly in the livestock sector, with both the number and proportion of large-scale livestock farms having increased. By 1982, cattle feedlots annually marketing more than 1,000 head were 1.5% of total cattle feedlots (Table 5). These large-scale farms accounted for 44% of total cattle sales for South Dakota. The corresponding figures for hogs are 4.9% and 33%. Dairy and rangeland operations are less concentrated. Livestock production and marketing trends in South Dakota are discussed in greater detail in Chapters 9-11.

Table 3. Farm numbers and farm product sales, by farm size, South Dakota, 1982.

Farm size sales category	Gross farm sales ($ '000)	Percent of farms[a]	Percent of sales[b]
Large	250 and over	3.3	29.5
Medium	100-249	13.2	29.0
	40-99	29.5	28.4
	Subtotal	(42.7)	(57.4)
Small	10-39	33.4	11.8
	Less than 10	20.5	1.3
	Subtotal	(53.9)	(13.1)

[a]Total number of farms is 37,150.
[b]Total sales are $2.48 billion.

Source: USDC (1982).

Table 4. Sales volume concentration of farms, South Dakota, 1959 and 1982.

Sales volume category[a]	Percentage of total gross farm sales 1959	1982
10% largest farms	35.1	47.0
40% middle-size farms	40.2	42.0
50% smallest farms	24.6	11.0

[a]In 1982, the 10% largest farms generated $140,000 or more of gross farm sales each. The middle 40% generated $35,000 - $140,000 of farm product sales, and the bottom 50% less than $35,000. These amounts have increased since then, but the same trends are continuing.

Source: Derived from USDC (1959 and 1982).

FARM FINANCIAL STRUCTURE TRENDS

The combination of declining farm numbers and rapid growth of capital requirements in agriculture has led to phenomenal growth in capital and credit use per farm. In 1970, the average South Dakota farm operator controlled $138,000 in assets and had debts of $26,500 (Table 6). By 1982, asset values per farm had increased by 420% to $580,000 while debts increased 477% to $126,500 per farm. More than half of the increase in asset values was caused

by appreciation in land values, while all of the rise in debt reflects increased cash flow commitments. Debt servicing costs have increased even faster because interest rates on farm operating loans rose from 7-9% in the early 1970s to 12-15% in 1982.

South Dakota total farm asset values declined 1% from 1982 to 1984, as farm real estate values began to decline. Total farm debt continued to increase (by 13%) during this same period.

The full impact of financial stress hit the farm sector in 1984. From 1984 to 1986, South Dakota asset values, paced by collapsing farm real estate values, declined 27%, while total farm debt was reduced 7%. Farm asset values and debts probably declined another 15-20% from January 1986 to late 1987. Rapid debt reduction has been accomplished by combinations of loan writedowns, asset liquidation, and the use of government program payments and off-farm income to repay debts.

The changing financial structure in South Dakota agriculture since 1970 demonstrates the impacts of international economic conditions and federal macroeconomic policies on farm asset values. Farm debts increased more rapidly than asset values in the 1970s as inflation caused rapid increases in production costs. Many farmers and ranchers borrowed money to expand their operations, using rising land values as collateral. However, greatly increased debt loads per farm combined with higher interest rates and lower commodity prices made it very difficult for many producers to cash flow the required debt-servicing payments in the 1980s.

Financially, today's South Dakota farmers and ranchers are diverse. Data from the USDA Farm Cost and Returns survey (USDA, 1987b) indicate that in January, 1987, about 19% of South Dakota farmers had no debt, 42% had low to moderate debt/asset ratios (less than 0.4), while 39% had debt/asset ratios above 0.4. Producers with debt/asset ratios above 0.4 are much more likely to encounter debt-servicing problems than lower debt producers.

Table 5. Large-scale livestock farms, South Dakota, 1982.

Livestock enterprise and size of operation	Number of farms	Enterprise sales per farm ($ '000)	Percentage of the state enterprise totals represented by large-scale farms	
			Farms	Sales
Cattle feedlots 1,000 or more head sold	88	2,223.0	1.5	44.4
Hogs and pigs 1,000 or more head sold	491	210.7	4.9	33.1
Dairy cows 200 or more cows milked	192	160.8	3.8	17.1
Calves 500 or more head sold	52	203.7	0.5	7.6

Source: USDC (1982).

Table 6. Total farm assets, debts, and equity, South Dakota, 1970-1986.

Year (January 1)	Total assets[a]	Total debt[a]	Total equity	Debt-to-asset ratio
All farms ($ million)				
1970	6,487	1,244	5,342	19.2
1974	9,660	1,683	7,977	17.4
1978	14,384	2,740	11,644	19.1
1982	22,036	4,806	17,230	21.8
1984	21,761	5,409	16,352	24.9
1986	15,916	5,020	10,896	31.5
Average per farm ($ '000)				
1970	138.0	26.5	111.6	19.2
1974	214.7	37.4	177.3	17.4
1978	359.6	68.5	291.1	19.1
1982	579.9	126.5	453.4	21.8
1984	588.1	146.2	441.9	24.9
1986	442.1	133.5	302.6	31.5

[a]Includes farm operator household assets and debts.

Sources: USDA (1978, 1987a).

Results from the same USDA survey for farm operators in the Northern Plains (South Dakota, North Dakota, Nebraska, and Kansas) indicate that 52% are in a favorable financial position with a positive net cash farm income and a debt/asset ratio of less than 0.40. At the other extreme, 11% of farm operators are financially vulnerable with negative net cash farm income and debt/asset ratios above 0.40. These farm households are highly leveraged and have income deficiencies that limit their viability as farm businesses. These farmers hold 25-35% of all farm debt. An estimated 37% of farm operators in the Northern Plains have negative net farm cash income or high debt/asset ratios. These operations have financial problems, but are not in immediate danger of financial collapse.

These results suggest that financial stress in South Dakota (and Northern Plains) agriculture still is present. South Dakota has higher proportions of indebted and highly leveraged producers than do most other

states. Furthermore, South Dakota farmers are more dependent on current net farm income to service their debt than farmers in most other states. In the next few years, South Dakota agriculture can regain a more financially secure position--provided net farm incomes continue to improve and continued debt reduction occurs.

TRENDS IN NET FARM INCOME AND OFF-FARM INCOME

Since the early 1960s, South Dakota net farm income has trended upwards but also has been highly volatile. Off-farm income, on the other hand, has consistently increased. Since 1976, net income margins (net farm income as a percent of gross farm income) in South Dakota agriculture have declined (Table 7). Production expenses (especially interest payments) increasing more rapidly than gross income and the 1976 drought are two major reasons that reduced margins have occurred.

Reduced margins and highly volatile net farm incomes highlight the sensitivity of South Dakota agriculture to changing macroeconomic policies, international economic conditions, and farm credit practices. Reduced margins from 1976 to 1984 made it very difficult to service increased debt loads. This has increased the need for: (1) sound financial planning with emphasis on unit cost reduction, and (2) seeking greater amounts of off-farm income.

GROWING IMPORTANCE OF OFF-FARM INCOME

Income received from nonfarm (off-farm) sources is a major component of net income earned by many farm families. Since 1964, a majority of net income earned by farm families in the U.S. has originated from nonfarm sources. Off-farm income is concentrated among farmers with less than $40,000 of gross farm sales.

South Dakota farmers receive a lower proportion of their family income from nonfarm sources than farmers in most other states. Income from nonfarm sources is typically 30-40% of net income earned by South Dakota farm families (Table 7), compared to 50-60% of net income earned by U.S. farm families.

Table 7. Farm and off-farm incomes, South Dakota, 1964-1984.

Three-year period	Three-year annual averages ($ million) Gross farm income[a]	Net farm income[b]	Off-farm income	Total net income[c]	Off-farm income as a percentage of total income	Net farm income as a percentage of gross farm income
1964-66	893.9	271.6	117.4	389.0	30.2	30.4
1967-69	1,068.8	301.5	138.4	439.9	31.5	28.2
1970-72	1,301.9	407.8	178.0	585.8	30.3	31.3
1973-75	2,119.6	786.3	263.7	1,050.0	25.1	37.1
1976-78	2,011.9	385.8	264.0	649.8	40.6	19.2
1979-81	2,868.4	560.3	317.0	877.3	36.1	19.5
1982-84	3,163.7	508.4	349.3	857.7	40.7	16.1

[a] "Gross farm income" represents gross farm sales adjusted by inventory changes.
[b] "Net farm income" is gross farm income minus all production expenses.
[c] "Total net income" for the South Dakota farm sector equals net farm income plus off-farm income.

Source: Lucier, et al. (1986).

The difference in relative importance of off-farm income for farm families in South Dakota versus in the United States has important implications:

First, South Dakota farm families and rural communities are more dependent on farm economic conditions compared to most other states. Improved farm incomes are essential to the economic well-being of South Dakota.

Second, off-farm income is growing in importance for many South Dakota farm families. However, South Dakota is not likely to have the number and range of off-farm opportunities found in more densely populated and urbanized states. The long distances to larger towns make it difficult for many farm family members to be employed there.

Third, net incomes received by farm families are likely to be highly variable because farm incomes are subject to the uncertainties of weather, farm exports, and changing government farm programs.

CONCLUSIONS AND IMPLICATIONS

Structural changes in South Dakota agriculture have several implications for our citizens. A few key implications are highlighted:

First, we must recognize that the traditional self-sufficient family farm has been replaced by fewer modern commercial family farms and many smaller, part-time farm operations. The modern commercial family farms that produce most of our food are complex, specialized, capital-intensive businesses that operate on narrow profit margins. They rely on international

markets that are subject to shifts in foreign policy and world weather conditions. Federal monetary-fiscal policies, farm credit policies, and commodity program decisions have major impacts on commercial farm operations.

Second, nonfarm employment growth throughout South Dakota is important for the continued viability of many farm operations. A growing proportion of South Dakota farm families relies on off-farm income to meet living expenses, make debt payments, and increase family income stability. More spouses are pursuing nonfarm careers, and some producers are combining off-farm employment with farming and ranching. These employment options and improved net farm incomes are both essential to the economic well-being of South Dakota farm and ranch families.

Third, the number of farm families in South Dakota will continue to decrease because the number of senior farmers greatly exceeds the number of younger farmers. A favorable long-term economic outlook for agriculture is the most important condition necessary to interest more young families to enter farming and ranching. For many young families, this includes family financial assistance and credit programs geared to beginning farmers.

These are a few key implications of changing economic trends in agriculture. Declining farm numbers and changing demographics of rural regions also have important implications for local governments, school districts, and main street businesses. Each group will continue to face many adjustment pressures. Strategic planning for the future will increase in importance. The combination of production, marketing, financial, and information management has assumed greater importance in the farm business which is now more vulnerable to changing market and financial conditions.

The future of South Dakota agriculture will be shaped by people who become involved in their own development: through improvement of their management skills, through their investment decisions, through community leadership activities, and through influencing the direction of public policies.

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CHANGING EMPLOYMENT STRUCTURE OF SOUTH DAKOTA AGRIBUSINESS

Brian H. Schmiesing[1]

Agribusinesses often are viewed as firms that either sell agricultural inputs to farmers and ranchers or buy their agricultural products. However, a broader perspective is required to understand the current U.S. agribusiness system (Goldberg, 1985). Many agribusinesses have evolved into global companies that merchandise food and fiber products to both domestic and international consumers. Employment in the food industry has shifted from farming to other agribusiness sectors, ranging from farm input supply to food retailing.

In this Chapter, an introduction to employment trends in the U.S. and South Dakota agribusiness industry is provided. Aggregate employment trends and the role of farming as a source of employment for the U.S. and South Dakota are reviewed. Trends in U.S. and South Dakota employment for agricultural services, food processing, and food retailing then are discussed.

EMPLOYMENT TRENDS BY TYPE OF EMPLOYMENT

Analysis of agribusiness employment is frequently conducted in terms of the numbers of full-time wage and salary employees (Connor, 1987). This approach capitalizes on the availability of detailed time series employment data for various types of agribusinesses.

Part-time workers and proprietors, however, represent major employment components of the food industry. Farms are a major proportion of proprietorship employment. Most U.S. and South Dakota farmers select proprietorships as their business organizational form.

The proportion of full- and part-time employment in the form of proprietorships is significantly higher in South Dakota than in the U.S. The percentage for South Dakota has been 25-30%, whereas for the U.S. it has been only 10-15% (Table 1). Thus, contrasting employment data which exclude proprietorships do not accurately reflect comparative agribusiness employment patterns in South Dakota and the U.S. In this Chapter, therefore, attention is given both to: (1) part- and full-time wage and salary, and (2) proprietorship employment.

Table 1. Employment by type for United States and South Dakota, 1970-1986.

Type of employment	1970	1975	1980	1986	Change from 1970 to 1986[a]
United States					
Number of people					
Wage and salary	79,050	84,908	97,741	106,969	27,919
Proprietorship	10,703	12,269	14,515	19,197	8,494
Farm	2,718	2,588	2,488	2,375	-343
Nonfarm	7,985	9,681	12,027	16,822	8,837
Total	89,753	97,177	112,256	126,166	36,413
Percentage distribution					
Wage and salary	88.1	87.4	87.1	84.8	-3.3
Proprietorship	11.9	12.6	12.9	15.2	3.3
Farm	3.0	2.6	2.2	1.9	-1.1
Nonfarm	8.9	10.0	10.7	13.3	+4.4
Total	100.0	100.0	100.0	100.0	n/a
South Dakota					
Number of people					
Wage and salary	216	240	262	269	53
Proprietorship	82	83	87	99	17
Farm	48	44	39	39	-9
Nonfarm	34	39	48	60	26
Total	298	323	349	368	70
Percentage distribution					
Wage and salary	72.5	74.3	75.1	73.1	0.6
Proprietorship	27.5	25.7	24.9	26.9	-0.6
Farm	16.1	13.6	11.2	10.6	-5.5
Nonfarm	11.4	12.1	13.8	16.3	+4.9
Total	100.0	100.0	100.0	100.0	n/a

n/a = not applicable

[a]The "percentage distribution" changes below are percentage point changes.

Source: Derived from USD (1987).

Non-farm proprietorship, as an employment type, has been expanding rapidly in both the U.S. and South Dakota. In the past 16 years, it has doubled in the U.S. and nearly doubled in South Dakota. Between 1980 and 1986, South Dakota's total employment increased by 19,000 employees, with

nearly two thirds of the increase involving non-farm proprietorship employment.

At the same time, farming has declined as the dominant source of proprietorship employment. In the U.S., the proportion of farm proprietorship to total proprietorship employment declined from 25% in 1970 to 12% in 1986. In South Dakota, the corresponding figures are 59% and 39%.

TRENDS IN U.S. EMPLOYMENT

Between 1970 and 1975, the decline in the number of individuals employed on U.S. farms slowed (Tables 2 and 3). Farming sector employment, over these same five years, declined by only 14,000. The economic stress of the 1980s, however, caused the rate of decline of employment in the farming sector to accelerate. Between 1980 and 1986, the number of farm employees declined by 442,000, or over 25 times the annual rate of a decade earlier.

The relative importance of farming as an employment source also has declined. In 1970, farming accounted for 4.4% of U.S. total employment. In 1986, the figure was only 2.7%. This trend makes the U.S. one of the most urbanized economies in the world.

Farming has not been the only sector whose relative importance has declined as a source of employment within the U.S. economy. Manufacturing, transportation, utilities, and government also have declined a relatively significant amount. However, nondurable manufacturing and the military are the only sectors other than farming to experience declines in the number of people employed.

The major growth area in U.S. employment has been in retail trade and service. Between 1970 and 1986, for example, total employment in the retail trade sector increased from 13.6 million to 20.7 million, while the service sector increased from 16.6 million to 32.3 million.

ARE THE TRENDS SIMILAR IN SOUTH DAKOTA?

The rate of decline in farming employment has been more rapid in South Dakota than nationally (Tables 4 and 5). In 1970, farming was the largest employment sector in South Dakota. More than 20% of those employed were in farming. By 1986, farming as an employment sector had declined to third, with only 12.2% of South Dakota employment in farming. The farm employment share had declined by 8.2 percentage points, with 15,830 fewer employees.

However, farming still is a significant employment sector in South Dakota. In 1986, farming provided more employment than manufacturing for nondurable and durable goods. While the relative importance of manufacturing in the U.S. economy has declined, the relative role of manufacturing employment in South Dakota has increased. South Dakota manufacturing employment as a proportion of total employment still is below that of the nation.

Table 2. Full-time and part-time employees, by industrial sector, United States, 1970-1986.[a]

Sector	Thousands of employees				Change from 1970 to 1986
	1970	1975	1980	1986	
Farming	3,962	3,948	3,819	3,377	-585
Agriculture services, etc.	520	658	889	1,167	647
Mining	700	835	1,202	1,099	399
Construction	4,392	4,669	5,634	6,660	2,268
Manufacturing					
Nondurable goods	8,244	7,738	8,266	7,909	-335
Durable goods	11,433	10,921	12,500	11,566	133
Transportation and utilities	4,851	4,971	5,647	5,974	1,123
Wholesale trade	4,163	4,868	5,733	6,169	2,006
Retail trade	13,626	15,123	17,809	20,732	7,106
Finance, insurance, real estate	4,914	5,859	7,556	9,628	4,714
Services	16,622	19,782	24,401	32,272	15,650
Federal government, civilian	2,902	2,912	3,047	3,096	194
Military	3,232	2,656	2,451	2,763	-469
State and local government	10,192	12,236	13,303	13,753	3,561
Total	89,753	97,176	112,257	126,165	36,412

[a]These employment data include proprietorships.

Source: Derived from USD (1987).

Table 3. Percentage distribution of employment, by industrial sector, United States, 1970-1986.[a]

Sector	1970	1975	1980	1986	Change from 1970 to 1986
Farming	4.4	4.1	3.4	2.7	-1.7
Agriculture services, etc.	0.6	0.7	0.8	0.9	0.3
Mining	0.8	0.9	1.1	0.9	0.1
Construction	4.9	4.8	5.0	5.3	0.4
Manufacturing					
Nondurable goods	9.2	8.0	7.4	6.3	-2.9
Durable goods	12.7	11.2	11.1	9.2	-3.6
Transportation and utilities	5.4	5.1	5.0	4.7	-0.7
Wholesale trade	4.6	5.0	5.1	4.9	0.3
Retail trade	15.2	15.6	15.9	16.4	1.3
Finance, insurance, real estate	5.5	6.0	6.7	7.6	2.2
Services	18.5	20.4	21.7	25.6	7.1
Federal government, civilian	3.2	3.0	2.7	2.5	-0.8
Military	3.6	2.7	2.2	2.2	-1.4
State and local government	11.4	12.6	11.9	10.9	-0.5
Total	100.0	100.0	100.0	100.0	n/a

n/a = not applicable

[a]These employment data include proprietorships.

Source: Derived from USD (1987).

The direct impact of higher farm income on agribusiness has been tempered, however, by producers using profits to reduce debt levels and/or increase liquid investment reserves. This pattern probably will continue until producers become confident that they have achieved adequate financial security in their farming and ranching operations.

CONCLUSION

During the past 16 years, the U.S. and South Dakota food sectors have experienced major shifts of employment from farming to retailing. South Dakota's eating and drinking places experienced particularly rapid employment growth, where full- and part-time employment increased more than 60%, from 11,882 in 1970 to 19,245 in 1986.

Considerable uncertainty surrounds the future of South Dakota's businesses that rely on the state's farming and ranching sector. Changes in government farm commodity programs, the competitive position of South Dakota farmers and ranchers in the production of specific commodities, the basic structure of farming and the technologies of production, processing, and marketing will have major impacts on the economic welfare of South Dakota agribusinesses.

Total food processing employment has not expanded rapidly in South Dakota, consistent with the national trend of reduced employment in food processing. Because the overall sales volume of the U.S. food processing industry is not expanding rapidly, South Dakota can expand its food processing industry only as it increases its market share relative to that in competing regions.

Thus, if South Dakota's agricultural processing sector is to expand, research into economic and technological constraints and opportunities for food processing must be undertaken. Ways must be determined for South Dakota food processors to compete effectively with existing firms in national and international markets.

Advocates of food processing for expanding employment must realize that this task will require a major commitment of resources. The fact that manufacturing employment in South Dakota has expanded over the past 16 years (by over 75%)--while nationally total manufacturing employment actually dropped--should provide incentive for the commitment of resources to the examination of future possible manufacturing development in the state.

FOOTNOTE

[1]The author would like to thank Larry Janssen, Ardelle Lundeen, Don Taylor, and Scott Peterson for their reviews and comments. Dean De Vos is thanked for his background research efforts, and Verna Clark for her word processing efforts.

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South Dakota in the national and international economies

Profitability of South Dakota agriculture is greatly influenced by economic policies and other developments in the national and international economies. In this section's four Chapters, some of the major national and international policy issues impacting South Dakota agriculture are highlighted.

Bill Kamps and Gerald Toland discuss the increasing influence of federal macroeconomic policies on agricultural sector performance. They examine the changing U.S. monetary and fiscal policy mix from 1970 to 1986 and its impacts on national economic performance and on agriculture.

Bashir Qasmi explains relationships among U.S. trade deficits, capital flows, and federal budget deficits. Reviewing U.S. trade, capital, and federal budget data from 1965 to 1986, Qasmi shows that: (1) U.S. trade deficits are large and widespread, (2) federal budget deficits are now largely financed by foreign capital inflows, and (3) reductions in U.S. trade deficits are not likely without reducing the federal budget deficit.

Richard Shane examines the impact of current farm legislation--The Food Security Act of 1985--on South Dakota farmers and ranchers. He also highlights U.S. farm program changes from 1933 to present and discusses the various policy approaches used to control supply and support agricultural prices during this period.

Lundeen and Rasmussen discuss the Tax Reform Act of 1986--the most significant U.S. tax legislation in three decades--and its major implications for South Dakota agriculture. Tax planning opportunities for individual producers also are suggested.

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IMPACTS OF THE MACROECONOMY AND INTERNATIONAL TRADE ON SOUTH DAKOTA AGRICULTURE

William E. Kamps and
Gerald D. Toland, Jr.

Macroeconomics is the study of the aggregate or macroeconomy. The measurement and analysis of a nation's employment, prices, and income are covered by macroeconomics.

The South Dakota economy is not insulated from the economic conditions that exist in the national economy or the world economy. Those involved in South Dakota agriculture know the impacts of higher and lower exports on the economic well-being of the state.

A greater knowledge of macroeconomics can help agricultural, industrial, and general business interests in South Dakota more fully anticipate the opportunities for potential growth and the economic problems that are likely to arise. Specifically, decision-makers can use macroeconomics to develop strategies for meeting state and national economic goals. These goals include reductions in unemployment and inflation rates and advances in economic growth and development.

In the next section, the increasing importance of the macroeconomy for South Dakota agriculture is considered. Following that, the nature of monetary and fiscal policies and the impacts of these policies in the U.S. between 1970 and 1986 are examined. The current economic situation is reviewed in the final section.

INCREASING MACROECONOMIC INFLUENCE ON SOUTH DAKOTA AGRICULTURE

The profitability of agriculture in South Dakota has become increasingly dependent upon developments in the national and international economies. Farm policies have continued to directly affect agriculture, but the indirect effects of the U.S. government's "non-farm" policies are having more impact on the profitability of U.S. and South Dakota agriculture. This is because of at least two factors. First, international trade has become more important to U.S. agriculture. Agricultural exports--valued at $7.4 billion in 1970--grew to $29.6 billion in 1986 (USGPO, 1987). Thus, the welfare of South Dakota agriculture now has more dependence on: (1) the international value of the dollar (U.S. exchange rate), (2) the policies undertaken in foreign countries and in our own country to stabilize internal levels of income, output, and employment, and (3) economic growth rates in other countries.

The second factor contributing to the less self-contained nature of U.S. agriculture is the greater input expenditure requirement of agriculture. Far in advance of any revenue receipts, farmers are required to make ever-higher outlays on land, equipment, and production inputs (Kitchen, et al., 1987). Such inputs are increasingly purchased.[1]

Agricultural production data clearly show that agricultural input prices and the availability and cost of credit (interest rates) now have more influence on the economic viability of farm operations. To the degree that agricultural input costs rise faster than the prices of the final saleable products, farmers are put in a profit squeeze.

THE IMPACT OF MONETARY AND FISCAL POLICY ON AGRICULTURE

Macropolicy can be segmented into two parts. **Monetary policy** involves control of the money supply by the Federal Reserve System. **Fiscal policy**, controlled by the Executive Branch of government, is concerned with the level of federal taxes and expenditures, i.e., the federal budget. Both types of policy can be employed to stabilize the national levels of income and output, employment, and prices.

Monetary policy

Money is most commonly defined to include the items that people use to make transactions, namely, currency (paper money and coins) and checking accounts. The Federal Reserve exerts its influence on the money supply by controlling the amount of checking accounts that can be created by depository institutions (banks).[2]

It does this in three ways:

First, the Federal Reserve determines the percentage of deposit accounts that must be held by banks as required reserves. If banks were required to hold all of their deposits as reserves, they merely would be warehouses for money and would not be able to make any loans. Instead, the banks are allowed to hold a fraction of such deposits as reserves. If the Federal Reserve wants to reduce the money supply, it can increase the reserve requirement on banks. This increases the amount of deposits that must be held as legal reserves, and reduces the ability of banks to "create" money through creating loans (checking accounts).

Similarly, if the Federal Reserve wants to increase the money supply, it will decrease legal reserve requirements and increase the ability of banks to make loans. The reserves themselves, like stored grain, make no income for the bank. The banks make profit through loans and other investments. The required reserves are "stored" in the vault of a bank or as a deposit in a Federal Reserve Bank (like the one in Minneapolis).

The second way the Federal Reserve can control the money supply is to use open-market operations. Open-market operations involve the buying and selling of federal government securities (the national debt) from/to private institutions on the open market. To illustrate, if the Federal Reserve sold $10,000 of federal securities to a bank, the bank's account at the Federal Reserve bank would be reduced by $10,000. The bank would now own securities worth $10,000, but it would have $10,000 less in reserves at the Federal Reserve bank and would be able to create a smaller amount of loans. Sales of federal government securities on the open market reduce the reserves of banks, reduce the ability of such banks to lend, reduce the amount of checking accounts, and so restrict the money supply. Purchases of government securities by the Federal Reserve, by contrast, increase the reserves of banks, increase the ability of banks to lend, increase the amount of checking accounts, and expand the money supply.

Open-market operations provide a flexible tool for the Federal Reserve to control the money supply. Through buying or selling specific amounts of government securities, the money supply is directly impacted. Because of such flexibility, the Federal Reserve's most frequently used policy instrument to change the money supply is open-market operations.

The third way of controlling the supply of money is the discount rate. The discount rate is the interest rate charged to banks who borrow money from the Federal Reserve. These loans have restricted uses. Banks obtain Federal Reserve loans to replace legal reserves when: (1) they lose reserves due to depositors withdrawing a lot of currency (and, thus, reserves), or (2) other difficulties arise beyond the control of the banks. If the discount rate is increased, the money supply is restricted because the higher cost of replacing reserve shortages is likely to result in conservative lending practices by banks. In a similar way, a farmer is less likely to borrow to build facilities to store more grain if the interest rate is high. The cost of guessing wrong on the storage of grain

at a high rate of interest can be prohibitive.

A reduction in the discount rate, by contrast, tends to expand the money supply. Banks can now borrow more cheaply from the Federal Reserve to meet reserve deficiencies and will likely follow a more liberal lending policy.

Why control the money supply? Ultimately, the reason is to try to control the amount of spending, the level of average prices, and the level of unemployment in the economy. A **restrictive** policy is used to reduce upward pressures on the average price level (i.e., to reduce inflation). This is done by decreasing the availability of credit, increasing the cost of credit, and reducing loans which, in turn, reduce spending and income. Such a policy is justified when the average price level is rising at a rapid rate because of aggregate (national) demand exceeding the aggregate supply in a close-to-full employment economy. The drop in aggregate demand caused by a reduced money supply is expected to slow the upward pressure on prices, without adversely impacting employment.[3]

Increases in the money supply, on the other hand, are used when the concern is with excess unemployment. This is **expansionary** policy. As the availability of credit increases and the cost of credit decreases, there will be increased spending, increased income and output, and reductions in the level of unemployment. If the economy is too close to full employment, or if the policy is too expansionary, the monetary expansion can cause inflation.

What impact does monetary policy have on South Dakota agriculture? The connection to the availability and cost of credit is most obvious. A restrictive policy means that loans to farmers are less available and at a higher cost. For an industry like agriculture that must rely on large amounts of credit, an interest percentage point or two can make a large difference in its profitability.

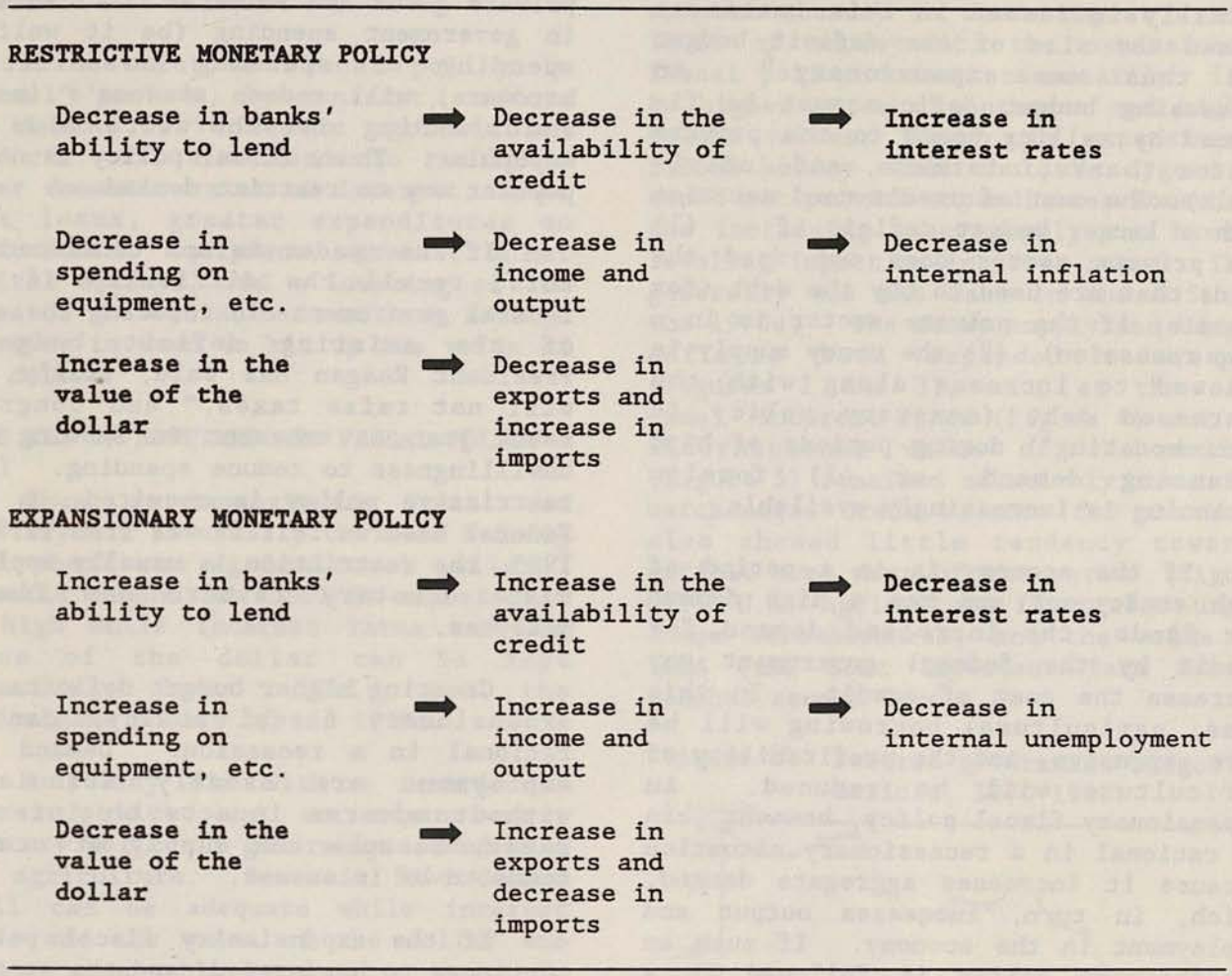
Monetary policy also has important impacts on the value of the dollar in international trade, which directly impacts South Dakota agriculture. The value of the dollar is the amount of foreign currency that can be purchased with a dollar. If the value of the dollar is rising, imports for American consumers are cheaper because the same number of dollars then buys more of another nation's currency. So, as the dollar's value increases, other countries' goods are cheaper for American consumers to buy. Exports of agricultural and other products, however, are more expensive for foreigners to buy. A German consumer, for example, then would need a larger amount of currency (marks) to buy the same number of dollars. U.S goods become more expensive because of the increase in the value of the dollar. Similarly, if the value of the dollar is falling, imports are more expensive for American consumers (the same number of dollars will now buy less foreign currency), and exports are less expensive (the same amount of foreign currency then buys more dollars).

How does monetary policy affect the value of the dollar?[4] If monetary policy in the United States is restrictive (relative to other countries), the value of the dollar will rise (relative to foreign currencies) because inflation in the U.S. will be lower than that in other countries. As a result, exports become more expensive (agriculture suffers) and imports less expensive (consumers benefit).

The opposite is true for an expansionary monetary policy. If monetary policy is expansionary (relative to other countries), the value of the dollar will decline (relative to foreign currencies), foreigners can get more dollars with the same amount of their currency, and our exports will tend to increase. Imports, then being more expensive, will decline. The longer term consequences of an expansionary policy, however, can be negative if levels of inflation become unacceptably high.

We will return to monetary policy later in considering the consequences of various mixes of monetary and fiscal policy, but, for now, the reader is directed to Figure 1. The top part of

Figure 1. The impacts of monetary policy on macroeconomic variables.



the figure summarizes what has been said about a restrictive monetary policy. In general, such a short-run policy tends to reduce inflation (assuming the economy is close to full employment) in the domestic (internal) economy, increase interest rates, and increase the value of the dollar in the international (external) economy. The policy is beneficial in reducing internal inflation, but has detrimental effects on agriculture because of the high cost of farm loans and the noncompetitiveness of our exports. Farmers, therefore, tend to be hurt under such a policy. The impact of a short-run expansionary monetary policy is summarized in the bottom of the figure. Such a policy generally would be beneficial to agriculture. It would reduce interest rates to South Dakota farmers and allow their products to be more competitive in international markets (with a lower valued dollar).[5]

Fiscal policy

Fiscal policy is the use of federal taxes and government spending (the federal government budget) to stabilize fluctuations in the macroeconomy. An expansionary policy could entail an increase in government spending on goods and services or a reduction in taxes. An increase in government spending **directly** affects aggregate spending, and a reduction in taxes brings about an **indirect** increase in spending by the private sector. An expansionary fiscal policy also can be viewed as an increase in the size of a budget deficit (or reduction in the size of a budget surplus).

An increase in spending, with taxes constant, or a reduction in taxes, with spending constant, will increase the size of budget deficit. This is shown by the tax cuts of 1981. A reduction in

taxes with spending constant (spending actually increased in this instance) raised the size of the deficit budget and thus was expansionary.[6] An increasing budget deficit must be financed by selling bonds to the private sector (banks,[7] farmers, and individuals). The cost of credit need not rise with a larger budget deficit if: (1) the private sector does not need the funds that are used to buy the debt (for example, if the private sector is in a deep recession), (2) the money supply is allowed to increase along with the increased debt (monetary policy is "accommodating") during periods of high financing demand, or (3) foreign financing is increasingly available.

If the economy is in a period of high employment and has a high demand for funds, the increased demand for credit by the federal government may increase the cost of credit. In this case, agricultural borrowing will be more expensive, and the profitability of agriculture will be reduced. An expansionary fiscal policy, however, can be rational in a recessionary situation because it increases aggregate demand, which, in turn, increases output and employment in the economy. If such an expansionary policy is followed in a more "normal" period, increasing interest rates may result.

By contrast, a restrictive fiscal policy is rational when the economy is suffering from high levels of inflation. In such a situation, the economy is close to or at full employment and there is excess demand for goods and services. A restrictive fiscal policy could involve an increase in the federal personal income tax (to decrease consumer expenditures) or an increase in taxes more directly on business (to decrease business expenditures) to reduce inflationary pressures on prices. Alternatively, a decrease in government spending would have a similar impact but would directly decrease aggregate demand.

Regardless of which type of restrictive policy is used, an increase in taxes or a decrease in government spending, the policy will be unpopular. We do not like an increase in taxes because it means, with lower disposable incomes, we have less to spend on private goods and services. A decrease in government spending (be it welfare spending or spending on military hardware) will reduce someone's income and spending and therefore also is unpopular. Thus, fiscal policy is not a popular way to restrict demand.

If the reader is not convinced of this, recall the difficulty of our federal government in reducing the size of the existing deficit budgets. President Reagan has said, flatly, "I will not raise taxes," and Congress seems just as vehement in showing its unwillingness to reduce spending. If a restrictive policy is required, as the Federal Reserve felt it was from 1979 to 1985, the restriction is usually applied via monetary rather than fiscal measures.

Creating higher budget deficits (an expansionary fiscal policy) can be rational in a recession. Demand and employment are usually stimulated without adverse impacts on interest rates, because the supply of credit tends to be in excess.

If the expansionary fiscal policy continues to be pursued, and the economy expands, interest rates will likely rise. As the cost of credit climbs, expenditures in agriculture and elsewhere will be reduced. Investment, defined as an increase in real capital (equipment and other productive assets), also will be reduced. Productive efficiency will also decline. Consequently, this tends to reduce the international competitiveness of agriculture and other industries. Agriculture is particularly hampered because of its heavy dependence on export demand.

Deficits can stimulate the economy and get us out of a recession, but, if pursued too much, they can have adverse impacts on growth and the viability of the national economy. If large deficits induce high interest rates in the U.S. over long periods, foreign demand for dollars will rise because foreigners will want to use their currencies to invest in U.S. financial markets. This raises the value of the dollar in international trade and also reduces the

competitiveness of U.S. agriculture in international markets.

A restrictive fiscal policy in "normal" periods, by contrast, reduces the demand for domestic agricultural products. It also tends to result in lower domestic rates of interest, lower cost loans, greater expenditures on agricultural equipment, greater other capital outlays, and a lowering of the value of the dollar because less foreign currency is used to bid up the value of the dollar.

THE MIX OF MONETARY AND FISCAL POLICY

Thus, an expansionary fiscal and monetary mix is usually the most beneficial short-run agricultural policy.[8] Domestic demand for food is expected to be high while interest rates and the value of the dollar can be kept relatively low. This was the predominant policy of the 1970s.

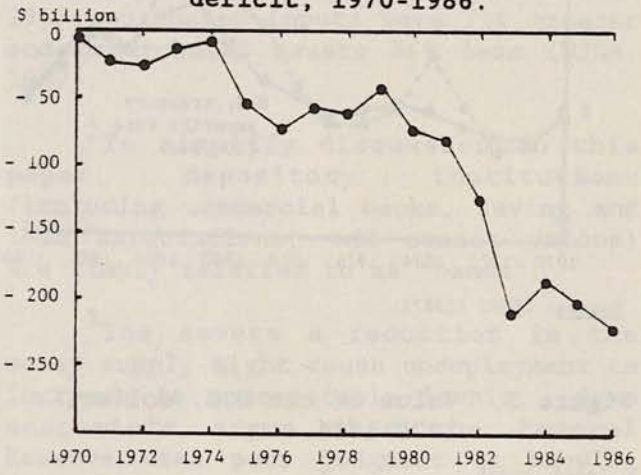
A policy mix with a restrictive fiscal policy and an expansionary monetary policy is generally second-best for agriculture. Domestic food demand still can be adequate while interest rates and the value of the dollar are kept at acceptable levels.

The other two possibilities are usually detrimental to agriculture. An expansionary fiscal policy and a restrictive monetary policy lead to perhaps satisfactory levels of domestic food demand, but also to high interest rates and dollar values. This was the predominant policy of the first half of the 1980s. Finally, restrictive fiscal and monetary policies perhaps do not lead to an unreasonable dollar value, but they do result in very low domestic demand for agricultural products and probably relatively high rates of interest.

Let's look at the record in the U.S. from 1970 through 1986. A series of six figures is used to facilitate discussion. Figures 2 and 3 give some indication of the mix of fiscal and monetary policies, respectively, for the 17-year period. If the lines in the two figures move in opposite directions during the same period, monetary and fiscal policies are operating in the same direction.

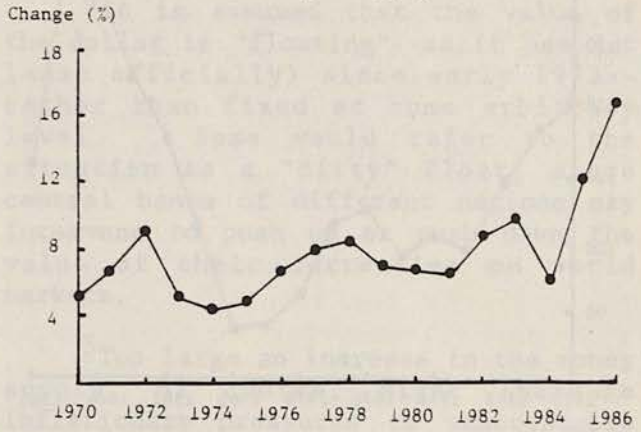
If both policies are expansionary, and the economy is operating at a high level of employment, the expansionary fiscal policy doesn't necessarily lead to higher rates of interest and higher dollar values. Though the expansionary fiscal policy still could be argued to crowd out private expenditures somewhat, the increasing money supply can have a leveling impact on interest rates. This generally was the case in the U.S. in the 1970s. The money supply and budget deficits both expanded moderately (Figures 2 and 3), and, at the same time, interest rates (Figure 4) and the international value of the dollar (Figure 5) remained relatively low. The merchandise trade balance for the U.S. also showed little tendency towards deficit over most of the period (Figure 6). U.S. agriculture flourished under these circumstances, and the value of land (the most important farm asset) reached record levels.

Figure 2. Federal government budget deficit, 1970-1986.



Source: USGPO (1987).

Figure 3. Annual percentage change in the money supply, 1970-1986.



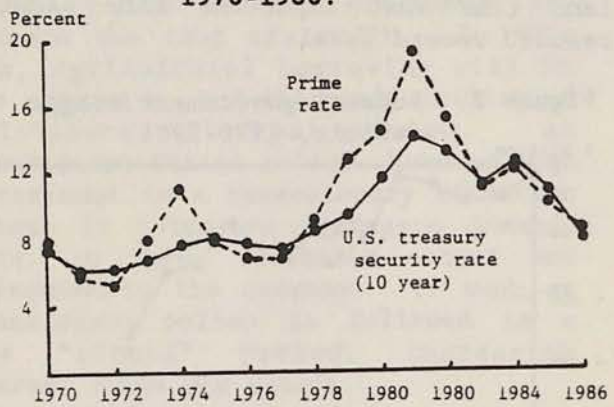
Source: USGPO (1987).

In 1979, the situation changed. Inflation in the internal economy was becoming severe (Figure 7). After declining from 1974 to 1976, the consumer-price index began to rise rapidly and reached annual rates of 11.3% in 1979 and 13.5% in 1980. The economy had also reached a high level of economic activity in 1979, with unemployment just below 6%. Under these circumstances, the Federal Reserve began a very restrictive monetary policy (Figure 3).[9] The restrictive policy contributed importantly to the recession of 1981. Fiscal policy--somewhat expansionary during 1980 to 1981--became very expansionary thereafter as a result of the tax cuts under the Economic Recovery Tax Act of 1981 and the increasing levels of military spending.[10] The economy expanded and, some would argue, reached full employment toward the end of 1983.[11] The expansionary fiscal policy and restrictive monetary policy, however, continued after 1983.

RECENT MACROECONOMIC SITUATION

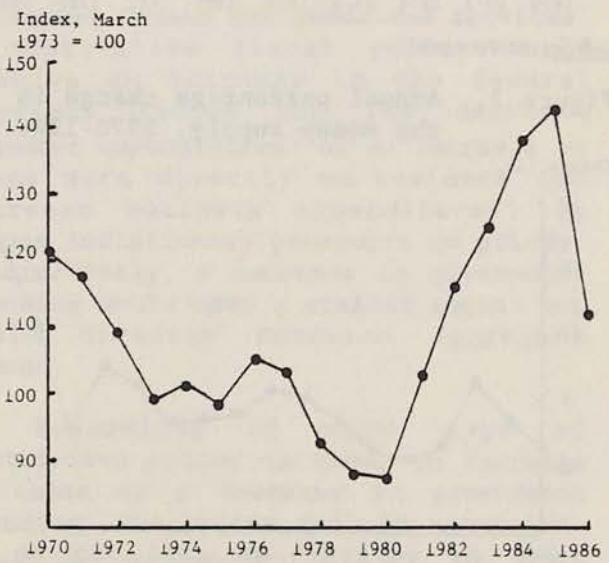
Beginning in 1985, the monetary policy shifted to become expansionary (Figure 3). Thus, the macroeconomic policies in 1985 and 1986 have again become generally favorable to agriculture. Under these circumstances, both interest rates and the

Figure 4. Prime interest and treasury security interest rates, 1970-1986.



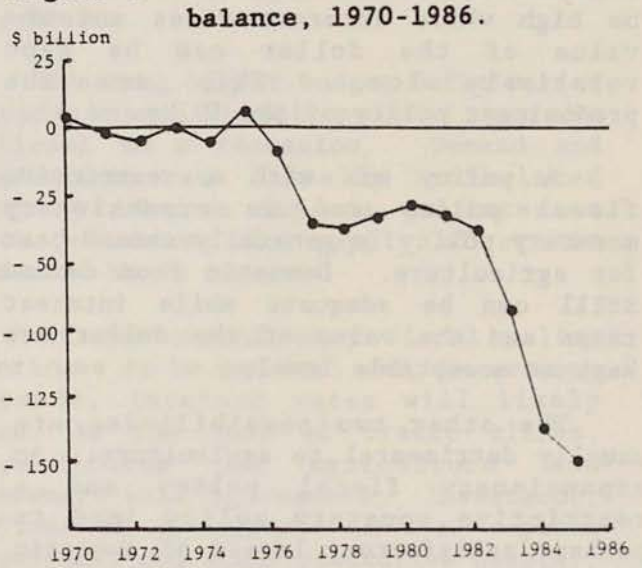
Source: USGPO (1987).

Figure 5. Value of the U.S. dollar, 1970-1986.



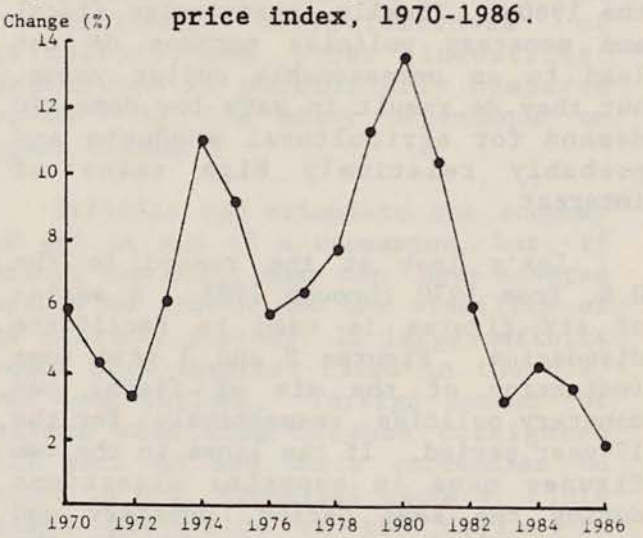
Source: USGPO (1987).

Figure 6. U.S. merchandise trade balance, 1970-1986.



Source: USGPO (1987)

Figure 7. Annual change in consumer price index, 1970-1986.



Source: USGPO (1987).

value of the dollar are expected to fall. Figures 4 and 5 suggest that both of these tendencies have taken place. Over time, the merchandise balance is expected to turn around, recognizing a certain lag in time for the financial adjustments to be translated into real goods movements. Although there are no quick miracles for agriculture, the macroeconomic prospects generally looked favorable.

The situation is changing in 1987, however, with renewed inflation fears. The fear is due in large part to the lower valued dollar (Winkler, 1987). The lower valued dollar increases exports and could push prices higher in industries that are already operating near their capacities. In addition, the lower valued dollar increases import prices. More expensive import goods mean foreign competition is reduced, and some domestic industries might respond by raising their prices.

The Federal Reserve found it necessary in September, 1987, to moderately tighten up the money supply to reduce the inflation fears produced by the falling dollar. The discount rate was increased from 5 1/2% to 6%. The prime interest rate and other rates responded. As a result of the discount rate increase, for example, the prime rate increased from 8-1/4% to 8-3/4% (Gutfeld, 1987).[12] As long as inflation fears are not realized, the Federal Reserve probably will respond with moderate restrictions on the money supply. If inflation fears are realized, monetary policy will likely become severely restrictive in light of the prospects for a continued expansionary fiscal policy.

What does all of this mean for South Dakota agriculture? Borrowing costs will rise for farmers, and the recovery of our exports may not be as robust as otherwise. Conceivably, the situation could return to that of the early 1980s. So long as inflation does not accelerate, however, and monetary policy is only moderately tightened, the situation should be tolerable.[13]

CONCLUDING COMMENTS

This paper has emphasized the large and increasing influence of the macro-economy and international economy upon agriculture. Particular attention was placed upon the impact of fiscal and monetary policy. Because of the important side-effects of national policy on South Dakota agriculture, it is important that the farm sector both understand and let itself be heard when impending policy changes will adversely impact agricultural enterprises. Agricultural prospects become particularly dim for South Dakota when the policy mix is one of a very restrictive monetary policy and very expansionary fiscal policy. Because such a policy combination is at least a possibility in the near future, agriculture should attempt to moderate both policies.

FOOTNOTES

[1]Between 1947 and 1985, the trend was clearly toward a larger proportion of the inputs of farms being provided by purchased assets. Comparing 1985 with 1947, purchased inputs were 71% greater and unpurchased assets 36% less (USDA, 1987).

[2]To simplify discussion in this paper, depository institutions (including commercial banks, saving and loan associations, and credit unions) are simply referred to as "banks".

[3]Too severe a reduction in the money supply might cause unemployment to increase to unacceptable levels. Some economists argue that the Federal Reserve uses poor judgment in knowing when to stop expanding or restricting the money supply, and in some cases curing one problem causes another.

[4]It is assumed that the value of the dollar is "floating"--as it has (at least officially) since early 1973--rather than fixed at some arbitrary level. Some would refer to the situation as a "dirty" float, since central banks of different nations may intervene to push up or push down the value of their currencies on world markets.

[5]Too large an increase in the money supply, of course, might increase inflationary pressures to unacceptable levels. The "short-run" is emphasized

in the discussion of both a restrictive and expansionary policy to emphasize the greater uncertainty of longer-term impacts.

[6]The theory was that the reduction in taxes that started taking place in 1982 would raise expectations of the private sector of the economy (farmers, workers, and others). Though tax rates were reduced, output was expected to rise sufficiently to increase tax revenue (since federal taxes are predominantly income taxes) and to lower (not raise) the deficit. So far, the expansion has presumably not been sufficient to substantially reduce the deficit.

[7]Sound familiar? Quiz: If banks buy government securities, what happens to loans and the rate of interest? If you answered that loans would decrease and the rate of interest would rise, you are right. Interest rates are going to rise if banks buy government debt since they have less reserves to create loans and the money supply will be reduced, as noted earlier.

[8]The cost of such a policy, of course, might be high inflation rates if the economy is operating at high levels of economic activity.

[9]The rates of change in the money supply in Figure 3 are somewhat deceiving as an indication of the actual severity of monetary policy. A more appropriate indication of the severity of monetary policy is the change in the "real" money supply. The real money supply is the actual (nominal) increase in the money supply less the rate of inflation. Since the inflation rate measured by the consumer price index in Figure 7 was 13.5% and the change in the money supply was only 7.1% in 1979, the real change in the money supply was negative in that year. For a more detailed explanation, see Dornbusch and Fischer (1987, pp. 165-172).

[10]The deficits shown in Figure 2 are not only the result of conscious increases or decreases in taxes and/or expenditures. A portion of the deficits came about as a result of the level of economic activity. The higher the level of economic activity, the higher the level of income, and hence the higher the level of tax revenue and the lower the resulting deficit budget. The opposite situation would result from a decline in economic activity. Nevertheless, if the impact of the economy on the size of the deficit budget is removed, the impact of conscious fiscal policy was still expansionary until at least 1984.

[11]The maximum level of unemployment consistent with "full employment" is a matter of debate. Unemployment rates have been as follows: 9.7% in 1983, 7.5% in 1984, and 7.0% in 1986. Which, if any, of these rates represents "full" employment is not subject to ready agreement among economists.

[12]The prime interest (lending) rate is applicable to very large borrowers with very good credit ratings. Other interest rates fluctuate in the same direction as the prime rate.

[13]Whoops! Problems with the stock market in October of 1987 (when this article is being reviewed for the last time) may lead to a more moderate or expansionary monetary policy. The Federal Reserve is not currently using a target for the level of the money supply, and it appears they may switch policies fairly quickly due to short-term needs of the economy.

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Continued on p. 23

TRADE DEFICITS, FOREIGN CAPITAL INFLOWS, AND FEDERAL BUDGET DEFICITS

Bashir A. Qasmi[1]

The world-wide plunge in the stock market during the third week of October, 1987, is a reflection of investor concern about U.S. continuing and large federal budget and trade deficits (Gutfield, 1987; Gutfield, et al., 1987; WSJ Editorial, 1987). It also emphasizes interdependence within the world capital market. Some economists had been warning that, without corrective policy actions, such a shakeup in the financial market was inevitable (e.g., Thurow, 1984).

The purpose of this Chapter is to explain the interrelationships among trade deficits, capital inflows, and federal budget deficits in the U.S. from 1965 to 1986. Specifically, it is shown that: (1) U.S. trade deficits are large and widespread, (2) federal budget deficits are now largely financed by foreign capital inflows, and (3) reductions in the trade deficit are unlikely to come without prior reductions in the federal budget deficit. Finally, some implications for South Dakota agriculture are discussed.

TRENDS IN U.S. TRADE BALANCE, 1965-1986

During the 1960s, the value of U.S. exports of goods and services, which averaged about 5.8% of Gross National Product (GNP), consistently exceeded the value of U.S. imports. The resulting trade surpluses are shown in the final column of Table 1. U.S. export sales boomed in the 1970s and, by 1981, the exports of goods and services totaled $376.5 billion (12.3% of GNP). During the same period, U.S. imports increased at an even faster rate, totaling $362.2 billion in 1981. This left a trade surplus in 1981 of $14.3 billion.

Since 1981, U.S. exports have declined to $372.8 billion (1% below the 1981 level). U.S. imports, on the other hand, have greatly increased and in 1986 they reached $498.5 billion (37.4% above 1981). During just five years, the U.S. trade deficit has grown from zero to over $125 billion.

The U.S. trade deficit is no longer limited to Japan and Canada. Instead, the U.S. is experiencing trade deficits with many trading partners. In fact, Stern (1986) reports that, since the early 1980s, the U.S. trade gap has widened with virtually all major areas of the world.

U.S. TRADE BY SECTOR

Traded goods and services are often separated into three classes: (1) agricultural goods, (2) non-agricultural goods, and (3) services. A review of trade trends from 1965 to 1986 clearly shows distinct differences in the degree of deterioration in the trade balance for each of the three sectors (Figure 1).

Agricultural goods

Each year from 1965 to 1986, the value of agricultural exports has exceeded the value of agricultural imports. The average annual agricul-

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tural trade surplus from 1965 to 1969 was $1.8 billion. Export earnings from agricultural goods increased more than six fold from 1969 to 1981. During this period, imports of agricultural goods increased at a much slower rate. Thus, trade surpluses continually increased, reaching a peak in 1981 of $27.0 billion.

Since 1981, U.S. agricultural exports have declined while agricultural imports have slowly and steadily increased. As a result, the annual surplus from agricultural trade in 1986 was only $4.8 billion (even lower than the agricultural trade surplus in 1973).

Thus, the strong traditional trade surplus in U.S. agricultural goods is being threatened. Given the current U.S. policy goal of reducing farm price supports and the recent decline in the value of the U.S. dollar relative to other foreign currencies, however, the agricultural trade surpluses may show some modest improvements in the coming years.

Non-agricultural goods

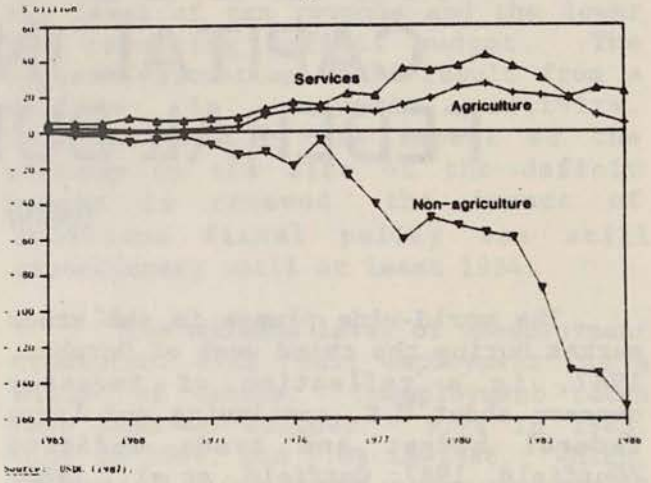
During 1965 to 1969, annual U.S. exports of non-agricultural goods ranged from $21.0 to $31.8 billion. On average, the trade in non-agricultural goods showed an annual deficit of about $2.3 billion. Since 1969, the annual exports of non-agricultural goods have increased from $31.8 to $207.1 billion. However, annual imports of these goods have increased from $35.7 to $360.0 billion, resulting in a very steep deficit ($152.9 billion) in non-agricultural goods trade.

Services

During 1965 to 1969, the U.S. receipts for services exceeded U.S. payments for services by about $6 billion per year. After that, the trade surplus in services increased steadily, reaching a peak of $43.5 billion in 1981. Since 1981, the annual surplus from services has decreased, but only to $22.4 billion in 1986.

Investment income is the most important component in the U.S. trade in services. Since World War I, the U.S.

Figure 1. U.S. balance of trade, by sectors, 1965-1986.



has traditionally been a net creditor nation. Receipts of dividends and interest from foreigners have exceeded corresponding payments to foreigners.

In recent years, however, the flow of foreign capital into the U.S. has increased faster than capital outflows. As a result, the U.S. investment income surplus decreased from $34.1 billion in 1981 to $20.8 billion in 1986.

Since the U.S. is now a net debtor nation, the services sector trade surplus in coming years is expected to become much smaller. The services sector trade balance may even move into deficit.

CAPITAL FLOWS

The financial impacts of the trade balance do not come from the transfer of goods and services, but from the movement of funds. Therefore, international financial transactions which are not directly related to the transfer of goods and services must also be taken into account. These financial transactions include unilateral transactions, capital flows, and changes in official reserves.

Unilateral transactions include grants from one government to another, the payment of pensions to retirees who live in other countries, and the private remittance of funds for non-business purposes. Unilateral payments from the U.S., in general, exceed unilateral payments received by U.S. residents,

thereby implying usual negative balances. From 1965 to 1979, the annual net unilateral transfers from the U.S. ranged from $3 to 7 billion (Table 2). More recently, the net annual unilateral transfers from the U.S. have grown to nearly $16 billion.

The sum of the trade balance for goods and services and net unilateral transactions indicates the change in a country's net obligations to foreigners during the year. If this sum[2] is negative, it must be offset by net capital inflows, a reduction in U.S. official reserves, an increase in the official reserves of other countries, or some combination of these. Similarly, if this sum is positive, it has to be offset by net capital outflows, an increase in U.S. official reserves, a decrease in the official reserves of other countries, or some combination of these.

Today, there is a world-wide capital market, with large amounts of capital moving across international boundaries. Because of relatively easy capital movements, particularly among the industrialized countries, large adjustments in trade imbalances take place through capital flows. Because the changes in official reserves are small relative to those in capital flows, the changes in the reserves are not discussed separately.

Capital outflows basically reflect the amount of U.S. financial capital invested in foreign countries. The annual capital outflows from the U.S. averaged $9.1 billion for 1965 to 1969. These outflows continued to increase until they reached a record level of $121.2 billion in 1982 (Table 2). Since 1982, the annual capital outflows from the U.S. have been substantially less.

Capital inflows, on the other hand, reflect the amount of foreign financial capital invested in the U.S. For 1965 to 1969, the average annual capital inflow into the U.S. was about $6.9 billion (Table 2). Since then, it has increased rapidly until, in 1986, it reached $213.4 billion.

Financial capital movements which escape accounting are depicted as "statistical discrepancies". Positive statistical discrepancies reflect primarily U.S. dollars held by foreigners. Sooner or later, these U.S. dollars show up in the international financial market or the U.S. underground

Table 1. U.S. balance of trade for goods and services, 1965-1986.[a]

Year	Balance for agricultural goods	Balance for non-agric goods	Balance for all goods[b]	Balance for services[c]	Balance for goods and services[d]
	($ billion)				
1965-69[e]	1.8	- 2.3	- 0.5	6.0	5.5
1970-74[e]	5.6	- 10.5	- 4.8	10.2	5.4
1975-79[e]	13.9	- 35.4	- 21.5	25.2	3.7
1980	24.8	- 52.5	- 27.7	37.2	9.5
1981	27.0	- 56.2	- 29.2	43.5	14.3
1982	21.8	- 59.1	- 36.7	37.0	0.3
1983	20.6	- 87.4	- 67.4	30.6	- 36.8
1984	18.6	-133.0	-114.4	19.6	- 94.8
1985	9.3	-134.8	-125.5	24.4	-101.1
1986	4.8	-152.9	-148.1	22.4	-125.7

[a]Positive numbers indicate surpluses (exports exceeding imports) and the negative numbers indicate deficits (imports exceeding exports).

[b]"Balance for all goods" equals the sum of the prior two columns.

[c]"Balance for services" includes net receipts from other countries for travel and transportation, royalties, fees, and dividends and interest.

[d]"Balance for goods and services" equals the sum of the prior two columns.

[e]The figures shown are annual averages for the indicated five-year periods.

Source: Derived from USDC (1987).

Table 2. Financial transactions offsetting the U.S. balance of trade for goods and services, 1965-1986.

Year	Balance for goods services[a]	Unilateral transfers[a]	Capital outflows[b]	Capital inflows[c]	Statistical discrepancy[d]
	($ billion)				
1965-69[e]	5.5	- 3.1	- 9.1	6.9	- 0.2
1970-74[e]	5.4	- 4.6	- 18.7	21.2	- 3.2
1975-79[e]	3.7	- 5.4	- 50.2	41.5	10.5
1980	9.5	- 7.6	- 86.1	59.3	25.0
1981	14.3	- 7.5	-111.0	84.1	20.0
1982	0.3	- 9.0	-121.2	93.7	36.1
1983	- 36.8	- 9.5	- 49.8	84.9	11.2
1984	- 94.8	-12.2	- 22.3	102.5	26.8
1985	-101.1	-15.3	- 31.4	129.9	17.9
1986	-125.7	-15.7	- 96.0	213.4	23.9

[a]Positive numbers indicate surpluses (exports exceeding imports) and the negative numbers indicate deficits (imports exceeding exports).

[b]"Capital outflow" includes increases (-) in the U.S. official reserves and SDR's allocation (+) to the U.S. by the International Monetary Fund.

[c]"Capital inflow" includes increases (+) in foreign official reserves.

[d]The sum of the first two columns equals the sum of the last three columns. In financial transactions computations, "statistical discrepancy" is calculated to represent the residual value in this identity.

[e]The figures shown are annual averages for the indicated five-year periods.

Source: Derived from USDC (1987).

market, and then in the U.S. capital market. Statistical discrepancies in the 1980s have ranged from positive $11.2 to $36.1 billion (Table 2).

TRADE DEFICITS AND FOREIGN CAPITAL FLOWS

The total net capital flow is represented by the sum of the capital inflows, the capital outflows, and statistical discrepancies. In general, total net capital flows should be about equal to the balance of trade (including net unilateral transfers). Since the changes in net unilateral transfers are relatively small, any changes in the goods and services trade deficits also result in equivalent changes in net capital flows or a country's net foreign debt. If the balance of trade is negative, the total net capital flow is expected to be positive (the total net capital inflows), indicating that the country is a net debtor to other countries. Similarly, if the balance of trade is positive, the total net capital flow is expected to be negative (the total net capital outflows), indicating that the country is a net creditor to other countries.

In practice, however, total net capital flows may not exactly equal trade deficits because of changes in the value of gold and foreign currencies held as reserves. Nevertheless, total net capital flows provide a relatively good estimate of a country's net foreign credit position.

The yearly total net capital inflow and the goods and services trade deficits for the U.S. are shown in Figure 2. Total net capital inflows are clearly inversely related to trade deficits. With minor exception, the U.S. recorded a continuous goods and services trade surplus from 1965 to 1982. During these years, the U.S. also generally experienced a negative total net capital flow, indicating that the U.S. was a net creditor.

Since 1982, the U.S. has experienced increasingly severe goods and services trade deficits. During these same years, the U.S. has registered increasingly large positive total net capital flows. Thus, the U.S. is now a definite net debtor country, with an alarming increase in net debts each year. As a result of this increased dependence on foreign capital, the U.S. financial market is subject to extreme vulnerability.[3]

UNPLEASANT ARITHMETIC OF BUDGET AND TRADE DEFICITS

The relationship between the federal budget deficits and trade deficits can be shown by the following identity:[4]

Private Savings Surplus		State & Local Surplus	-	Federal Budget Deficit	=	Trade Deficit.

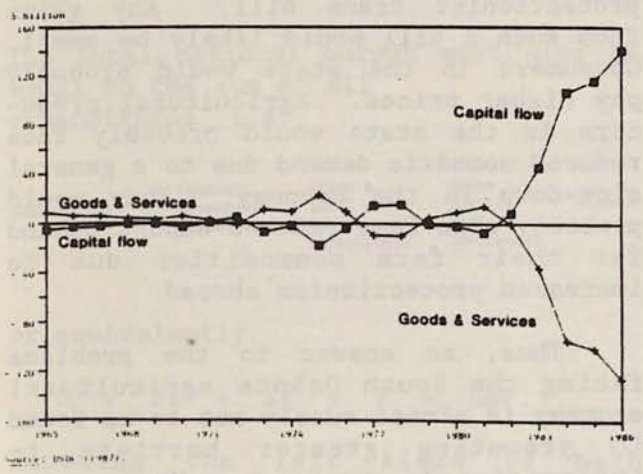
The private savings surplus is equal to gross private savings minus gross private domestic investment. The state and local surplus is equal to total receipts minus total expenditures by state and local governments. It has already been established that trade deficits are also approximately equal to net borrowing from foreigners (total net capital inflows).

This identity shows that if the (1) private savings and (2) state and local surpluses are inadequate to offset the federal deficit, a country has to have a trade deficit so that funds can be borrowed from foreigners. If the economy is operating at full capacity and the foreign funds are not available, impacts of federal borrowing will depend upon the monetary policy being pursued.

If the Federal Reserve pursues a restrictive monetary policy, interest rates are likely to increase and a good part of federal deficits would, probably, be financed by the crowding out of private investments.[5] On the other hand, if the Federal Reserve pursues an expansionary monetary policy, inflation is likely to result. Both policy options affect the economy adversely.

In the past four to five years, federal borrowing needs (equal to federal deficits) have been increasing, while the surpluses from private sources and state and local governments have been decreasing (Table 3). As a result, the gap between the funds needed to finance federal deficits and the surplus

Figure 2. U.S. trade deficit and foreign capital flow, 1965-1986.



available from domestic sources has greatly increased (Figure 3). This gap has been met by borrowing funds from foreign sources which was made possible by trade deficits.

TRADE LEGISLATION AS A SOLUTION

In response to increased international trade deficits, many federal legislators are eager to pass trade legislation aimed at achieving a balance in trade with various trading partners. Although varying in detail, all such proposals are basically protectionist. These protectionist moves address the symptoms of macroeconomic maladjustments in the U.S. (trade deficits), not the fundamental underlying causes of the maladjustments.

Protectionist trade legislation may save some jobs in the short run for industries facing severe competition from abroad. But the adverse affects of such legislation, especially in the longer run, are almost sure to outweigh the benefits. Three adverse effects of trade protectionist policies are the following:

1. To the extent that trade protectionist legislation limits imports and protects domestic producers from foreign competition, higher consumer prices for some goods and services are almost inevitable.

2. Because foreign capital will not be available, the federal deficit has to be financed domestically. In the absence of an expansionary monetary policy, this would require the crowding out of private investment and/or a substantial increase in domestic savings, resulting in a decrease in aggregate expenditure and possibly a recession. An expansionary monetary policy to accommodate federal borrowing, on the other hand, may fuel the fires of a new round of inflation.

3. An even more certain outcome of protectionist policy is retaliation by

Table 3. Availability of domestic funds for financing U.S. gross domestic investment and the U.S. federal deficit, 1965-1986.

Year	Gross private savings	Gross private domestic investment	Local and state government surplus[a]	Federal borrowing to finance deficit[b]	Overall surplus domestic funds[c]	Balance of trade in goods and services[d]
			($ billion)			
1965-69[e]	138.6	132.1	0.2	2.4	4.3	5.5
1970-74[e]	211.4	200.6	7.7	13.7	4.8	5.4
1975-79[e]	366.9	342.6	20.6	42.9	2.0	3.7
1980	478.4	437.0	26.8	61.3	6.9	9.5
1981	550.5	515.0	34.1	63.8	5.3	14.3
1982	557.1	447.3	35.1	145.9	- 1.0	0.3
1983	592.2	502.3	47.5	176.0	- 38.6	- 36.8
1984	674.8	662.1	68.5	170.0	- 88.8	- 94.8
1985	687.8	661.1	61.7	198.0	-109.6	-101.1
1986	680.5	684.4	60.8	204.0	-147.1	-125.7

[a] "Local and state government surpluses" include federal transfers to state and local governments.

[b] "Federal borrowing to finance deficit" equals Federal budget deficit.

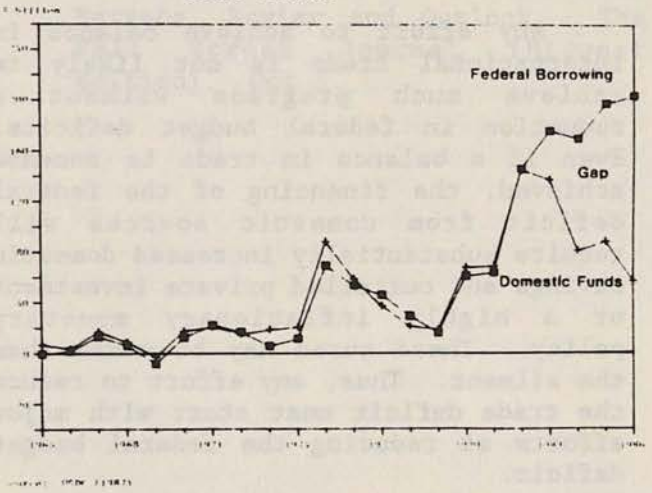
[c] "Overall surplus domestic funds" represents the difference between the sum of the first and third columns and the sum of the second and fourth columns. The negative numbers indicate the shortage of capital from domestic sources. These domestic capital shortages are met through borrowing from non-U.S. sources.

[d] The positive numbers indicate U.S. trade surpluses (exports exceeding imports) and negative numbers indicate U.S. trade deficits (imports exceeding exports).

[e] The figures shown are annual averages for the indicated five-year periods.

Source: Derived from USDC (1987).

Figure 3. U.S. federal borrowing needs and domestic funds available, 1965-1986.



other countries with their own protectionism. Selling U.S. products abroad will become more difficult. Increased protectionism also can gain a world-wide momentum, resulting in world-wide recession. Therefore, considering protectionist trade legislation--even as a bargaining chip to extract concessions from trading partners--is quite risky.

IMPLICATIONS FOR SOUTH DAKOTA AGRICULTURE

The U.S. trade deficit has mushroomed in the 1980s. In five years, it has grown from zero to over $125 billion. The U.S. trade deficit no longer involves two or three countries. It has spread into virtually all major regions of the world. Without major corrective policy interventions, the U.S. trade balance is likely to continue to further deteriorate.

Current federal budget deficits cannot be financed domestically. U.S. trade deficits, in effect, are financing the U.S. federal budget deficits. These trade deficits enable the U.S. to borrow funds from other countries.

Any effort to achieve balance in international trade is not likely to achieve much progress without a reduction in federal budget deficits. Even if a balance in trade is somehow achieved, the financing of the federal deficit from domestic sources will require substantially increased domestic savings and curtailed private investment or a highly inflationary monetary policy. These cures may be worse than the ailment. Thus, any effort to reduce the trade deficit must start with major efforts at reducing the federal budget deficit.

A protectionist trade bill may, in the short run, save some jobs in the industries facing competition from abroad. However, it would probably result in higher prices for consumers and increased difficulties for agriculture and other industries which depend on large export sales. Furthermore, it could be catalytic to a certain world-wide protectionism which could contribute to world-wide recession.

Relatively few industries in South Dakota would likely benefit from a protectionist trade bill. Any gains from such a bill would likely be small. Consumers in the state would probably pay higher prices. Agricultural producers in the state would probably face reduced domestic demand due to a general slow-down in the economy. They would probably also face reduced export demand for their farm commodities due to increased protectionism abroad.

Thus, an answer to the problems facing the South Dakota agricultural economy is almost surely not to be found in promoting greater barriers to international trade. Much more fundamental is a reduction in the federal budget deficit. Without purposeful and courageous efforts to this end, overcoming the basic maladjustments in the U.S. macroeconomy is likely to remain like the proverbial "chasing after the wind".

FOOTNOTES

[1]Suggestions and helpful comments by Larry L. Janssen, William E. Kamps, Brian H. Schmiesing, and Donald C. Taylor are gratefully acknowledged by the author.

[2]The sum of the goods and services traded balance and net unilateral transactions is generally referred to as the current account balance.

[3]Foreign investments are sensitive to changes in U.S. interest rates relative to other industrialized countries, as well as to the investors' expectations concerning prospective changes in the exchange rates. Even when U.S. interest rates are relatively high, a fear of the decreasing value of the U.S. dollar can make foreign investors very nervous.

[4]All expenditure in an economy must be equal to the national output plus exports minus imports, i.e.,

Consumption	+	Federal Tax receipts	+	State & Local Tax Receipts	+	Gross Private Domestic Savings	+ Exports - Imports = Output

or equivalently,

$$C + FT + ST + S + X - M = GNP.$$

The total national output must also be equal to the sum of all expenditures, i.e.,

Consumption	+	Federal Government Expenditure	+	State & Local Government Expenditure	+	Gross Private Domestic Investment	=	Output.

or equivalently,

$$C + FE + SE + I = GNP.$$

Equating the left sides of both equations, and rearranging the terms, the following identity is obtained:

$$(S-I) + (ST-SE) - (FE-FT) = (M-X), \text{ or}$$

Private Saving Surplus	+	State & Local Surplus	-	Federal Budget Deficit	=	Trade Deficit

This identity gives the basic relationship between the federal budget deficits, trade deficits, state and local surplus, and private surplus (Stern, 1986).

[5]For example, foreign funds may not be available if: (a) U.S. trade deficits are eliminated and/or (b) foreigners' expectations are for a lower value of the U.S. dollar. Increased surplus from state and local government is less likely. In 1986, Gross Private Savings were only 16% of GNP. If the 1986 budget deficits were to be financed by increasing domestic savings, the gross Private Domestic Savings in 1986 would have to be increased to 20% of GNP. Such increases in U.S. Domestic Private Savings are not likely.

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IMPACTS OF FEDERAL FARM POLICY ON SOUTH DAKOTA AG PRODUCERS

Richard C. Shane[1]

South Dakota agricultural producers received $232 million of government payments in 1985. This represented 7.2% of their total revenue from crop and livestock sales. In 1983, government payments were even higher at $267 million or 9.6% of farm revenue. Government payments in 1986 will be higher still. These government payments made up 36.9 and 39.7% of net farm income in 1984 and 1985, respectively (SDASS, 1987).

FARM PROGRAM HISTORY[2]

Government programs have played a major role in shaping South Dakota's agricultural economy for more than 50 years. The first modern farm commodity legislation was the Agricultural Adjustment Act of 1933. Even before the passage of that act, farm organizations, politicians, and analysts were encouraging farmers to voluntarily reduce production. The objective was to stem the disastrous drop in farm prices mainly attributed to a loss of agricultural export markets in the 1920s. At that time, surpluses of farm commodities began to build.

Cooperative marketing was authorized by the Agricultural Marketing Act of 1929. However, attempts by cooperatives to control surpluses and stabilize prices failed. In December, 1932, board members recommended legislation to Congress to control production of agricultural commodities.

From the first major agricultural legislation or "farm bill" in 1933 until today, much debate has surrounded the issues of: (1) acreage reduction versus marketing quotas, and (2) flexible market-oriented price supports versus rigid, high income enhancing price supports. Nevertheless, the underlying goals of farm policy throughout the 50-plus year period have been basically the same, namely, to achieve production control and income stability.

The farm bill of 1933 provided for voluntary acreage reductions and price supports based on parity. Although other farm bills were passed between 1933 and 1938, the Agricultural Adjustment Act (AAA) of 1938 was the first to make sweeping changes. The 1938 farm bill provided for marketing quotas, acreage allotments, payment limitations, and non-recourse loans. The AAA legislation of 1933 and 1938 provided the basic foundation for farm policy over the ensuing 50 years.

The Agricultural Act of 1948 shifted price supports from fixed percentages of parity to flexible amounts. The Agricultural Act of 1949 superseded the 1948 legislation, however, and postponed flexible price supports. The Agricultural Act of 1949 and the Agricultural Adjustment Act of 1938 are fundamental legislation with no expiration dates. If current agricultural policy changes are not enacted before expiration of amendments such as the 1985 Food Security Act, the farm program reverts to these two laws.

Flexible price supports--provided through the Agricultural Act of 1954--were first put in place during the 1955 production season. This act also authorized Commodity Credit Corporation (CCC) grain reserves. Following were the Agricultural Act of 1956, which provided for the famous Soil Bank, and the Emergency Feed Grain Program of 1961. The latter provided for voluntary acreage reduction, but this time with payment-in-kind provisions.

By the early 1960s, most of the jargon we hear today in farm legislation arguments had already been established. Further legislation became a rehash of past policy, with varying combinations

of provisions and an occasional new slant. By 1964, voluntary acreage reduction programs for feed grains were extended to cover wheat. Wheat marketing certificates (quotas) also were issued.

In 1970, as cyclic surpluses were beginning once again to ease, more flexible supply control was enacted. To promote increased exports, policy tended more to a market orientation. Government payments were limited to $55,000 per crop as major concerns surfaced in regard to large payments received by commercial farms.

Farm legislation of the 1970s reflected the world economy of the day. Population and income increases in developing countries, policy changes in centrally planned economies, and reduced growth rates in world grain production led to unprecedented demand growth for farm products. World agricultural trade expanded from $50 billion in 1970 to more than $225 billion in 1980.

During this decade, U.S. exports increased six fold (Mackie, et al., 1987). As the world feed grain trade skyrocketed (Figure 1), the U.S. became heavily dependent on foreign markets. In both absolute and relative terms, the U.S. grew in its dominance of the world feed grain export market (Figure 2).

Agricultural policy reflected the "good times" down on the farm. Under the Agriculture and Consumer Protection Act of 1973, price support payments were replaced with target prices covering cost of production and deficiency payments. Payment limits were reduced to $20,000 per crop, and production expansion was emphasized to meet accelerating growth in world demand.

As world demand was spurred on by the devaluation of the U.S. dollar, farm commodity prices reached astounding levels. Fence-row to fence-row production was encouraged to stave off the food disasters forecast by Malthusian supporters. The Food and Agriculture Act of 1977 provided for increases in price and income supports.

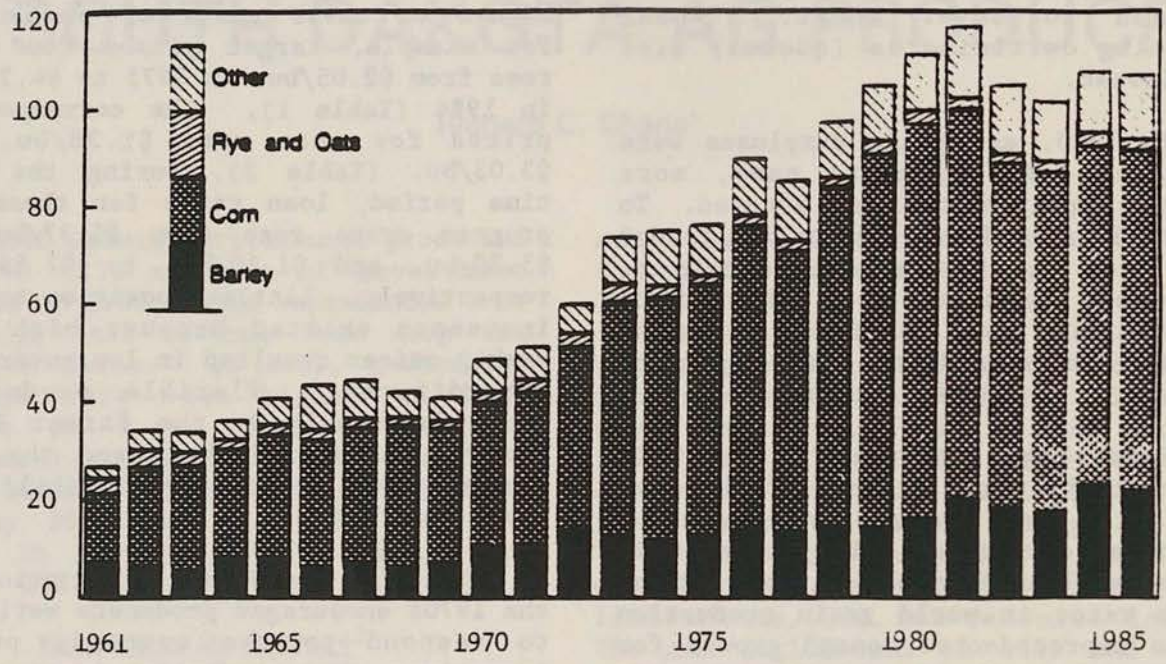
As crop prices escalated, input prices climbed higher and costs of production increased. With rapid increases in land input prices, target prices and loan rates both were adjusted higher to cover costs of production. For example, target prices for wheat rose from $2.05/bu. in 1975 to $4.38/bu. in 1984 (Table 1). The corresponding prices for corn were $1.38/bu. and $3.03/bu. (Table 2). During the same time period, loan rates for these two program crops rose from $1.37/bu. to $3.30/bu. and $1.10/bu. to $2.55/bu., respectively. Little opposition to such increases existed because high cash market prices resulted in low government expenditures. Flexible production controls remained, the Farmer Owned Reserve was established, and the USDA Secretary was given some flexibility to lower loan rates.

The high world cash-grain prices of the 1970s encouraged producers worldwide to respond to the economic profit incentive. Crop production increased in other countries as well as in the U.S. (Table 3). To become less dependent on the world market, both importing countries and exporting countries expanded production.

By the early 1980s, many of the world economic conditions that had encouraged expansion were drastically changed. Economic growth stagnated, and importing countries became increasingly aware of the need to preserve foreign exchange to service debt. Trade policies became increasingly protectionist to shield farmers from drops in world prices. Marginal lands that were put under the plow to meet increasing demands throughout the 1970s began to contribute to grain surpluses.

The potentially devastating impacts of large surpluses were not yet apparent when the Agriculture and Food Act of 1981 was enacted. This farm bill provided for higher target prices and loan rates than those in 1980 (Tables 1 and 2). Cash prices at the local level still were above support prices. However, Congress was aware that farm program costs needed to be reduced, and a number of cost-cutting measures were enacted. Dairy support prices were lowered, and rice allotments and quotas were eliminated.

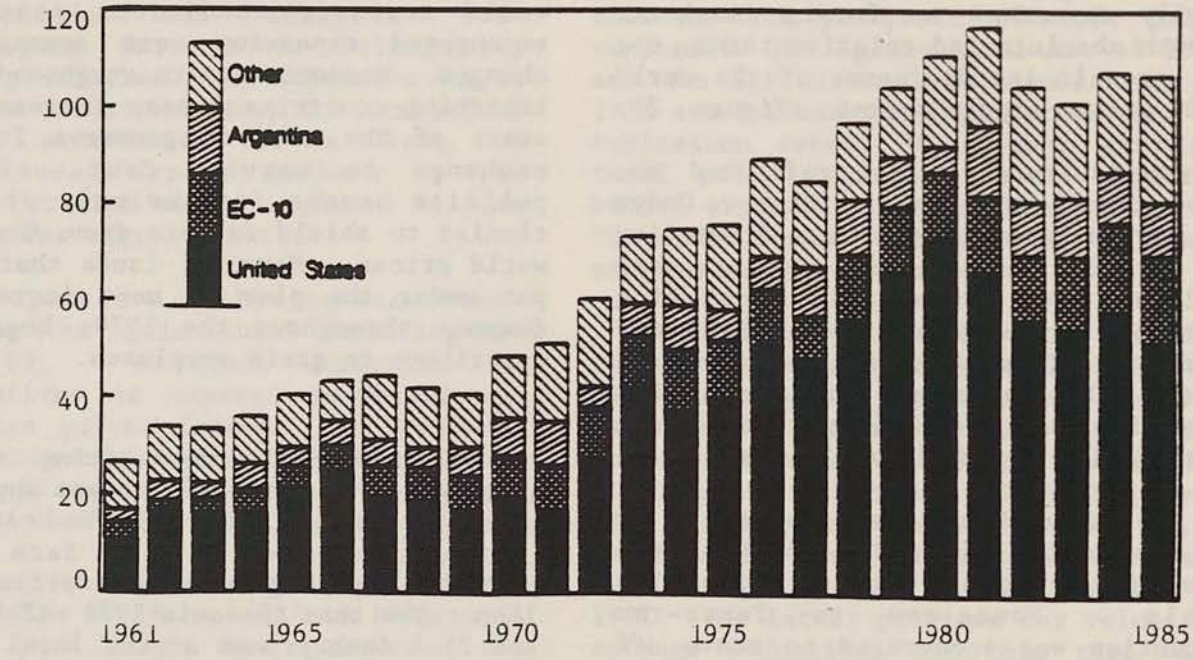
Figure 1. World feed grain exports, by commodity, 1961-1985.



Source: Mackie, et al. (1987).

Figure 2. Relative share of major world feed grain exporters, 1961-1985.

Million
metric tons



Source: Mackie, et al. (1987).

Early in the 1980s, surpluses began to mount, and U.S. and world grain prices plummeted. Loan rates established for U.S. crops tended to set a floor under world prices, with prices staying close to the loan rate in years of surplus (Figures 2 and 3).

Surpluses of grain led the Secretary of Agriculture, John Block, to use some of his discretionary authority. Set-aside requirements of 10% for corn and 15% for wheat were imposed in 1982. These set-sides had little impact on production, however, and another record harvest was put in the bins.

By the end of 1982, it was apparent that the farm bill of 1981 and its high price supports could not continue. U.S. exports decreased for the first time in eight years, but production was at record levels. Farm prices decreased, and net income to farming fell to its lowest real level since 1933. Land values began to drop, and farmer equity began to erode. Loan payments became delinquent. Many farmers faced bankruptcy. Government action once again, as in the 1960s, centered around surpluses.

More drastic measures of supply control were initiated with the payment-in-kind (PIK) program of 1983. To qualify for government PIK payments, producers had to set aside certain minimum fractions of their crop bases. They also had the option to divert an additional 10-30% of their crop base for additional PIK payments. Farmers could bid to remove 100% of their base acres from production if they wished. PIK payment rates were set at 80% of normal yield for all crops except for wheat, for which the rate was 95%. The 1983 farm program, including PIK, led to 82 million acres of program crops (one third of normal planted acres) being diverted from production.

High participation, coupled with the worst drought since the 1930s, led to larger than expected harvest reductions. Prices for PIK commodities rose more than anticipated. Farmers who either participated heavily in the PIK program or not at all received excellent income if they were located in non-drought stricken areas of the U.S.

Table 1. Wheat government support and cash prices, United States, 1933-1988.

Crop year	National average support price: Target price	National average support price: Loan price	National average price to farmers: Cash price to non-government program participants	National average price to farmers: Blended price to government program participants[a]
	($ per bushel)			
1938	n/a	0.59	0.56	n/a
1943	n/a	1.23	1.36	n/a
1948	n/a	2.00	1.98	n/a
1953	n/a	2.21	2.04	n/a
1958	n/a	1.82	1.75	n/a
1963	2.00	1.82	1.85	2.03
1968	2.63	1.25	1.24	1.79
1973	3.39	1.25	1.95	4.17
1974	2.05	1.37	4.09	n/a
1975	2.05	1.37	3.56	n/a
1976	2.29	2.25	2.73	n/a
1977	2.90	2.25	2.31	2.85
1978	3.40	2.35	2.90	3.50
1979	3.40	2.50	3.78	n/a
1980	3.08	3.00	3.91	n/a
1981	3.81	3.20	3.70	3.85
1982	4.05	3.55	3.55	4.05
1983	4.30	3.65	3.53	4.30
1984	4.38	3.30	3.38	4.38[b]
1985	4.38	3.30	3.16	4.38[b]
1986	4.38	2.40	2.42	4.38[b]
1987	4.38	2.28	2.60[b]	4.38[b]
1988	4.29	2.17	2.85[b]	4.00[b]

n/a = not available

[a]The blended price reflects a combination of the cash price, loan rate, and government payments. If the cash price exceeded the government support price, blending prices was not necessary.

[b]Projected by the author.

Sources: USDA (1982b and 1986).

Table 2. Corn government support and cash prices, United States, 1938-1988.

Crop year	National average support price: Target price	National average support price: Loan price	National average price to farmers: Cash price to non-government program participants	National average price to farmers: Blended price to government program participants[a]
	($ per bushel)			
1938	n/a	.57	.47	n/a
1943	n/a	.90	1.08	n/a
1948	n/a	1.44	1.28	n/a
1953	n/a	1.60	1.48	n/a
1958	n/a	1.36	1.12	n/a
1963	1.25	1.07	1.11	1.19
1968	1.35	1.05	1.08	1.20
1973	1.64	1.05	2.55	2.71
1974	1.38	1.10	3.03	3.08
1975	1.38	1.10	2.54	2.56
1976	1.57	1.50	2.15	n/a
1977	2.00	2.00	2.03	n/a
1978	2.10	2.00	2.20	n/a
1979	2.20	2.00	2.50	n/a
1980	2.35	2.25	3.11	n/a
1981	2.40	2.40	2.50	n/a
1982	2.70	2.55	2.68	2.70
1983	2.86	2.65	3.25	n/a
1984	3.03	2.55	2.62	3.03[b]
1985	3.03	2.55	2.41	3.03[b]
1986	3.03	1.92	1.51	3.03[b]
1987	3.03	1.82	1.90[b]	3.03[b]
1988	2.97	1.74	1.80[b]	2.90[b]

n/a = not available

[a]The blended price reflects a combination of the cash price, loan rate, and government payments. If the cash price exceeded the government support price, blending prices was not necessary.

[b]Projected by the author.

Sources: USDA (1982a and 1986).

However, farmers who did not participate in PIK, and who were stricken with drought, incurred heavy losses. Many of these had speculated on a large PIK program participation rate and higher prices. They had not counted on a crop failure. As a result, they experienced severe financial stress.

Export declines through 1983 were attributed to the high price of U.S.

crops (Tables 1 and 2) and the virtual elimination of excess levels of surplus grain stocks. Policy makers saw the need for continued acreage controls when it became evident that a movement back to fence-row to fence-row production in the U.S. could lead to massive surpluses in one or two years.

Acreage reduction provisions for government program participation in 1984 and 1985 were set at 20% plus a 10% paid diversion. Wheat producers could also participate in a PIK diversion of 10 or 20%, with a payment of 85% of normal yield. With grain prices relatively high, the government program was not sweet enough to encourage high participation rates. Bumper crops were harvested two years in a row, and, once again, record surpluses accumulated.

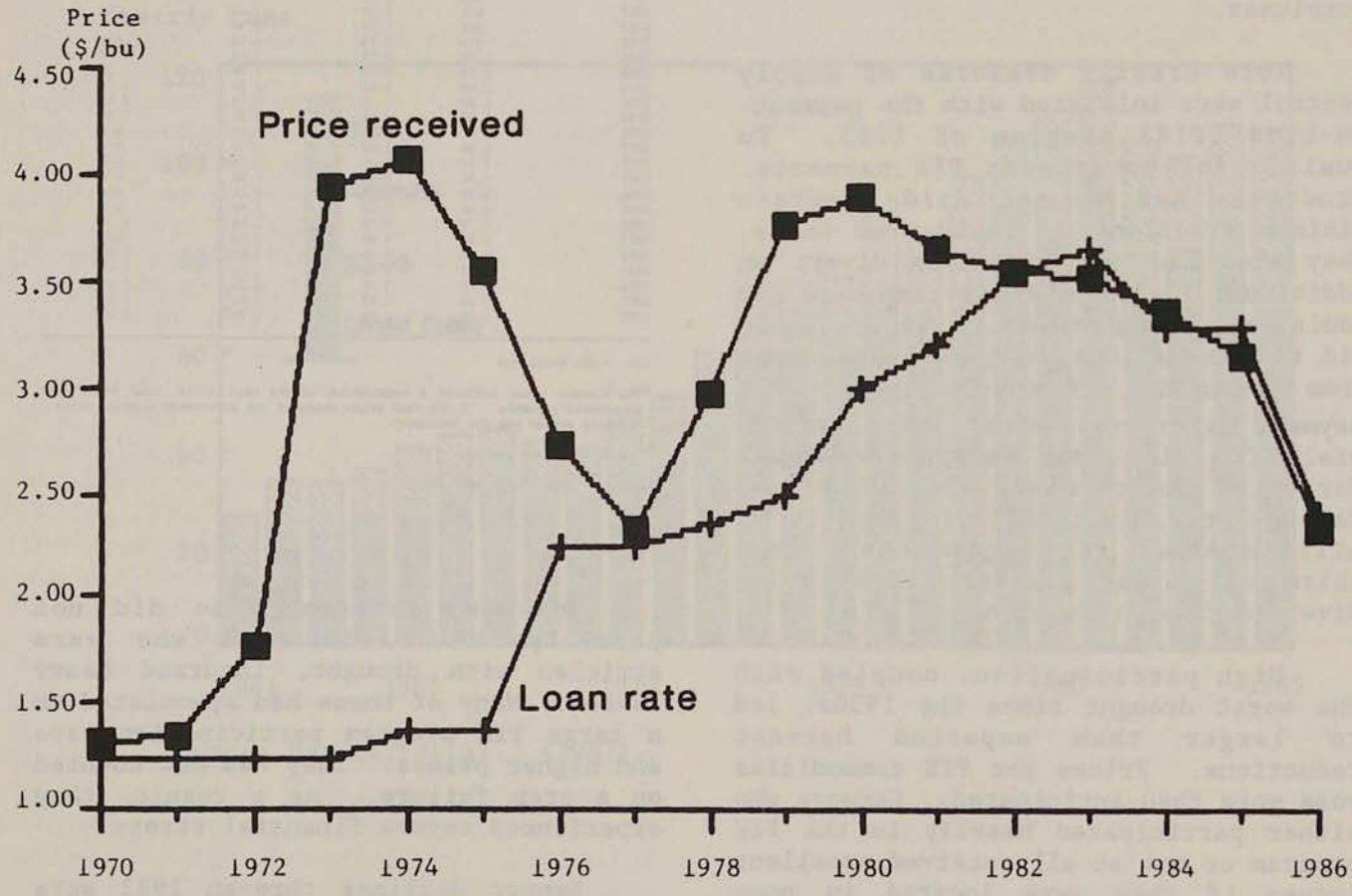
Farmers who did not participate in government programs received prices near the loan rates for their crops (Tables 1 and 2). These prices were not high enough to cover total costs of production; debt servicing often was impossible. With equity decreased dramatically and cash flow inadequate to meet debt service obligations, many more farmers experienced financial stress. Bankruptcy filings and foreclosure proceedings took place at record paces. In South Dakota, for example, 564 farm bankruptcy filings were made in 1986 (Janssen and Schmiesing, 1987). In 1980-81, the number was only 37.

FOOD SECURITY ACT OF 1985 (CURRENT FARM BILL)

The record surpluses of 1984 and 1985 led policy makers in 1985 to consider sweeping changes in agricultural legislation. As in 1933, the goals were still farm income stability, price support, and supply control.

The sweeping changes turned out to be new twists in the age-old conflict

Figure 3. Wheat: U.S. price received by farmers and government loan rate, 1970-1986.



Source: Shane and Mends (1987).

among: (1) flexible market orientation, (2) rigid price supports and marketing quotas, and (3) acreage reduction. The Food Security Act of 1985 reflects a compromise among conflicting views. Much is left to the discretion of the Secretary of Agriculture, including the option of imposing marketing loans. The lowering of loan rates gradually over time results in the bill having both price-support and market-oriented features. The use of PIK certificates to redeem grain under loan further enhances the market orientation of the farm bill.

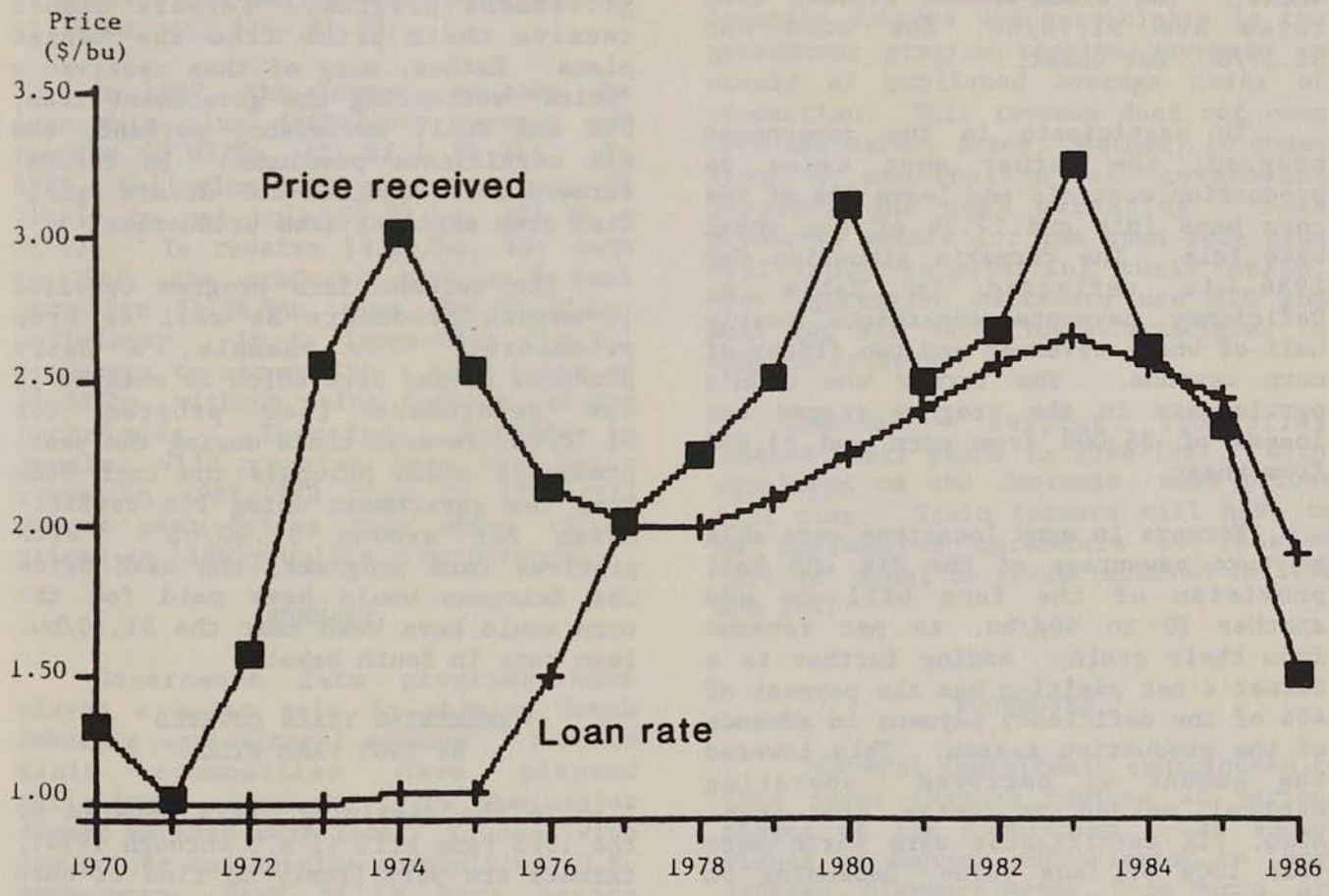
Income stability and price support also are present in the farm program because farmers receive deficiency payments. Deficiency payments represent the difference between the loan rate and the target price or the difference between the cash price and the target price, whichever is smallest. Acreage reduction, paid diversion, and conservation reserve components of the farm bill address production or supply control.

SOUTH DAKOTA FARMERS AND THE 1985 FOOD SECURITY ACT

Since the enactment of the 1985 farm bill, South Dakota farmers participating in the government program have received a price for grain which exceeds the published cost of production estimates. Farmers participating in the government program have received the loan rate plus the deficiency payment for grain.

For example, in 1986 the average corn loan rate in South Dakota was $1.78/bu. This was reduced 4.3% to $1.70/bu. by the Gramm-Rudman bill. The national average cash price for 1986 was $1.51/bu. (Table 2). Since the national average cash price was below the national loan rate of $1.92/bu., the deficiency payment became the difference

Figure 4. Corn: U.S. price received by farmers and government loan rate, 1970-1986.



Source: Shane and Mends (1987).

between the national loan rate of $1.92/bu. and the target price of $3.03/bu., or $1.11/bu. This deficiency payment was added to the South Dakota $1.70/bu. loan rate, for a total revenue of $2.81/bu.

Corn producers in South Dakota have received a higher net price only three times in history, and two of those years were during drought when production was low. Also, costs of production per bushel have declined somewhat since 1982, because land prices and petroleum-based input prices have declined.

IMPACT OF 1985 FARM BILL ON SOUTH DAKOTA PRODUCERS

To demonstrate the impact of the 1985 farm bill on a producer, a case study is developed. Assume a farmer produces corn and wheat on 400 acres of cropland. The cropland base is divided equally between the two crops. Normal yields for the crops are 80 bu./acre for corn and 30 bu./acre for wheat. Production costs excluding land are $150/acre for corn and $90/acre for wheat. The Gramm-Rudman reduced loan rates are $1.70/bu. for corn and $2.37/bu. for wheat.

To participate in the government program, the farmer must agree to production controls and leave 20% of the corn base idle and 27.5% of the wheat base idle. The farmer's situation for 1986 is reflected in Table 4. Deficiency payments constitute nearly half of wheat revenues and two fifths of corn revenue. The farmer who didn't participate in the program reaped net losses of $6,000 from corn and $5,600 from wheat.

Farmers in many locations were able to take advantage of the Pik and Roll provision of the farm bill to add another 20 to 40¢/bu. to net revenue from their grain. Adding further to a farmer's net position was the payment of 40% of the deficiency payment in advance of the production season. This lowered the amount of borrowed operating capital needed to raise the crop. Also, PIK certificates were worth more than 100% of face value. Depending on the time of the year the certificates were used or sold, farmers realized an additional 5-25% through redemption of their certificates.

Table 3. Harvested acres, coarse grains and wheat, selected major producing countries, 1970-71 through 1986-87.

Area or country	1970-71	1975-76	1981-82	1983-84	1984-85	1985-86	1986-87
Coarse grains							
W. Europe	24.0	25.2	24.4	23.3	23.4	23.8	23.2
Canada	8.4	8.6	9.2	7.8	8.0	8.3	7.9
Australia	4.3	3.9	4.8	5.8	5.5	5.2	4.4
Argentina	7.5	5.9	6.4	6.2	6.1	5.7	4.9
S. Africa	5.5	5.6	5.3	4.8	4.8	4.9	4.9
U.S.S.R.	43.9	58.1	58.0	61.2	59.2	58.5	58.6
Total above	93.6	107.3	108.1	109.1	107.0	106.4	103.9
U.S.	39.7	42.6	43.6	32.9	43.6	45.5	41.5
Total above	133.3	149.9	151.7	142.0	150.6	151.9	145.4
Wheat							
W. Europe	17.0	15.4	16.4	17.0	17.1	16.2	16.7
Canada	5.1	9.1	12.4	13.7	13.2	13.7	14.2
Australia	6.5[a]	8.6[a]	11.9[a]	12.9	12.1	11.7	11.3
Argentina	3.7	5.3	5.9	6.9	6.0	5.3	5.1
S. Africa	1.9[a]	1.8[a]	1.8	1.8	1.9	2.0	1.9
U.S.S.R.	65.3	62.0	59.1	50.8	51.1	50.1	48.7
Total above	99.4	102.2	107.6	103.1	101.4	99.2	97.9
U.S.	17.7	28.1	32.8	24.8	27.1	26.2	24.5
Total above	117.1	130.3	140.4	127.9	128.5	125.4	122.5

[a]These are planted acreages.

Source: Wisner and Nourbakhsh (1987).

The "bottom-line" results of this case study are quite different from what many have believed about grain prices. Yes, cash market corn has been as low as $1.00/bu. and wheat as low as $2.00/bu. That, however, isn't the price received by farmers who participated in the government program. Farmers didn't receive their price from the market place. Rather, many of them received a "price" reflecting the government loan, PIK and Roll, deficiency payment, and PIK certificate premiums. In return, farmers were required to divert specified crop acreages from production.

The current farm program benefits livestock producers as well as crop producers. For example, a dairy producer raises corn which is entered in the government loan program for $1.70/bu. Several times during the year, producers could purchase the corn back from the government using PIK certificates for around $1.40/bu. With previous farm programs, the cash price the dairyman would have paid for the corn would have been near the $1.70/bu. loan rate in South Dakota.

REMAINING YEARS COVERED BY 1985 FARM BILL

In the remaining years covered by the 1985 farm bill (i.e., through 1990), farmers are very likely to find it hard to achieve "prices" as high as in 1986 or 1987. The producer in the corn-wheat

case study above had to make no special marketing efforts to receive the income from loan and deficiency payments.

Under current farm policy, however, excess grain supplies have been reduced. As surplus stocks continue to decline, cash prices once again will exceed loan rates. Deficiency payments will decline because they represent the difference between the target and cash prices. To insure a "price" as high as in 1986 and 1987, farmers will have to aggressively market crops to achieve at least the average market price.

To contrast the situations, in 1987, the national cash price will be below the national loan rate for corn (Tables 1 and 2). The deficiency payment--reflecting the difference between the target price of $3.03/bu. and the national loan rate of $1.82/bu.--will be $1.21/bu. In 1988, the national cash price will very likely average above the national loan rate of $1.74/bu. In addition, the target price for 1988 has been lowered to $2.97/bu. If the national average cash price is $1.80/bu., the deficiency would be only $1.17/bu. ($2.97 - $1.80).

In 1987, the farmer can take the loan rate plus deficiency payment and receive $3.03/bu. ($1.82 + $1.21). In 1988, following the same strategy is likely to net only $2.91/bu. ($1.74 + $1.17). To receive $3.03/bu. for corn in 1988, the producer must sell cash corn for $1.86/bu. plus the $1.17/bu. deficiency. It is impossible for all producers to accomplish a cash price of $1.86/bu. without using forward pricing techniques. Therefore, farmers in general will receive less for their crops in 1988-1990 than in 1986-1987 unless cash prices rise above target prices--a highly unlikely occurrence.

SUMMARY

Government farm programs have played a major role in shaping South Dakota's agricultural economy. Surplus grain commodities have plagued agriculture since the 1920s when major export markets were lost. To cope with low prices and surplus commodities, U.S. government farm bills have become commonplace.

Table 4. Farmer government program participant, hypothetical case.

Farm feature	Corn	Wheat
Base acres	200	200
Idle acres	40	55
Planted acres	160	145
Production (bu)	12,800	4,350
Loan payment ($)	21,760	10,310
Deficiency payment ($)	14,208	8,613
Production costs	24,000	13,050
Net revenue	11,968	5,873

The first modern farm bill was the Agricultural Adjustment Act of 1933. The major goals of the program were production control and farm income stability. These goals are still present in today's farm bill, the Food Security Act of 1985. Between 1933 and 1985, various farm bills were enacted, but considerations for each of them have centered around two major issues: (1) acreage reduction versus marketing quotas for controlling supply, and (2) flexible market-oriented price supports versus rigid, high price supports for stabilizing income.

Under the current farm bill, South Dakota's farmers who participate in the government program receive revenues in excess of published average costs of production. This revenue does not come from the market place. Rather, it comes from a combination of government payments and cash marketing. Some producers settle for the loan rate plus deficiency payment for their grain. More aggressive marketers use PIK and Roll and PIK certificate strategies to enhance revenues.

Commodity surplus stockpiles reached their peaks in 1986-1987. With surpluses on the decrease, cash prices will rise. Grain farmers will have to be aggressive marketers to receive "prices" equal to those received in 1986 and 1987.

FOOTNOTES

[1]Several individuals contributed to this paper through reviews at various stages of its completion. The author wishes to express appreciation to Larry Janssen, Clarence Mends, Gene Murra, Art Sogn, and Donald Taylor for their

constructive comments. A special thanks to Penny Stover for her tolerance of the editing process. However, the author assumes full responsibility for the article's content.

[2]A primary reference used in developing this section is Bowers, et al. (1984).

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TAXATION POLICIES: IMPLICATIONS FOR SOUTH DAKOTA AGRICULTURE

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Chris H. Rasmussen

The Tax Reform Act of 1986 (TRA 86) was the most significant U.S. tax legislation in three decades. Goals of the legislation were to simplify the tax code, reduce marginal rates, and lessen the impacts of tax policies on business decisions.

Previous tax policies have impacted agricultural production, investment, and financing decisions. The purpose of this paper is to identify tax provisions which have had major impacts on agriculture in the past and to assess the effects of TRA 86 on these impacts. In the first section of the Chapter, impacts on individual producers are examined. Tax planning opportunities for agricultural producers are suggested. In the second section, a macro analysis of the impacts of the tax reform on agriculture in general is presented.

Some of the major provisions of TRA 86 with potential to affect agricultural producers are: (1) an increase in the standard deduction, (2) an increase in personal exemptions, (3) a reduction in the number of tax brackets, (4) a reduction in marginal rates, (5) a repeal of income averaging and the investment tax credit, (6) a lengthening of the required asset life, (7) an increase in the annual limit of expensing, and (8) changes in cash accounting rules and deductions for passive losses. See Table 1 for a comparison of key provisions of the old and new tax laws.

FARM TAX PLANNING AFTER THE TAX REFORM ACT OF 1986

Despite the sweeping tax reform purportedly brought on by TRA 86, many of the tax planning opportunities in existence before TRA 86 are still available. For example, paying a fair wage to a spouse for farm labor to reduce social security taxes was used by farmers before TRA 86, and it continues to be worth considering today.

This Chapter is not intended to comprehensively cover TRA 86. Rather, it focuses on planning opportunities which have been deleted, created, or changed by TRA 86.

Some tax planning ideas and strategies which follow are still in a stage of transition and development. There are many areas of law where forthcoming IRS regulations and interpretations will be of importance. Within this perspective, important topics to agricultural producers are now addressed.

In the authors' opinion, the most profound change in TRA 86 applying to ag producers is the repeal of the investment tax credit (ITC). Since January 1, 1986, the credit has been unavailable to producers. The demise of the credit is accompanied by a reduction in the credit carry-forward as shown in Table 2. It is clear that producers with ITC carry-forwards should, if possible, consider reporting income to offset the credit before it is lost.

Profitable producers buying machinery and equipment in 1987 and after might consider taking advantage of the liberalized equipment expensing provisions allowed in the code. Repeal of the investment credit and lengthening of asset lives reduce the incentive to depreciate assets because annual depreciation deductions will be smaller. The expensing provisions allow the producer to expense up to $10,000 worth of assets purchased in 1987-1988. Thus, profitable producers can immediately reduce income, decrease income taxes and social security taxes, and, on occasion, maximize the earned-income credit.

Table 1. Comparison of key provisions of the prior tax law and the 1986 Tax Reform Act.

Tax provision	Old law	Tax reform act[a]
GENERAL PROVISIONS		
Individual tax rates (Joint return)	14 Brackets 11% bottom rate 14% over $4,530 " " " 50% over $171,580	2 Brackets (88) 15% bottom rate 28% over $29,750
Corporate tax rates	5 Brackets 15% bottom rate 18% over $ 25,000 30% over 50,000 40% over 75,000 46% over 100,000	3 Brackets (7/87) 15% bottom rate 25% over $50,000 34% over 75,000
Standard deduction	$3,670	$5,000 (88)
Personal exemption	$1,080	$2,000 (89)
Depreciation allowances	ACRS--most capital assets depreciated over 3, 5, or 15 years	MACRS or ADS Most assets formerly depreciated for 3 years changed to 5 years and most assets formerly depreciated over 5 years changed to 7 years. 200% declining balance method.
Investment tax credit	6% or 10% for most depreciable farm assets	Repealed. Limited carry-over and carry-back allowed.
Income averaging	Reduced taxes paid when income in current year was more than $3,000 above 140% of prior three year average.	Repealed.
Passive losses	Passive losses related to farm activities can be used to offset other income.	Passive loss deductions cannot exceed farm income[b]
FARM SPECIFIC PROVISIONS		
Development or preproductive expenditures	Cost of raising dairy and breeding cows, and developing new orchards and vineyards deductible in year expense is incurred.	If preproduction period exceeds two years, development costs must be capitalized. Can be avoided if straight line depreciation used on all farm assets placed in service that year.
Soil and water expenses	Immediately deductible	Deductible only if soil and water plan approved by USDA or other authority.
Discharge of indebtedness from unrelated parties	Debt forgiveness treated as taxable income if farmer is solvent.	Debt forgiveness for solvent farmers can be used to lower the basis in other farm assets.
Dairy buy out	Capital gains treatment on sale of dairy cattle.	Special provision to allow capital gains treatment rather than being fully taxable.

[a] After full phase-in of TRA 86. Numbers in parentheses indicate year provision will be fully in effect.

[b] As a practical matter, landlord participation in property management will for the most part make these losses at least partially if not totally deductible.

Source: Adapted from Lins, et al. (1987).

One provision of TRA 86 that may create some bookkeeping "nightmares" is the requirement to capitalize pre-production costs on such things as dairy cattle and breeding stock. Although this provision presents no substantial tax planning opportunities, the producer should be aware of the need to adjust accounting records and establish a basis for home-raised animals. Under prior law, the costs of bringing home raised animals to the production stage were expensed when paid, and the animals had no depreciable income tax basis.

Under the new provision, operating expenses will be reduced or income will be recognized for the value of the animals. Further, each animal will acquire a basis available for depreciation when it reaches the productive stage. TRA 86 does not provide a specific method for determining a value for these animals, but treasury regulations are expected to suggest a specific procedure. Farmers can obtain relief from this adverse accounting requirement, but they first must agree to use prescribed lives and straight-line depreciation on all assets acquired. This may be too steep a price to pay for bookkeeping simplification.

The long-standing tradition of paying children a fair wage to reduce taxable income continues to be an often appropriate way to reduce the income and social security taxes of the ag producer. TRA 86 limits the amount of tax-free income a child can earn to $2,540. Children will be taxed on payments in excess of $2,450, but, presumably, at the children's lower rate which still would result in an overall income tax saving.

Recent changes in the area of debt forgiveness may cause producers to consider offers of compromise to lending institutions such as commercial banks, the Federal Farm Credit System, and the Farmers Home Administration. A few months ago, the producers would have been required to show insolvency to avoid tax on the value of forgiven debt. Current law provides that debt forgiven by a lending institution to an ag producer is tax-free income regardless of the producer's financial condition. Certain tax attributes such as net operating loss carry-forwards and the investment tax credit may be lost, but no immediate adverse tax consequences will result.

Table 2. Investment tax credit carry-forwards under TRA 86.

Tax year ending 12/31	Percent of tax credit lost
1987	17.5
1988	35.0
1989	35.0
1990	12.5

TRA 86 places limits on the amount of prepaid expenses that can be deducted by the ag producer. The law states that--to the extent prepaid farming expenses exceed 50% of the expense for which economic performance has occurred--these prepaid expenses will be deductible only as the purchased items are consumed. This provision probably will not cause any major hardships for most producers. From an accounting standpoint, this provision is a small step toward accrual basis accounting for farmers (i.e., recording expenses and revenues as they occur).

Several provisions in TRA 86 will have a bearing on the amount of income tax that an ag producer owes. The standard deduction has been increased, the exemption for deductions has been increased, the number of tax brackets has been reduced, and the maximum marginal tax rate has been reduced (see Table 1). These changes and many others do not provide any significant tax planning opportunities and are, therefore, outside the scope of this article.

In conclusion, the purpose of this section is to indicate possible opportunities and areas of concern to ag producers from TRA 86. Before any tax planning or accounting procedure change is undertaken, a competent professional should be consulted for specific advice.

IMPACT OF THE TAX REFORM ACT OF 1986 ON THE AGRICULTURAL SECTOR

Two general areas are discussed in this section: the amount and composition of investment that may change as a result of tax reform, and the overall amount of taxes paid by the agricultural sector.

Changes in investment in agriculture

The cost of capital, which is an integral factor in the decision to invest, depends upon the price of the asset, the real after-tax rate of return for the asset, the rate of depreciation, the tax rate for a firm, and the investment tax credit. Tax rules affect most of these components of the cost of capital. For example, the cost of capital decreases when the investment tax credit increases and when depreciation is accelerated. The effect of a change in the tax rate is indeterminate, depending on the value of other parameters (Carman and Hardesty, 1987, p. 114).

The earlier investment tax credit and accelerated depreciation tax policies had major impacts on the cost of capital. Hanson and Bertelsen (1987, p. 7) illustrate that the combination of accelerated depreciation and the investment tax credit could, in some cases, lead to the discounted present value of tax deductions exceeding the cost of the investment, thereby representing a form of negative taxation. As shown in their example, without these two tax incentives, negative taxation was impossible.

All agricultural investments were not impacted equally by each of the tax policy factors. In addition, some tax incentives provided for sheltering ordinary (and/or nonfarm) income. Land appreciation in the 1970s contributed to increased machinery and land investments in selected enterprises by farm and nonfarm investors. Tax incentives also have greater value for higher income taxpayers. The higher the relevant marginal rate, the greater the tax savings from deductions. Thus, expansion was encouraged for higher income and typically larger farms.

The predictable result for some commodities was expanded production, surpluses, and lower prices--all of which have contributed to the current financial stress in agriculture. Researchers have found some evidence indicating livestock, poultry, and perennial crop production have been positively affected by tax incentives. Feed grain and oil crop production increases appear to have been encouraged by land and irrigation development (Carman and Hardesty, 1987, p. 115).

With the repeal of the investment tax credit and the lengthening of the depreciation schedule, two of the most important tax incentives for investment are removed. Because these incentives were applicable only to selected investments, their removal also will tend to equalize the effect of taxation across various types of investment possibilities. However, retention of expensing provisions which apply only to equipment still may provide incentive to invest therein. While some tax reform policies may act as a disincentive for investment, the reduction in individual and corporate tax rates may counterbalance the trend toward investment reduction.

Thus, while the exact effect of TRA 86 is uncertain, some tax incentives that led to overinvestment in certain agricultural enterprises have been removed. It appears that post-TRA 86 investments will be tied more closely to business decisions than to tax policies. Commodity prices also may play a larger part in investment decisions.

Tax liability of the agricultural sector

While TRA 86 was intended to be revenue-neutral (e.g., to generate no net change in total revenue), it was designed to shift part of the tax burden from individuals to businesses. Some lower income persons may escape taxation altogether.

In two recent studies, the level of taxes paid by the agricultural sector after implementation of TRA 86 has been addressed.

In the first study, Lins, Offutt, and Richardson (1987) examined the tax bills of grain farms in the Midwest and Southern Great Plains under alternative tenure and debt situations. The full-owner with low debt experienced a decrease in taxes after the TRA 86. For the part-owner, taxes decreased under low debt but increased with moderate or high debt. Under all debt situations, a tenant farmer would pay higher taxes after TRA 86. While these results came from simulations with some rather strict

assumptions, the results may indicate the general trend of post-TRA 86 taxes for grain farmers.

In a second study, Rossi and Durst (1987) used a simulation model to estimate the differences in tax liabilities between pre- and post-TRA 86 for six farm enterprise types. They obtained data from more than 15,000 randomly selected farm sole proprietors' tax returns and compared the differences under the two policies. Their methodology, however, did not accommodate changes in behavior that may be induced by new tax policies which could result in changed tax liabilities.

For these 15,000 tax returns, tax liabilities decreased from $10.77 billion under pre-TRA 86 conditions to $9.98 billion under TRA 86. The types of enterprises experiencing reductions in tax liabilities were: (1) field crops, (2) beef, (3) fruits, nuts, and vegetables, (4) hogs, sheep, and chickens, and (5) general. Only dairy farms experienced an increase.

For most enterprises, the decrease in marginal tax rates accounted for the majority of the tax decrease. However, depreciation, expensing, and personal exemptions explained reductions for dairy and hogs, sheep, and chickens. These provisions generally offset the increase from the loss of the investment tax credit and capital gains preferences (but not for dairy).

The study also showed the largest percentage decrease in tax liabilities with TRA 86 was in the lower income brackets, namely, for those farms with less than $15,000 in farm business receipts. Those farms with more than $60,000 in farm business receipts, on the other hand, experienced increased taxes.

CONCLUSIONS

The TRA 86 embodies many significant changes from previous tax policies. The impacts of some provisions are the opposite of others. Therefore, it is difficult to state unequivocally the final impact.

However, because of the strong impact of the deletion of the investment tax credit and accelerated depreciation, and because of changes in other provisions on investment decisions, it is likely that less investment will occur in agriculture, and that the composition of the remaining investment will change.

It also appears that tax liabilities of some types of farm enterprises and tenure may decrease because of selected provisions of TRA 86, while farms with other types of enterprises and tenure may experience increased tax liabilities. The configuration of enterprises, assets, and debts for each individual farm will be important in deciding the final result.

Many of the tax provisions discussed in both sections of the paper are not unique to agriculture. For example, the decrease in marginal rates and increase in standard deductions are applicable to all taxpayers. The large number of farm families with off-farm income can realize substantial tax savings from these provisions. The total income picture will determine the final tax bill for each individual producer.

It is important to note that individual tax strategies may change in response to changes in tax policies as taxpayers attempt to take advantage of the various provisions. Therefore, the actual results may differ from the analysis carried out before the full impacts of the implementation of the TRA 86 are known.

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Continued on p. 44

Farm commodity production and marketing

South Dakota is a major grain and livestock production state. The current status and trends in South Dakota's grain production, rural transportation, and livestock industries are examined by the authors of the five Chapters in this section.

Brian Schmiesing examines 1965-1986 acreage, yield, and production trends of major grains and oilseeds produced in South Dakota. Major increases in overall grain production, wheat, soybean, corn, and barley production are documented, and implications for South Dakota agribusinesses are identified.

Chuck Lamberton discusses major changes in South Dakota's railroad and grain-handling system in the last 20 years and looks ahead to transportation needs and issues likely to arise in the next several years. The restructured rail system has improved access to world grain markets. Farmers have benefited, although many small towns have lost direct access to rail service. A priority need is an assessment of physical requirements and financial support of local road systems.

The South Dakota livestock industry has been a major contributor to the state and national economies for decades. Cash receipts from livestock and livestock products are about 60% of all agricultural receipts in South Dakota.

Trends in South Dakota's cattle and hog industries are discussed in two Chapters by Gene Murra and Clarence Mends. Long-term trends in livestock numbers, production and slaughter, marketing, and incomes are presented and analyzed. Don Peterson discusses historical trends in South Dakota's dairy, sheep, and poultry industries. For each industry, South Dakota production trends, prices, and incomes are placed in the context of national production and consumption trends. Together, these three Chapters provide information on present conditions in South Dakota's livestock industries and factors that may lead to changes in those industries during the next several years.

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SOUTH DAKOTA GRAIN PRODUCTION TRENDS

Brian H. Schmiesing[1]

The long-term competitive positions of South Dakota grain producers and associated agribusinesses depend upon the productivity of South Dakota's grain production sector. International grain markets are an important outlet for U.S. and South Dakota grain production. South Dakota producers and agribusinesses must compete not only against alternative suppliers within the U.S., but also against alternative foreign suppliers. Further, the decisions of grain processors and livestock producers to locate or expand in South Dakota depend importantly on the availability of specific grain commodities.

During the past two decades, there has been a major increase in the aggregate level of South Dakota grain production. Changes in aggregate production have resulted from a combination of changes in overall harvested acreages, increases in acreages of higher yielding crops, and increases in yields per acre of specific crops.

In this Chapter, the following issues are analyzed: (1) How have the acreages for various crops planted in South Dakota changed? (2) How have South Dakota crop yields per acre changed?[2] and (3) How do South Dakota crop yields and yield trends compare with those of surrounding states? Statewide trends and the implications of these trends to South Dakota agriculture are presented.

DATA USED IN ANALYSIS

The analysis is based on U.S. Department of Agriculture and South Dakota Statistical Reporting Service information. Annual harvested acreage and yield levels for 1965-1986 were collected for South Dakota major crops.

The analysis was conducted on harvested acres rather than planted acres. This approach may result in the average yields being overestimated during years when the percentage of planted acreage actually harvested drop significantly. However, producers do have alternatives to harvesting for grain production alone. To use planted acres in computing per-acre yields, may result in an underestimation of the economic attractiveness of specific crops. Harvested acres also were used so direct comparisons could be made with neighboring states on the basis of acres actually harvested for grain.

The level and the variability of the proportion of planted acres that is actually harvested differ among South Dakota crops. The greatest variability in the proportion is associated with crops having uses other than strictly grain production. For example, corn can be harvested for silage, while soybeans are limited to being harvested for grain production. During the drought year of 1976, the harvested acres as a percentages of planted acres for the state's major crops were as follows: corn (38%), wheat (76%), oats (55%), and soybeans (97%). During 1977 to 1986, the harvested percentages averaged the following: corn (79%), wheat (88%), oats (80%), and soybeans (97%). The percentage of harvested corn acres during 1976 dropped to 38% or significantly below the average for the following decade. In direct contrast, the harvested percentage for soybeans was 97% or identical to average harvested percentage for 1977-1986.

LIMITATIONS OF YIELDS AS INDICATORS OF COMPETITIVE POSITION

Although yield trends and yield levels can be used as indicators of agricultural productivity or competitive position, they are imperfect measures. Yields indicate the amount of physical volume of a commodity produced, not the profitability of production.

Profitability of a specific crop depends upon the price received and the cost of producing the crop. South Dakota grain prices are among the lowest in the United States. The large transportation costs of shipping South Dakota grain for export must be deducted from the price received at West Coast and Gulf export markets. Therefore, grain prices are lower in South Dakota than at export ports-of-exit.

Whether a specific crop is produced also depends upon the profitability of that crop relative to other crops. Again, yields can not be used as an indicator of whether one crop is more competitive than another.

However, changes in the acreage and yields do indicate whether the overall, sectorial, competitive position of a particular crop is changing. An improved competitive position of crop would be indicated by increasing acreage and yields. Declining acreage and stagnant yields would indicate a crop with a deteriorating competitive position.

CHANGES IN SOUTH DAKOTA ACREAGES AND YIELDS

During the past 20 years, major shifts have occurred in the harvested acreage for primary crops produced in South Dakota (Table 1). Between 1965-75 and 1976-86, substantial increases took place for soybeans (156%), winter wheat (72%), spring wheat (36%), barley (35%), and grain sorghum (20%). In contrast, major area losses were experienced by flaxseed (-65%), rye (-31%), corn for silage (-29%), and oats (-24%).

Several crops also had substantial yield increases during the same period (Table 2). The yield increases were the largest for corn for grain (43%), soybeans (33%), and sorghum for grain (23%), whereas they tended to be least for winter wheat (-6%) and durum wheat (6%).

Some positive association is shown between yield changes and harvested area changes over time for certain crops (e.g., soybeans experienced both a 33% yield increase and 156% area increase). In such cases, farmers appear to have expanded production in crops for which productivity increases have been relatively great.

Some definite exceptions to the direct relationship between yield trends and harvested area are shown (e.g., winter wheat and corn for grain). The drop in winter wheat yields may have been caused by winter wheat production being expanded in less favorable production environments rather than by a lack of yield-increasing technology. The lack of increase in corn for grain area and substantially increased corn yields undoubtedly reflect, in part, the start of a substantial increase in irrigated corn production during the mid-1970's.

Table 1. Average acreages, major grain crops, South Dakota 1965-75 and 1976-86.

Crop	Average harvested area ('000 acres) 1965-75	1876-86	Percentage change between time periods
Soybeans	318	816	156
Wheat--winter	656	1,126	72
Wheat--other spring	1,512	2,053	36
Barley	429	577	35
Sorghum for grain	281	338	20
Corn for grain	2,452	2,452	0
Wheat--durum	155	143	- 8
Oats	2,286	1,728	-24
Corn for silage	944	670	-29
Rye	224	155	-31
Flaxseed	535	185	-65

Source: SDASS (1987).

Table 2. Average yields, major grain crops, South Dakota, 1965-75 and 1976-86.

Crop	Average yield per acre[a] 1965-75	1976-86	Percentage change between time periods
Corn for grain	45	65	43
Soybeans	21	28	33
Sorghum for grain	35	43	23
Flaxseed	12	13	12
Wheat--other spring	21	23	12
Barley	35	39	12
Rye	29	32	10
Oats	45	48	8
Wheat--durum	22	24	5
Corn for silage	6	7	0
Wheat--winter	30	28	- 6

[a]All yields are in bushels per acre, except for corn silage which is in tons per acre.

Source: SDASS (1987).

YIELD TRENDS AND CHANGES IN LOCATION OF PRODUCTION

Yield trends for South Dakota's major grain commodities can be more fully understood by examining regional changes in harvested acreage. Between 1965 and 1986, the total harvested acreage for South Dakota's major crops increased 2.3 million acres (Table 3). All regions experienced increases in harvested acres, with the largest increase occurring in the central part of the state (Figure 1 and Table 3). The favorable wheat prices of the 1970s, the introduction of sunflowers as a cropping alternative, and soil-bank land again entering production probably were major contributing factors to this trend.

Winter wheat acreage in the western regions expanded primarily because of an increase in overall harvested area rather than the displacement of previously produced crops (Table 3). However, a major proportion of the expanded acreage of winter wheat, sunflowers, and barley in the north-central and central crop reporting districts came from declines in oats acreage. Oats decreased by 312,000 acres in the north-central district and by 163,000 acres in the central district.

The northeast district has had a major shift in its grain complex. Harvested flaxseed and oats collectively declined by 586,000 acres, while spring wheat, barley, and soybeans increased by 624,000 acres.

The soybean area increased by 789,000 acres in the east-central and southeast districts, while oats dropped in these districts by over 500,000 acres. The harvested acres of spring wheat and corn for grain also increased in these districts.

The pattern of expansion of harvested acres probably has had an impact on South Dakota crop yields. For example, winter wheat yields averaged 30 bu./acre during 1965-1975 and only 28 bu./acre during 1976-1986. The expansion of winter wheat acreage was primarily in the western and central regions of South Dakota. In direct contrast, soybean acreage expanded primarily in the more productive eastern region of the state.

Table 3. Changes in harvested acreages between 1965 and 1986, South Dakota, by crop reporting district.

Crop	Total	Area change ('000 acres), by crop reporting district[a] NW	WC	SW	NC	C	SC	NE	EC	SE
Wheat--winter	1,400	193	278	30	290	332	175	66	17	19
Soybeans	998	0	1	0	51	21	3	133	313	476
Barley	633	48	7	- 2	214	96	6	161	81	22
Corn for grain	491	12	1	4	29	157	- 5	56	115	122
Wheat--other spring	448	- 92	6	- 2	- 5	65	- 16	330	131	31
Sunflower	370	18	3	3	117	100	29	59	29	12
Rye	- 38	5	0	- 1	5	- 7	- 1	- 27	- 9	- 3
Wheat--durum	- 44	- 5	- 2	- 1	- 10	- 9	- 2	- 14	0	- 1
Sorghum for grain	- 69	0	43	1	0	- 21	85	- 4	- 54	-119
Flaxseed	- 459	- 8	0	0	- 67	- 6	- 1	-297	- 79	- 1
Oats	-1,409	- 44	-15	- 7	-312	-163	- 30	-289	-304	-245
Total	2,321	127	322	25	312	565	243	174	240	313

[a]The crop reporting districts are identified by name in Figure 1.

Source: SDASS (1987).

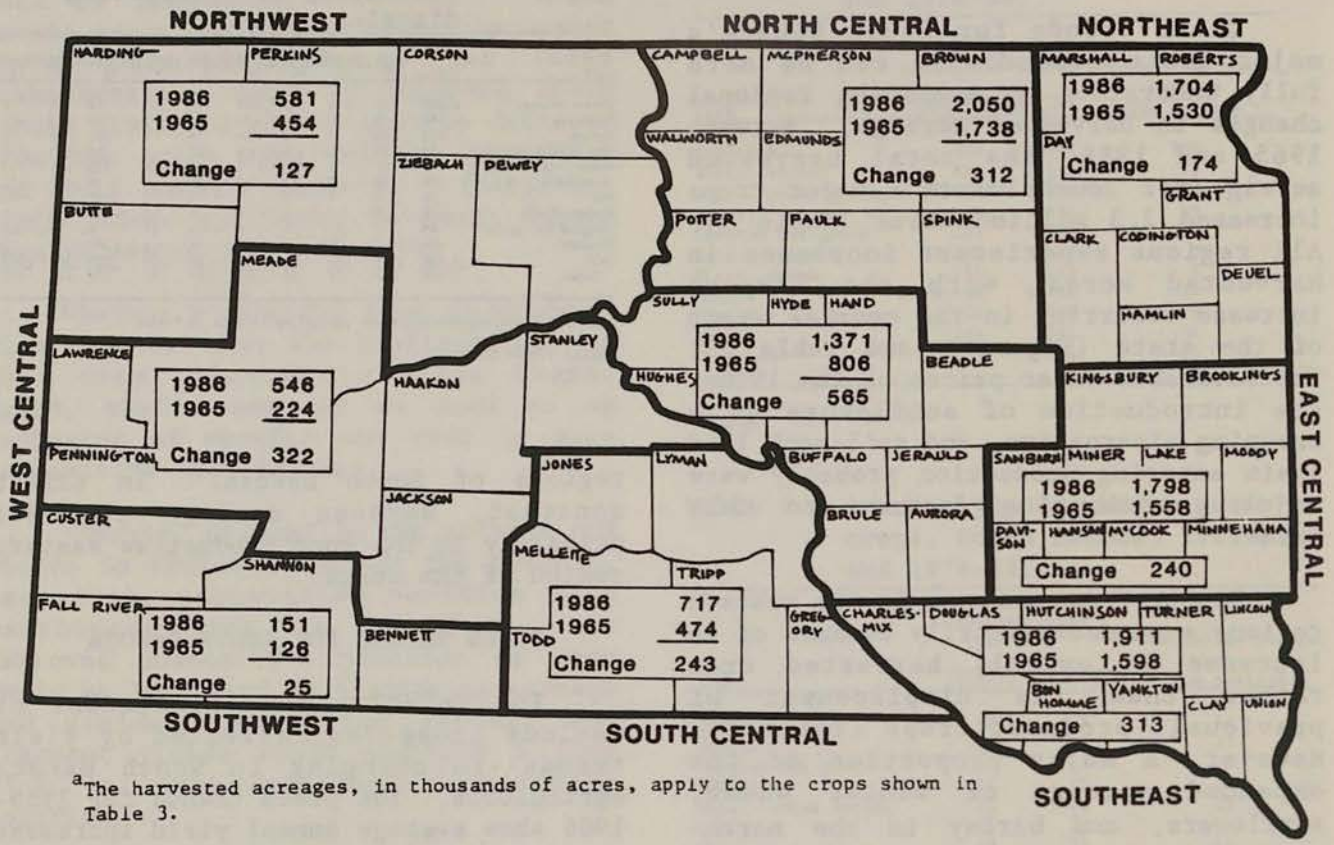
YIELD TRENDS FOR SOUTH DAKOTA

The relative competitiveness of various crops--as reflected by yield trends--is changing in South Dakota agriculture. The yield trends for 1965-1986 show average annual yield increases at the following rates: corn (1.7 bu.), oats (0.4 bu.), soybeans (0.6 bu.), winter wheat (0.1 bu.) and spring wheat (0.4 bu.).

The impact of yield increasing technology is most readily apparent when contrasting South Dakota corn and oats yields before and after 1977 (Figure 2). During 1965-1977, oats yields frequently were higher than the statewide yield for corn. However, in all years since 1977, oats yields have not been greater than corn yields. Irrigation for corn has contributed to this divergence in yield trends. In 1986, the statewide corn for grain yield averaged 82 bu./per acre, while the average yield was 79 bu./acre for dryland corn and 125 bu./acre for irrigated corn.

Improvement of soybean yields relative to winter wheat yields has occurred (Figure 3). During 1965-1976, winter wheat yields were consistently higher than soybean yields; this was not true during 1977-1986. However, unlike corn and oats, the primary production regions for these two commodities are significantly different.

Figure 1. Harvested acreages, South Dakota, by crop reporting district, 1965 and 1986.[a]



[a]The harvested acreages, in thousands of acres, apply to the crops shown in Table 3.

Source: derived from SDASS (1987).

Soybean production appears to have altered the level of production risk within South Dakota agriculture. Statewide, soybean yields do not follow closely the yields of either spring wheat or winter wheat. This can best be seen by comparing the historical yields for winter wheat and soybeans (Figure 3). Years with high winter wheat yields were frequently years with low soybean yields and vice-versa. A similar, but not as strong, pattern exists for spring wheat. Typically, low yields in wheat production regions are offset by favorable soybeans yields in soybean production regions.

The current farm program limits producers' flexibility in altering their cropping patterns. Historical acreages planted to specific crops are used to determine the base acreage for each crop. These base acreages are used by the ASCS to determine government payments to be received by a producer and the number of acres a producer is allowed to plant of a specific crop. Therefore, cropping patterns in 1986-1987 were heavily dependent upon historical acreages planted rather than solely current productivity. A high commodity price-period with less government involvement or a more price-oriented policy may result in further shifts in cropping patterns.

SOUTH DAKOTA YIELDS RELATIVE TO SURROUNDING STATES

Since the 1930s, federal farm programs have been used to manage capacity reduction when grain surpluses have developed. The Food Security Act of 1985 has achieved capacity reduction through required set-asides for farm program participants and the Conservation Reserve Program. This type of capacity reduction requires land to be set aside in extremely productive as well as less productive regions of the U.S.

Currently, there are proposals to reduce production capacity through

market prices rather than government programs. This would imply that market prices would determine which land would continue to be used in grain production. Assume two production regions have identical grain prices. With a major price decline, the region having the least productive land would be the first to reduce capacity.

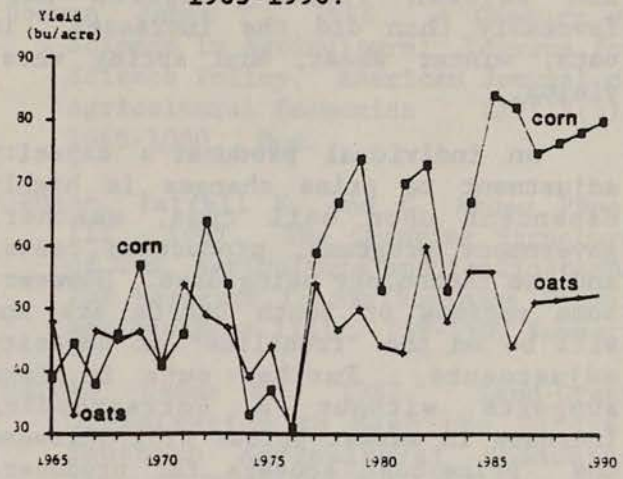
The total costs of producing a crop can be divided into fixed and variable costs (Schmiesing and Bleyhl, 1986). In the short-run, fixed costs can be ignored in the production decision. However, eventually fixed assets such as machinery, buildings, and other assets must be replaced. If inadequate returns are associated with farming land with poor productivity, the productive assets used on the farmland will not be replaced. Such land will exit from production in the long-run.

Assume the production of a specific crop is greatly reduced in a region. Such a region probably will be the last to increase production when price increases occur. The lack of an infrastructure in terms of machinery, facilities, and management would limit the ability of fringe regions to respond quickly to price increases. Fringe production regions would be confronted with an increased exposure to a "bust" agricultural economy.

A crucial issue for Great Plains states, such as South Dakota, is the competitiveness of the grain complexes in these states relative to other regions. Presented in Table 3 are the average statewide yields of Iowa, Minnesota, Nebraska, North Dakota, and South Dakota for 1976-1986 and how much higher or lower these states' yields were than South Dakota yields for the 1965-1975 period. South Dakota yields compared most favorably for oats, soybeans, and winter wheat. The yields for these crops were in excess of 70% of surrounding states. However, corn and spring wheat yields were less than 60% of neighboring states.

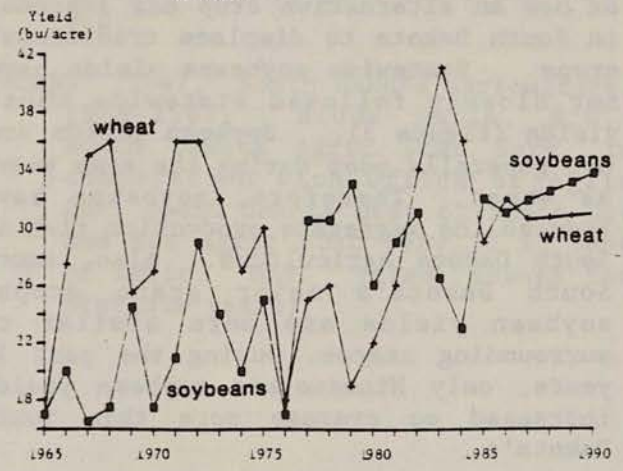
Minnesota generally has experienced a consistently higher increase in its crop yields during the past 11 years than the other surrounding states. South Dakota's performance in increasing

Figure 2. Statewide corn and oat yields, South Dakota, 1965-1990.



Sources: SDASS (1987) for 1965-1986 and author projections for 1987-1990.

Figure 3. Statewide soybean and wheat yields, South Dakota, 1965-1990.



Sources: SDASS (1987) for 1965-1986 and author projections for 1987-1990.

Table 4. Average yields, major crops, South Dakota and neighboring states.

Crop	Iowa	Minnesota	Nebraska	North Dakota	South Dakota	South Dakota as a percent of the state high
Average yield per acre for 1976-1986						
Corn for grain	112	101	108	70	65	58.0
Oats	61	59	50	47	48	78.7
Soybeans	37	33	33	24	28	75.7
Winter wheat	36	34	36	28	28	77.8
Spring wheat	n/a	39	n/a	28	23	59.0
Average change in bushels per acre, 1976-1986 relative to 1965-1975						
Corn for grain	18	23	26	19	19	73.1
Oats	7	6	6	2	4	57.1
Soybeans	6	9	6	6	7	77.8
Winter wheat	4	6	3	1	-2	-33.3
Spring wheat	n/a	8	n/a	3	3	37.5

n/a = not applicable

Source: SDASS (1987)

yields has been less consistent across crops. Increases in South Dakota corn and soybean yields compared more favorably than did the increases in oats, winter wheat, and spring wheat yields.

An individual producer's capacity adjustment to price changes is highly dependent upon soil type, weather, government programs, production costs, and the technology being used. However, some regions of South Dakota are and will be on the "frontline" of capacity adjustments. Further cuts in farm supports without a corresponding increase in market prices will increase the price-cost squeeze for producers farming low productivity land.

IMPLICATIONS OF TRENDS

Soybeans are an excellent example of how an alternative crop has expanded in South Dakota to displace traditional crops. Statewide soybeans yields have not closely followed statewide wheat yields (Figure 3). Soybean yields are not generally poor during the same years as wheat. Therefore, soybeans have reduced the aggregate production risk in South Dakota agriculture. Also, among South Dakota's major grain crops, soybean yields are more similar to surrounding states. During the past 10 years, only Minnesota's soybean yields increased on average more than South Dakota's.

Although South Dakota has been among the leading states in oats production, the competitive position of oats as a crop appears to have eroded significantly. In eastern South Dakota, soybeans have replaced oats on many acres, while in central and western South Dakota winter wheat acreage has increased at the expense of oats acreage. Yield increases for oats have lagged corn and soybeans. Also, South Dakota oats yield increases have lagged behind all of the surrounding states except North Dakota.

Since 1965, a major expansion of wheat acreage occurred in central and western South Dakota. In 1986, winter wheat harvested acreage was 1.4 million acres higher than in 1965, and spring wheat harvested acreage increased 0.4 million for the same period. This harvested acreage expansion occurred despite current acreage set-asides required of producers participating in the farm program.

The competitive position of corn is a mixture of conflicting trends. Although corn for grain yields have increased significantly, total acreage harvested has not expanded like soybeans. Irrigation has had a role in statewide yield increases. However, in comparison to neighboring states, the statewide yield for corn for grain is relatively low. This would appear to imply that continued production in certain dryland production regions may be extremely vulnerable to low market prices for corn. This depends partially upon the profitability of alternative crops.

A critical question is whether current yield trends will continue. In 1987, the estimated U.S. acres harvested for major South Dakota crops (in millions of acres) were: corn (59.5), soybeans (57.6), winter wheat (39.3), spring wheat (13.3), sorghum for grain (10.5), barley (10.0), oats (6.9), and durum wheat (3.3). The large acreages associated with corn and soybeans imply a large potential market for yield enhancing technologies for these crops. Minor crops like oats and durum wheat do not provide the same level of commercial opportunity.

What will be the role of land-grant universities and agribusinesses in technological innovation for these minor U.S. crops (Bonnen, 1986; Jensen and Pope, 1987; Martin, 1987)? Also, is there an economic return to pursuing technology innovations for these crops?

A more market-oriented policy using prices to allocate capacity adjustments in the grain production complex probably will result in South Dakota being on the "frontline" of this adjustment process. A market-price oriented policy may have a major impact on South Dakota regions lacking the necessary productivity to compete. At what level of grain prices will specific types of South Dakota agricultural land revert to grasslands or other low intensity uses? Information on where and how much

adjustment would occur would be useful not only to agribusinesses but also to rural communities in their planning efforts.

Another major issue is the drought resistance of the current and developing cropping patterns. Yield levels comparable to the 1976 drought would be extremely damaging to the state's agricultural economy. Such crop yields would generate greater economic stress than in 1976 because agribusinesses and producers have since adjusted to significantly higher production levels associated with higher yields. The South Dakota agricultural economy also is now more highly financially leveraged than in the 1970s.

FOOTNOTES

[1]The author would like to thank Larry Janssen, Richard Shane, and Wayne Ellingson for their comments and reviews of this chapter. Gratitude is expressed to Verna Clark and Penny Stover for their service in preparing the chapter.

[2]Whenever "yield" is used in this Chapter, the intended meaning is "yield per acre."

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SOUTH DAKOTA'S GRAIN TRANSPORTATION SYSTEM

Charles E. Lamberton

South Dakota farmers and rural residents depend upon the state's transportation system. The more efficient that system is, the greater the income of farmers and those working in rural industries, and the lower is the cost to farmers, business, industries, and consumers of the commodities brought to rural areas.

This paper describes the changes in South Dakota's transportation system during the past 20 years, and it looks ahead to some transportation needs and issues likely to arise in the next several years. Because the South Dakota road and rail system are interdependent, and the rail system is primarily dependent upon grain traffic, this paper is focused on the movement of grain and the principal economic determinants of grain flows.

RESTRUCTURING THE RAIL SYSTEM

South Dakota's rail system has been physically and financially restructured in the past 20 years. First, a wave of 21 abandonments occurred during the 1965-72 period. Of these, 13 reflected the efforts of policy undertaken by the Chicago & North Western (C & NW) Transportation Company to rid itself of the financial drain caused by light-density branchlines (Table 1). After the passage of the 4 R's Act in 1976, South Dakota abandonment activity experienced a second wave due primarily to the financial plight of the Chicago, Milwaukee, St. Paul & Pacific Railroad Company (Milwaukee).

The 1976 Act required each state to become involved in rail planning and made matching funds available for rehabilitation. It helped to achieve recognition of rail problems at the state level. In South Dakota, the attitude of both the general public and state officials changed from that of fighting each abandonment to one of retaining an essential core system.

The 1976 South Dakota Legislature repealed several sections of state law which imposed unnecessary regulatory and expense burdens on railroads. In 1978, laws were passed to accommodate handling of federal 4 R's Act funds, facilitate rehabilitation through an "Iowa Plan," and allow the formation of Regional Railroad Authorities. The 1979 Legislature repealed much of the law regulating railroad practices and rates. Necessary regulatory law was rewritten by the 1980 Legislature, and many of the remaining regulatory responsibilities were transferred from the Public Utilities Commission to the Department of Transportation to allow a more comprehensive and coordinated transportation planning effort within a single agency.

The 1980 Legislature created the South Dakota Railroad Authority with the power to purchase rail properties. The purchase was to be financed by a 1% retail sales tax. Of the abandonments in 1980, 964 miles were lines of the bankrupt Milwaukee Road. In October,

Table 1. Railroad branchline abandonments, South Dakota, 1965-1981.

Year	Number	Miles	Year	Number	Miles
1965	1	5.3	1973	0	0
1966	2	35.4	1974	1	26.0
1967	1	47.7	1975	0	0
1968	2	53.2	1976	1	4.1
1969	3	65.5	1977	4	143.0
1970	4	128.5	1978	3	210.2
1971	5	73.8	1979	7	256.5
1972	4	122.9	1980	21	1,089.0
			1981	4	70.3

1980, the Railroad Authority's purchase of some 760 route miles from the Milwaukee, including yards and structures at several locations, was approved. In all, the Authority spent $25 million to establish a state rail system. The purchases were completed in 1981.

The 1981 South Dakota Legislature authorized the Railroad Board to contract for railroad operations and maintenance on the state-owned lines. The Division of Railroads negotiated an operating agreement with a major railroad, the Burlington Northern (BN), which phased in service on the state-owned system as rehabilitation work was completed during the summer of 1981.

BN service offered advantages not possible for shortline operations such as single-carrier movements of grain to the principal export terminals without interchange delays and unit-train grain rates. The BN operates the South Dakota lines without direct subsidy. In short, the South Dakota owned core system was placed in the national rail system without requiring direct operating or maintenance subsidies.

Incorporating the Milwaukee mainline into the BN system provided South Dakota shippers with direct, single-carrier access to the Pacific Northwest. By shortening BN hauls between the West Coast and western coal fields and the markets in Minnesota, Wisconsin, Missouri, and the Gulf Coast, it became possible to increase bridge traffic to provide support to the rest of the state-owned system. It also could be instrumental to future industrial development in South Dakota.

After attempting to abandon its line west of the Missouri River, the CNW sold the entire line from the Mississippi River at Winona, Minnesota, to Rapid City, South Dakota, in 1986. The new railroad company, the Dakota, Minnesota & Eastern, operates 965 miles of former CNW track, serves 57 stations in South Dakota, and employs 140 people out of its new headquarters in Brookings.

In 1978, the state's entire rail system had been operated by the Milwaukee and CNW with minor BN and Soo branches. By 1986, after elimination of thousands of miles of branch lines, the state's system consists of the BN and DME within the national rail system. Although direct rail access to many small communities has been lost, access to world grain markets has been improved.

GRAIN TRUCKING

The movement of agricultural commodities by truck has been regulated only by the state and only for intrastate movements. Because most of the state's commodities are shipped to other states, such regulation has not had a significant effect on trucking grain. The trucking business has the characteristics of a perfectly competitive or contestable market. Consequently, market forces have induced an efficient grain trucking industry with entry and exit occurring quickly as the demand for service waxes and wanes.

Many elevators own trucks and many have an agreement or lease arrangement with private truckers. Such agreements assure available capacity and help to stabilize truckers' revenues. On hauls to Sioux City, Mankato, Dawson, or the Twin Cities, trucks often return with fertilizer, soybean meal, or feed. Back-hauls are usually not available on short hauls to nearby subterminals.

HIGHWAYS

Perhaps of greater significance to agriculture is the growing problem of highway maintenance and construction costs. Bridges on state highways are deteriorating rapidly, with many structurally deficient and/or obsolete. The South Dakota Department of Transportation has estimated that it will cost $140 million to repair and replace deficient bridges at 1978 costs.

Much of the state's primary highway system--constructed during the 1920s, 1930s, and 1940s, and designed to last 40 to 50 years--is reaching the limit of its design life. Traffic levels and vehicle weights have increased beyond those for which these highways were constructed and have, therefore, accelerated deterioration. Much of the

secondary highway system was built in the 1950s and 1960s. These lighter roadways are, in many cases, facing the same problems and, with the restructuring of the state's rail and grain handling systems, are relied upon to carry a greater burden than in the past.

LOCAL RURAL ROADS

The efficient movement of farm supplies, crops, and livestock is dependent upon access to local rural roads and bridges. Access enables the timely delivery of seed, fertilizer, and machinery and, in turn, the marketing of farm products. The many geographically dispersed agribusinesses and rural communities have differing transportation requirements and often have fewer transportation alternatives than employment sectors located in urban centers. The quality of rural life is adversely affected if emergency vehicles, such as those for police, fire, and health protection, are forced to use long and circuitous routes. Lack of an adequate local transportation system also increases costs of local industries and restricts nonagricultural industrial development.

Many of today's local rural roads and bridges were built in the late 19th and early 20th century when overland transportation for passengers and freight was limited to horse and wagon or railroad. Farms were small and numerous and the farm population needed access to homes, schools, and churches as well as markets. The development of automobile and truck industries in the 1920s and 1930s created the need to get rural America out of the mud. Roads were surfaced and some bridges replaced to accommodate trucks of six to seven tons gross weight. About 70% of today's rural bridges are such bridges built before 1935. Most bridges constructed in the 1940s were designed for 15-ton loads. By 1950, about 50% of local rural road mileage had been improved with all-weather surfaces. The width, grade, base, surface design, and capacity of much of today's rural road and bridge system are based upon the traffic needs of the 1940s and 1950s.

The demands on local rural roads and bridges have changed dramatically in the last 35-50 years as exemplified by the changes in farm equipment and farm trucks. A farmer may use a pickup or tractor to draw two wagons with 600-900 bushels of grain and a gross weight of 28-36 tons. Bridges longer than 55 feet bear the entire load at one time. Single-axle wagons can carry more than 800 bushels of grain with loaded weight up to 50,000 pounds per axle.

Agricultural trucks also have become larger. Tandem axle trucks with a gross weight of 27 tons are common on rural roads and bridges. Most states have adopted the federally allowed weight limits of 20,000 pounds per axle, 34,000 pounds per two axle tandem, and 80,000 pounds maximum overall weight. The use of unit trains carrying loads of 175,000 to 200,000 bushels of grain has resulted in fewer but larger elevators and train loading facilities. This has caused grain to be collected from farms in larger trucks carrying heavier loads on the local road system. It also has diverted some of the heavy grain traffic from the interstate, federal, and state highway system to local roads.

Increasing farm size due to technological change has resulted in fewer farms and declining farm population. Thus, although an extensive and higher quality rural road and bridge system may still be necessary to carry the increased products of farms, some rural roads may no longer be needed for access to homes, schools, churches, and markets. Greater social and economic mobility and interdependence have increased the use of the rural road system. In addition, demographic changes have eliminated much of the rural school system. Children travel longer distances in large, 72-89 passenger buses weighing up to 15 tons. These changes in the demands on the rural road system mean that it is not known whether the extent or quality of that system is correct, too great, or deficient.

South Dakota has more than 83,000 miles of roads, streets, and highways, nearly 70,000 miles of which are the responsibility of county or township government. Thus, more than 83% of the

state's roadways are local rural roads. Of the 70,000 miles of local rural roads, more than 62,000 miles (89%) are not hard surfaced. The state has nearly 7,500 bridges, of which nearly 60% are on the non-federal-aid road system. This number does not include the uncounted rural bridges less than 20 feet long.

In 1985, South Dakota county and township governments spent nearly $63 million on roads and bridges or approximately $900 per mile of rural road. The principal source of funds was local property taxes ($27.8 million), with motor vehicle registrations second in importance ($19.2 million).

Therefore, South Dakota faces the dilemma of other midwestern states. There exists an extensive system of rural roads and bridges, most without hard surfacing and many in poor condition. The system must carry an increased volume of agricultural commodities in larger, heavier vehicles. However, the decrease in rural population, income, and property value, has made it increasingly difficult to finance the system, and rural industrial development has been retarded.

GRAIN HANDLING AND STORAGE SYSTEM

The state's grain transportation system now consists of a network of roads and highways over which grain is moved by truck to elevators, subterminals, and processors in South Dakota and neighboring states. The primary marketing outlet has traditionally been the country elevator system. While the volume of grain produced and marketed has increased, the number of elevators has decreased (Table 2). The decrease in elevator numbers has occurred among smaller elevators, as some are closed and others are expanded. In addition, large new elevators have been built. Total elevator storage capacity has increased from 80.3 million bushels in 1963 to 85.2 million bushels in 1984. Average elevator capacity has increased 50% over this period. Total storage capacity is estimated to be 695 million bushels, of which 578 million bushels is on-farm storage.

Of the 346 elevators, 194 are owned by cooperatives of which 15 are line elevators of regional cooperatives. The rest are independently owned or line elevators of grain marketing firms. The financial crisis in agriculture, the loss of rail service for many small elevators, and the improved rail service for others have caused a restructuring of the ownership pattern of country elevators. In some cases, an individual cooperative has purchased the elevators of other cooperatives to form a single marketing entity with multiple facilities. This has also occurred among independents but to a lesser degree and on a smaller scale.

Table 2. Country elevators, by storage capacity, South Dakota, 1963-1984.

	Number of Elevators			
Storage Capacity	1963	1968	1974	1984
0 - 199,000 bu	382	348	276	169
200,000 - 399,999 bu	82	95	108	113
400,000 - 599,999 bu	26	23	43	40
600,000 - 799,999 bu	0	0	0	7
800,000 bu and over	0	0	0	17
Total	490	466	427	346

The restructuring of the rail system has been a major inducement behind the trend. The surviving rail system consists primarily of rehabilitated lines with heavy rails capable of carrying unit trains. The introduction of unit-train rates, when the line capacity became available after 1981, caused many elevators to increase their load-out capacity. Twenty-six elevators are now capable of loading half-unit trains but not full units. Fourteen are capable of loading at least a complete unit-train (54 cars) in one day. Prior to the restructuring of the 1980s, there were no such facilities.

Two of the unit-train loading facilities have no storage capacity. They load hopper cars with a belt loader directly from a pit, as trucks deliver grain from nearby elevators on a closely timed schedule. This system has enabled shippers to make use of the increased rail capacity and the existing system of country elevators which collect, dry, clean, blend, and store grain before delivering it to the loading pit.

GRAIN FLOWS

In a 1974 study, it was found that South Dakota grain was shipped to eastern and export markets and processing plants through Minnesota and Iowa. Soybeans were trucked to processors in Sioux City, Iowa, and both Mankato and Dawson, Minnesota. In all, 58% of the grain leaving South Dakota went to Minnesota, primarily to the Twin Cities and Mississippi River terminals. The processors and Missouri River terminals at Sioux City, Iowa, received 36%. Less than 4% was shipped to the West Coast.

A study of 1981 grain flows from the 15 counties in the southeastern part of the state revealed a major shift in grain marketing patterns. Several branchlines were lost and unit-train service and rates were introduced on other lines. However, rail service was not available for much of 1981 in most of the region as track work and BN service were phased in during that year. Consequently, 84% of the corn, and virtually all of the other commodities shipped from the region were moved by truck. The availability of BN unit train service late in 1981, however, caused 16% of the corn to be shipped to the Pacific Northwest Coast ports. This evidenced the value of the new market access made possible by the state's rail restructuring program.

A 1983 survey of the same 15 southeastern counties, plus the next tier of six counties immediately north of those, revealed a further shift to the use of rail service and shipments to more distant markets. The share of corn shipped by rail rose to 37% of the total and was 56% of the corn shipped out of the state. Of the corn shipped by rail, 64% went to the Pacific Northwest, 21% to Middle South states, 7% to the Gulf ports, and 7% to Southwest states.

By 1983, 30% of the region's soybeans were shipped by rail and sent beyond the traditional Iowa and Minnesota processing plants. Of the beans shipped by rail, 46% went to the Pacific Northwest, 20% to Middle South states, and 21% to Illinois.

Although the southeast is not the state's primary wheat producing region, the 1983 data also showed the impact of the new rail system on wheat movements. Of the wheat shipped out of the state from that region, 64% went by rail. Most of it went to the Omaha area because the single unit-train wheat shipper in the region had a rate unique to that destination.

The rail service availability in 1983 caused a significant shift in the marketing pattern for the southeast's three major commodities: corn, soybeans, and oats (Table 3). A significant share of feedgrains, such as corn and oats, is processed as feed and stays within the state. Feed barley also stays in the state, but a large amount of malting grade barley is now shipped by unit-train to Minnesota and Wisconsin from north-central and northeast South Dakota.

The net benefit of the new rail service to corn producers in 21 counties ranged from 11 to 28¢/bu in 1983. That represented a return between $7 and $17 million in additional farm income in 1983 on the state's $25 million investment. This estimate does not include the benefit to producers of soybeans or other commodities.

GRAIN PRICING SYSTEM

Most local elevators buying grain directly from farmers price the grain off daily bids from subterminals in the area or terminals in Iowa, Nebraska, and Minnesota. Most grain is bought on a cash basis. Grain which is forward-priced to the farmer is generally priced off either the Minneapolis futures or to-arrive price. Few local elevators hedge their purchases in the futures market. Most grain is purchased FOB the local elevator.

Prior to rail restructuring and deregulation, the marketing options were limited. Most grain moved to the Twin Cities or the Mississippi River terminals below the Twin Cities by single car or truck. Some went to the Missouri River at Sioux City, Iowa, for movement to the Gulf, and some wheat went to

Duluth, Minnesota, for export. Sioux City was largely a truck move from southeastern South Dakota, and Duluth was a single car or truck haul from northern South Dakota. This pattern meant the Minneapolis pricing reflected where the grain would actually flow, and transportation cost allowances were reasonably certain.

With the availability of unit-train movements, and particularly with the advent of rail contracting, local elevators are delivering grain to unit-train subterminals in the state. Some of the subterminals also buy directly from farmers. The subterminals usually buy the grain FOB the subterminal and ship under a rail contract rate. Subterminals owned locally or by regional grain firms ship some grain under their own contract. Most, however, ship primarily under the contract of the purchaser, an international grain firm.

Most of the subterminals receive grain primarily by truck from local elevators which have already cleaned, dried, and blended the grain. The subterminal tests and blends to its own needs and loads trains. Those train-loading facilities which use only a dumping pit are owned by international firms which ship to their own export terminal where the grain is tested. Grain is priced FOB the loading pit in units of four truckloads. The local elevator delivers four truckloads at a time to fill one railcar. Thus, each car can be identified by the local elevator delivering the grain and any dockage applied, even though the grain is checked at the port rather than inland.

When the local elevator delivers to a subterminal, it may have purchased grain earlier priced off the Minneapolis market and may have hedged the purchase in the futures market. When called by the subterminal to help fill a train, the local elevator would receive a bid which raises the local cash price. When removing the hedge, the local elevator would then gain because the higher bid from the subterminal will have narrowed the basis of the hedge. By delivering to a nearby subterminal rather than the Mississippi River, the local elevator benefits from the lower cost of transportation than would have been built into its Minneapolis plus transportation cash bid to the farmer. To the extent that there is competition among local elevators to buy and deliver grain to the subterminal, these gains are bid back into the price paid to farmers.

Table 3. Destinations of South Dakota exports, selected grains, 1981 and 1983.

	Percentages of total state exports					
	Corn		Soybeans		Oats	
Destination	1981	1983	1981	1983	1981	1983
Pacific Northwest	16	24	--	14	--	--
Middle South	--	18	--	6	--	35
Gulf Coast	--	3	--	--	--	--
Southwest	--	3	--	--	--	--
Iowa-Nebraska	30	19	82	62	12	44
Minnesota	--	--	16	12	--	7
Illinois-Wisconsin	--	--	--	6	--	--
South Dakota	24	35	--	--	13	15
Other[a]	31	--	2	--	75	--

[a]Includes Middle South, Southwest, and Minnesota.

TRANSPORTATION RATES

The two railroads which provide virtually all the rail service to South Dakota grain shippers offer the full range of rates: single car, multicar, half-unit train, unit-train, and contracts. The DME, which began operations in September, 1986, adopted the tariffs and all contracts which the CNW had offered prior to the takeover.

Although many elevators and local subterminals have rail contracts, many report that it is to their advantage to ship under the contract of the major grain company receiver's contract. Subterminal shippers, knowing their own contract rates and the current price of grain, can estimate closely the contract rate of the buying firm. The buyer may have a better contract because it has made volume commitments to the railroad which the shipper could not make. Thus, unit-train shippers generally benefit from the buyer's contract.

It is difficult to separate the effects of rail contracts from those of the entire restructuring of the grain transportation system. However, it appears that contracts have contributed

to a lessening of competition in the sense of the concentration of volume. Small cooperative and independent elevators without access to railroad service or railroad contract rates have lost volume and been forced to narrow their margins. It is likely that many of these firms will eventually leave the market.

The use of contracts has increased the share of grain movements going through subterminals. Adequate rail service, trucking alternatives, and grain supply are available to cause the industry to remain very competitive even though more concentrated than in the past. It is unlikely that a significant degree of monopoly rent will accrue to grain firms from the use of rail contracts.

The use of contracts has contributed to shippers' flexibility in the choice of destinations. Along with the rail restructuring, this has allowed South Dakota grain to reach new markets and allowed shippers to choose the most profitable of those markets. Competition appears to be adequate across markets and buyers, as well as among shippers, so that a significant share of the gains from reduced transportation cost is bid back to the farmer.

Truck rates are generally market-determined and have been relatively stable for some time. Carriers often have an ongoing agreement with a shipper concerning rates, service availability, and backhaul. Elevators often sell grain to local truckers who actually market the grain to many feedlots over a wide territory. By serving as a marketer as well as a trucker, the trucker saves the elevator the cost of locating feedlot buyers and truck dispatching. This also provides an outlet for grain which would be subject to dockage if sent to a subterminal, because feedlots will accept a higher percentage of fines and broken kernels. This appears to be a very efficient marketing system arising in response to natural, unregulated economic incentives.

CONCLUSION

The state's rural transportation system has undergone substantial physical restructuring. The grain handling and marketing system has adjusted in response to that restructuring. The system has been made more efficient and the state's farmers have benefited.

As rural demographic and economic needs change, more changes will be necessary in the transportation system. The immediate need appears to be an assessment of the physical requirements and financial support of the local rural road system. In some areas, that system may no longer need to be as extensive as in the past. In other areas, residents may no longer be willing or able to support the extent or quality of the road system they have had. Retaining good quality road access to rural areas, however, will be necessary for the future success of farmers and rural industries. An analysis of future needs and financial capability will be needed if the state's limited resources are to be used as efficiently as possible to enhance the growth of South Dakota's rural economy.

SOUTH DAKOTA'S CATTLE INDUSTRY

Gene E. Murra and Clarence Mends[1]

A brief descriptive overview of the cattle industry in South Dakota is presented in this Chapter. Particular emphasis is given to beef cattle and calves.

The present status and some of the changes and developments in South Dakota's cattle economy are reviewed. Where appropriate, attention to trends is included. Characteristics and locations of major producing counties in the state, marketing outlets used, and cattle and calf shipments are discussed. The purpose of this Chapter is to provide understanding of present conditions and factors that may lead to changes, so people concerned with the industry's future might be more informed as they plan for the 1990s.

The South Dakota livestock industry has been a major contributor to both the state and national economies for several decades. The South Dakota cattle and calf inventory ranks 9th nationally, the inventory of beef cows that calve ranks 5th, and the cattle on feed inventory ranks 9th. In terms of cash receipts from all livestock and livestock products, South Dakota, with receipts of $1.9 billion (Table 1), ranks 13th in the nation. From 1981 to 1985, cash receipts from livestock and livestock products averaged about 60% of all agricultural receipts in South Dakota.

Table 1. Cash receipts from marketing livestock, South Dakota, 1981-1986.

	Livestock and products		Cattle and calves	
Year	$ billion	Percent of total farm marketings	$ billion	Percent of total farm marketings
1981	1.87	66.3	1.27	45.3
1982	1.64	61.6	1.04	39.0
1983	1.65	59.1	1.06	38.0
1984	1.80	59.0	1.20	39.4
1985	1.90	59.3	1.33	41.3
1986	n/a	n/a	0.88	n/a

n/a = not available

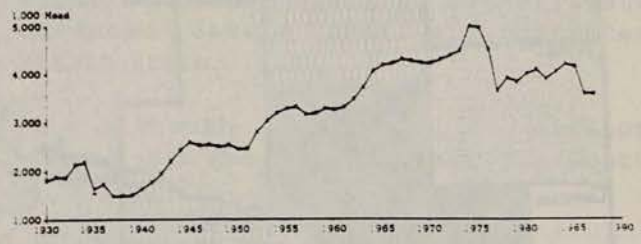
Source: SDASS (1985, 1986, 1987).

In the state's agricultural economy, cattle and calves historically have accounted for about 40% of cash receipts from farm marketings. Total cash receipts from cattle most years have been more than $1 billion annually. No other single category, grain or livestock, contributes even a third of this amount.

CATTLE NUMBERS

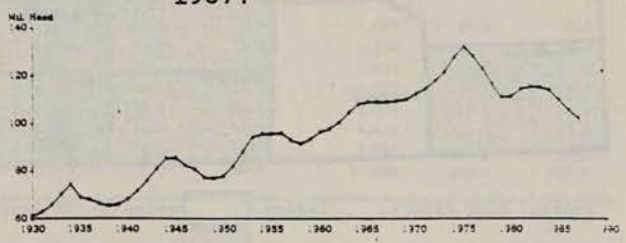
In general, the pattern of changes in the state's cattle inventory over time (Figure 1) has been similar to that for the nation (Figure 2). For the U.S., cattle numbers increased until a 1975 peak and have been lower since then. The U.S. current cattle and calf inventory is about 102 million head, or about the same level as that reported in the early 1960s. South Dakota's current January 1 inventory of about 3.6 million head also is nearly equal to that in the early 1960s.

Figure 1. Inventory of cattle and calves, South Dakota, 1930-1987.



Source: SDASS (1987).

Figure 2. Inventory of cattle and calves, United States, 1930-1987.



Source: SDASS (1987).

South Dakota's cattle and calf inventory grew cyclically from about 2 million head in 1930 to a peak of about 5 million head in 1974 (Figure 1). During the next three years, numbers decreased rapidly. Since 1977, the numbers have stabilized at about 4 million head, although in 1986 and 1987 the numbers are slightly less. These cattle are spread widely across the state (Figure 3).

The large decrease in cattle and calf production in the mid- and late-1970s resulted from low prices and profitability of feeder cattle and increases in production costs--mainly from higher grain prices and interest rates. In South Dakota, severe drought in many areas also caused large reductions in cattle numbers. Many herds were reduced in size, sometimes to the point of complete liquidation.

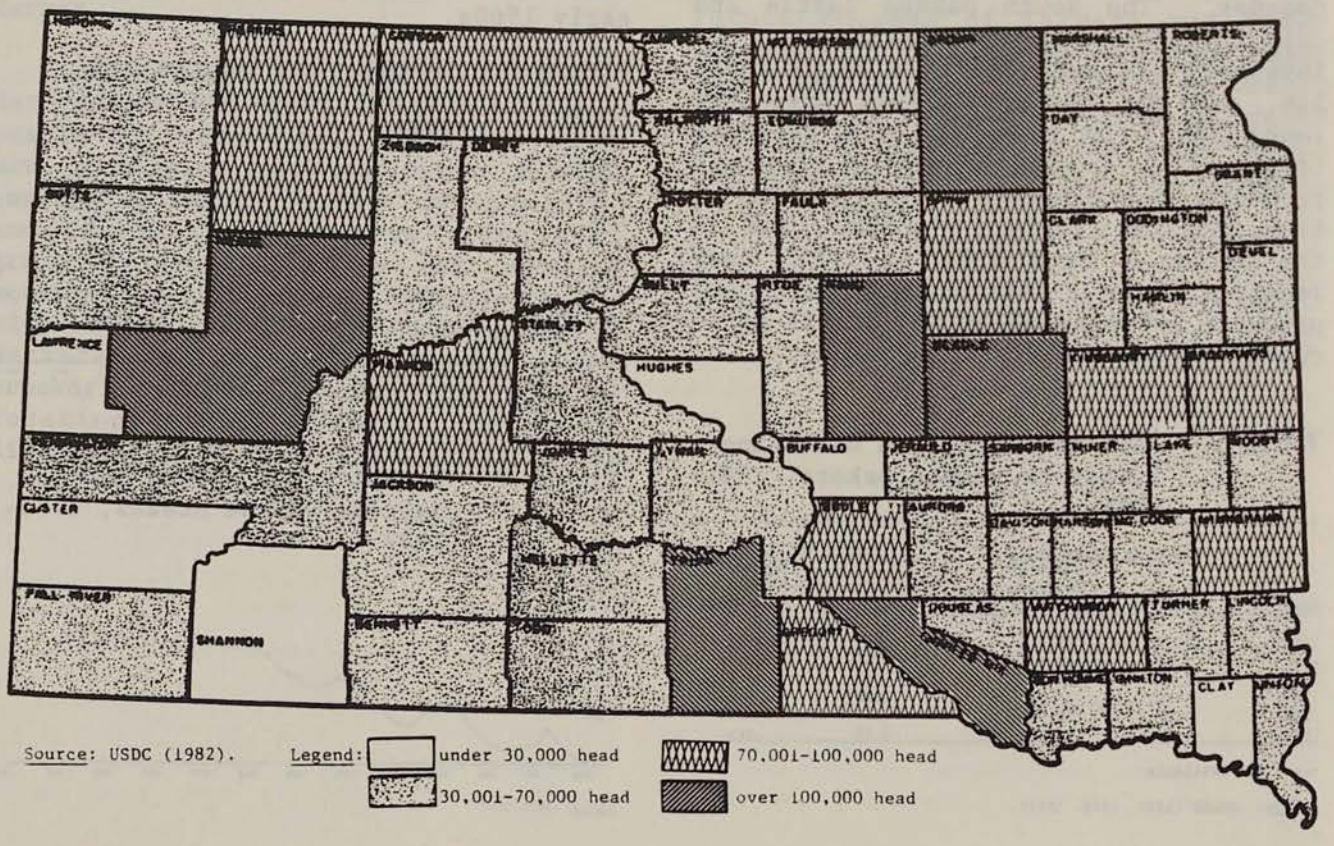
While some growth is expected in both the state's and nation's total cattle inventories, that growth likely will be slow. Growth is expected because, in general, the cattle business very recently has been quite profitable. Lower production costs--including grain, interest rates, and land costs--coupled with higher cattle prices have generated the added profitability. Favorable weather, especially during the winter of 1987, and ample grazing supplies also have added to "expansion fever."

The growth likely will be slow, however, because of the biological constraints of inventory growth for cattle, some reluctance by lending agencies to allow or encourage expansion, and knowledge of what happens to prices if numbers grow too fast and to an excessively high level. Inventory levels, at least in the next 10 years, likely will not move much above the early 1980s level, which for South Dakota was slightly above 4 million head.

NUMBER OF FARMS WITH CATTLE

In addition to smaller total inventories, fewer farms have cattle

Figure 3. Cattle and calf inventory, South Dakota, by county, 1982.



today compared to the past. In 1970, almost 40,000 farms had cattle in South Dakota. In 1987, following a continued downward trend since 1970, only 25,000 farms have cattle.

While recent detailed figures are not available, most farms or ranches with larger cattle herds are in West River, farms with feedlots are in East River, and most of the decline in the number of farms with cattle has been in the smaller-sized operations. Little change in these patterns is likely in either the near- or long-term.

The lack of a consistent feed grain supply and some limitations on alternative uses of land in western South Dakota present some constraints on what changes will occur there. In eastern South Dakota, producers who have discontinued cattle production likely won't re-enter the business in the near-term. Some of the smaller-sized operations probably will stop raising cattle because the economic incentives are not large enough for the risks involved.

CALF CROP

Decreases in the calf crop have accompanied recent decreases in the total cattle inventory. In both 1983 and 1984, for example, 1.80 million head were calves born in South Dakota (Table 2). In 1986, only 1.64 million calves were born in the state. The lower calf crop in 1986 resulted from high production costs and low prices received in the preceding two or three years. Of the calves born in the state, about 90% were beef animals and 10% dairy.

Table 2. Calves born during the year in inventory on January 1st, South Dakota, 1980-1986.

Year	Million head	Year	Million head
1980	1.75	1984	1.80
1981	1.72	1985	1.69
1982	1.78	1986	1.64
1983	1.80		

Source: SDASS (1987).

Most farms in South Dakota which produce calves have only small cow herds. In 1982, 55% of the state's beef cattle farms had fewer than 100 cows; they accounted for 17% of total production (Table 3). The relative importance of small cow-calf farms has dropped considerably since 1959, especially from the standpoint of farm numbers. Larger cow herds typically are found in the range area in the western two thirds of the state. Smaller herds often are located on farms which produce both grain and livestock.

PRODUCTION AND SLAUGHTER

Since 1981, total cattle and calf production in South Dakota has averaged 1.70 billion lbs. (Table 4). The peak was reached in 1985 (1.79 billion lbs.), and the low was in 1986 (1.49 billion lbs.). Cattle marketings in the state are generally 10-20% higher than production, reflecting out-of-state produced cattle that are marketed within-state.

Although more than 1.6 million calves are born each year in South

Table 3. Number of cattle and calf farms, by size of herd and percentage of total production, South Dakota, 1959-1982.

Size of herd category (cows)	1959[a]		1969			1978			1982		
	Number of farms	Percent of farms	Number of farms	Percent of farms	Percent of production	Number of farms	Percent of farms	Percent of production	Number of farms	Percent of farms	Percent of production
1-19	9,680	20.4	2,718	8.0	0.8	3,222	11.5	0.9	3,013	11.1	0.8
20-49	17,079	36.0	8,899	26.3	7.9	6,171	21.9	5.6	5,356	19.8	4.5
50-99	11,981	25.2	10,081	29.8	18.5	7,324	26.0	14.0	6,553	24.3	11.9
Sub-total	(38,740)	(81.6)	(21,698)	(64.1)	(27.2)	(16,717)	(59.4)	(20.5)	(14,922)	(55.2)	(17.2)
100-199	5,778	12.2	7,475	22.1	26.5	6,472	23.0	24.0	6,419	23.8	22.5
200-499	2,508	5.3	3,927	11.6	29.4	3,930	14.0	30.8	4,453	16.5	33.0
500 and over	411	0.9	726	2.2	16.9	1,001	3.6	24.7	1,206	4.5	27.3
Total	47,437	100.0	33,826	100.0	100.0	28,120	100.0	100.0	27,000	100.0	100.0

[a] Data on percent of production in 1959 are not available.

Source: USDC (1959, 1969, 1978, 1982).

Dakota, many of the calves are shipped out-of-state for finishing. For example, in 1986 a total of 1.73 million cattle and calves were marketed in the state. That same year, only 0.61 million head were marketed as fed cattle. While some of the other 1.12 million head were retained for herd replacement and slaughtered as non-grainfed animals, a high percentage was shipped to other states. Between 80 and 90% are finished in Nebraska, Iowa, and Minnesota (Figure 4). The vast majority of the remaining cattle are fed out in states further south than Nebraska.

Total cattle slaughter within the state since 1980 has averaged 650,000 head per year. That figure is close to the number of fed cattle marketed each year. In 1986, about 757,000 head of cattle were slaughtered in the state, which was the highest since 1976.

In South Dakota, cattle slaughter usually is greatest during late fall and early winter. Lowest slaughter levels usually are during the spring.

INCOME

Cash receipts from cattle and calves dropped below $1 billion in 1986 (Table 1) for the first time since 1978. The highest annual cash receipts for the past 10 years occurred in 1985, when cattle and calves accounted for $1.33 billion. The 1986 income, at $880 million, is the second-lowest in the past 10 years.

The low cash income in 1986 was the result of two major factors:

First, prices for cattle were low, averaging $52.60/cwt. Of the last 10 years, only 1977 ($37.50/cwt.) and 1978 ($49.40/cwt.) had lower average prices.

Second, marketings of both cattle and calves were low. The 1.62 billion pounds marketed in 1986 was the lowest in the past 10 years.

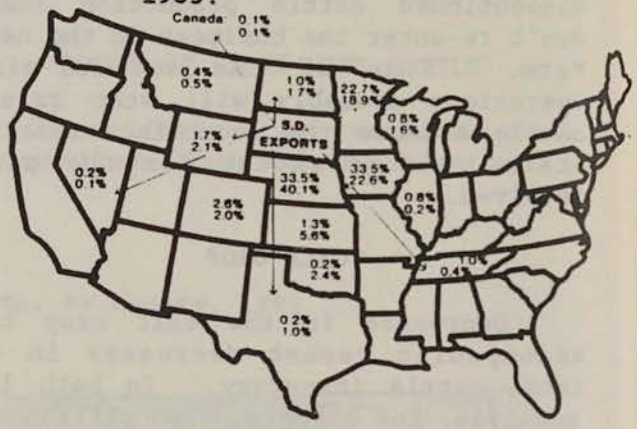
Higher prices in 1987 once again should cause cash receipts to be well above $1 billion. With some evidence of herd stabilization or even slight rebuilding and increased discussion of some type of retained ownership of calves, annual cash receipts from cattle and calves likely will remain above $1 billion during the next several years. Retained ownership of cattle on feed by calf producers also is likely to expand as cow-calf producers attempt to use cheap feeds more fully, increase income by selling more pounds per cow, and distribute fixed costs over a larger base.

Table 4. Cattle and calf production and marketings, South Dakota, 1981-1986.

Year	Billions of pounds	
	Production	Marketings
1981	1.77	2.12
1982	1.64	1.75
1983	1.73	1.84
1984	1.77	2.06
1985	1.79	2.37
1986	1.49	1.62
Average	1.70	1.96

Source: SDASS (1987).

Figure 4. Feeder and slaughter exports from South Dakota, by state of destination, 1981 and 1985.



Source: Adapted from Bau (1987).

Note: The top and bottom percentages pertain to 1981 and 1985, respectively.

MARKETING

The major market outlets for cattle in South Dakota are: (1) several auctions throughout the state, (2) the Sioux Falls terminal market, and (3) direct sales to cattle dealers and

feeders. Auctions are the most widely used outlet for feeder cattle and cows, while the terminal market and direct sales are most common for slaughter cattle.

Most producers use the cash method of pricing cattle. Cattle tend not to be forward-priced, but, rather, are priced at the time of change of ownership. Less than 10% of the producers use the futures market or options to price their cattle. The use of the cash forward contract varies from year to year, but generally is used for only a small percent of the sales.

CONCLUSION

While current cattle numbers are about equal to the inventory of the early 1960s and are 15% lower than the peak of the mid-1970s, South Dakota's cattle industry still is the most important agricultural cash income producer in the state. That situation likely won't change. Large areas of the state are ideally suited for the production of cattle and recent profits should help keep interest strong.

In addition, greater interest has developed in programs which will increase the returns for each head produced within the state. Retained ownership programs, such as backgrounding or feeding cattle in the state, show potential for expansion. Increased processing of some of the current production also is feasible. While rapid growth in those areas is not expected, some growth probably will occur.

FOOTNOTE

[1]The authors wish to thank Brian Schmiesing and Don Peterson for their comments and useful suggestions. We also especially appreciate the excellent editorial services provided by Don Taylor and Larry Tennyson. Gratitude is expressed to Penny Stover for her typing service and Rodney Dean Kappes for his assistance.

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SOUTH DAKOTA'S HOG INDUSTRY

Gene E. Murra and Clarence Mends[1]

The major characteristics of South Dakota's hog industry are described in this Chapter. Most comments concern the past and present situations, with a few comments about the future outlook for the industry. Together, the comments should provide insight for those concerned about the role and importance of the industry.

The hog industry in South Dakota is the second-largest agricultural cash farm income producer in the livestock category (behind cattle) and is the third-largest income producer from all farm marketings (behind cattle and wheat) in South Dakota. The state's December 1, 1986 inventory of hogs and pigs on farms ranks 9th in the U.S., as does the annual pig crop.

During 1981-86, cash receipts from hogs in South Dakota averaged almost $290 million per year. Hogs contributed 8-10% of the total cash receipts from farm marketings in the state during that period.

HOG NUMBERS AND PRODUCTION

Hog numbers in South Dakota peaked in 1923, when an inventory of 3.1 million head was recorded. That level was almost reached again in 1931. The lowest inventory on record was 1935, when there were only 600,000 head in the state. Since then, numbers generally have remained in the 1.5 to 2.0 million area (see Table 1 for specifics since 1981). In general, the state's inventory has followed the pattern of the nation. That pattern, since 1950, is shown in Figure 1.

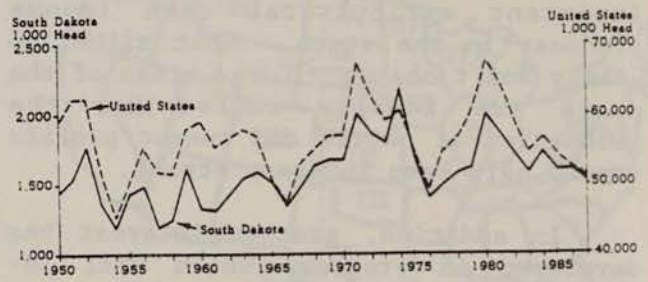
The state's hog producers also have followed other general trends noted in the U.S. For example, in 1965 there were over 1 million hog producers in the U.S. and approximately 23,000 in South Dakota (Figure 2). By 1986, that number had decreased to slightly over 300,000 in the U.S. and around 7,500 in South

Table 1. Hog and pig inventories, production, inshipments, and marketings, South Dakota, 1981-1986.

Year	Million head: Number on hand December 1	Million head: Pig crop	Million head: In-shipments	Million head: Marketings	Production (million pounds)
1981	1.71	2.66	0.10	2.76	631.1
1982	1.58	2.33	0.08	2.41	543.6
1983	1.73	2.56	0.07	2.37	607.2
1984	1.60	2.56	0.06	2.62	618.6
1985	1.61	2.70	0.05	2.60	613.4
1986	1.52	2.63	0.04	2.64	630.7

Source: SDASS (1987b).

Figure 1. Inventories of all hogs and pigs, South Dakota and United States, 1950-1987.



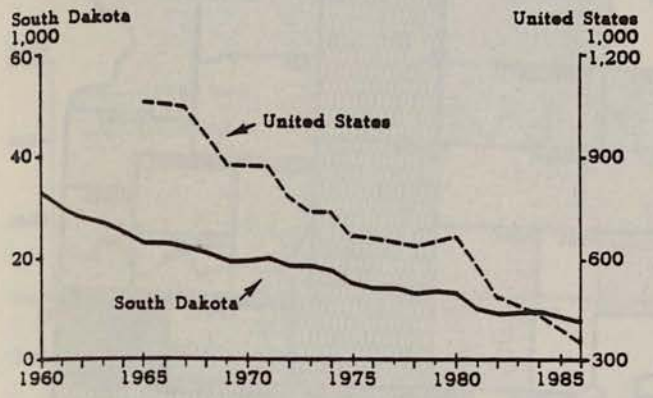
Source: SDASS (1987a).

Dakota. Typical hog farms, while fewer in number, usually are larger now than in the past, sell more hogs and pigs per farm, and more likely have the enterprise as one of the major farm enterprises rather than as a supplemental one.

Annual hog production in South Dakota has averaged slightly over 600 million pounds in recent years. In general, the fall and spring pig crops in South Dakota are about equal in size. The state's spring and fall pig crop has averaged 2.5 million head per year since 1981, with about half born in the spring and the other half in the fall. Many of the state's larger hog operations have year-around farrowing systems. Because in-shipments are a very small part of that total, most of the production is South Dakota based (Table 1).

Most hog producers in South Dakota have small hog operations. In 1982,

Figure 2. Hog producers, South Dakota and United States, 1960-1986.



Source: SDASS (1987a).

farms which sold less than 200 head per year accounted for more than 50% of all farms which sold hogs (Table 2). Farms with sales of less than 100 feeder pigs per farm represented more than 40% of all farms with hog and pig sales. A comparison of 1978 and 1982 census data suggests some growth in the larger-sized operations. In 1978, only 2.4% of the farms sold more than 1,000 head per year, compared to 4.9% of the producers with that sales volume in 1982 (Table 2).

Hog production in South Dakota is concentrated in the eastern part of the state (Figure 3) because that part also produces most of the corn used in hog production. No drastic changes in production location are expected in the near future. The eastern part of the state will continue to account for most of the state's hog production. Some recent interest in starting a large-scale production unit in central South Dakota may be one exception to that situation.

SLAUGHTER AND MARKETING

Hog slaughter in South Dakota, while fairly evenly distributed throughout the year, is heaviest in the late spring and late fall (Table 3). Average slaughter weights generally have been 245-250 lbs./head.

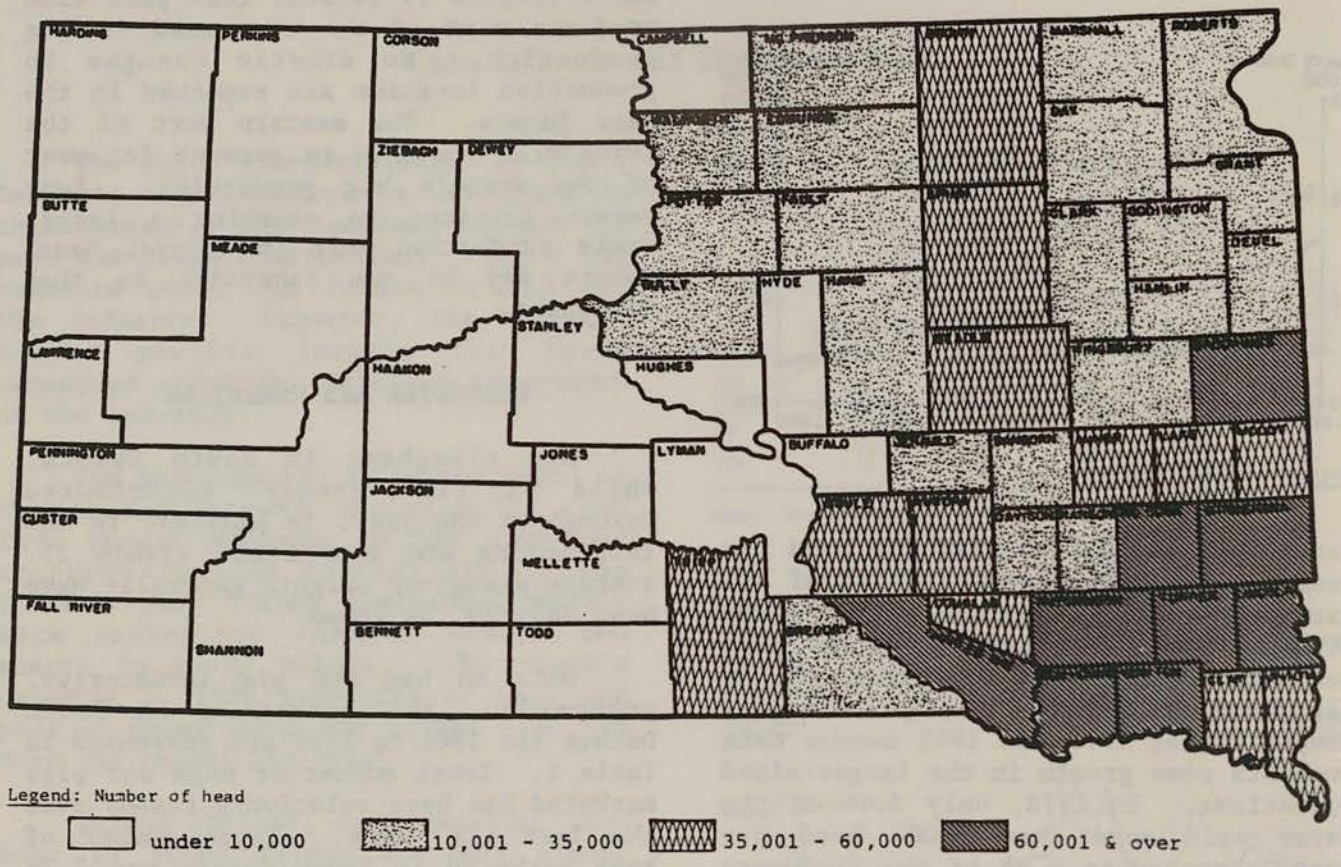
Data on hog and pig inventories, production, and marketing in South Dakota for 1981 to 1986 are presented in Table 1. Total number of hogs and pigs marketed has been relatively steady over the last six years. Total number of hogs marketed in South Dakota was 2.76 million head in 1981. In 1986, 2.64 million head were marketed.

Table 2. Size of hog and pig farms by sales volume, South Dakota, 1978 and 1982.

	1978					1982				
	Number of farms	Number of head	Percent of total head	Value ($'000)	Percent of total value	Number of farms	Number of head	Percent of total head	Value ($'000)	Percent of total value
Total hogs and pigs sold:										
Farms with:										
1-49 head	2,832	69,212	2.4	6,631	2.6	1,938	47,276	1.5	5,208	1.7
50-99 head	2,422	172,660	6.0	16,663	6.4	1,606	113,841	3.7	12,485	4.0
100-199 head	3,116	434,076	15.1	41,350	16.0	2,159	300,195	9.8	32,139	10.3
Sub-total	(8,370)	(675,948)	(23.5)	(64,644)	(25.0)	(5,703)	(461,312)	(15.0)	(49,832)	(16.0)
200-499 head	3,192	955,458	33.1	86,968	33.6	2,718	824,338	26.9	84,637	27.1
500-999 head	886	589,575	20.5	51,833	20.0	1,106	738,487	24.1	74,692	23.9
1000 & over	301	660,133	22.9	55,679	21.4	495	1,042,614	34.0	103,463	33.0
Total	12,749	2,881,114	100.0	259,124	100.0	10,022	3,066,751	100.0	312,624	100.0
Feeder pigs sold										
Farms with:										
1-49 head	934	22,455	3.4	993	3.5	660	15,810	2.2	691	2.1
50-99 head	631	44,339	6.8	1,947	6.9	481	34,031	4.6	1,495	4.5
100-199 head	642	88,351	13.5	3,900	13.7	543	73,905	10.1	3,353	10.1
Sub-total	(2,207)	(155,145)	(23.7)	(6,840)	(24.1)	(1,684)	(123,746)	(16.9)	(5,539)	(16.7)
200-499 head	665	199,039	30.5	8,629	30.4	636	197,474	26.9	8,790	26.6
500-999 head	189	127,723	19.6	5,739	20.2	245	161,395	22.0	7,341	22.2
1000 & over	63	171,241	26.2	7,166	25.3	105	251,517	34.2	11,413	34.5
Total	3,124	653,148	100.0	28,374	100.0	2,670	734,132	100.0	33,083	100.0

Source: USDC (1983).

Figure 3. Hog and pig inventory, South Dakota, by county, 1982.



Source: USDC (1983).

The major market outlets for slaughter hogs in South Dakota are one terminal market and direct sales to packers. Auctions, including special feeder pig sales, are the most widely used feeder pig markets in the state.

Most producers use the cash method of marketing. However, some increased interest in pricing hogs through the futures market, options, and forward pricing has been noted recently. Even then, probably 90% of the hog producers in the state do not forward-price their hogs.

A major factor in the level of income from hogs and pigs is the price received. Prices received in South Dakota follow the U.S. pattern very closely (Figure 4). In general, prior to 1970, prices were below $25/cwt. Since 1975, prices generally have remained above $40/cwt.

Prices in the mid-$60/cwt. range were noted in the summers of both 1986 and 1987. Profitable production has been noted for most of 1986 and 1987. That most likely will contribute to some expansion in the industry during the next year or so.

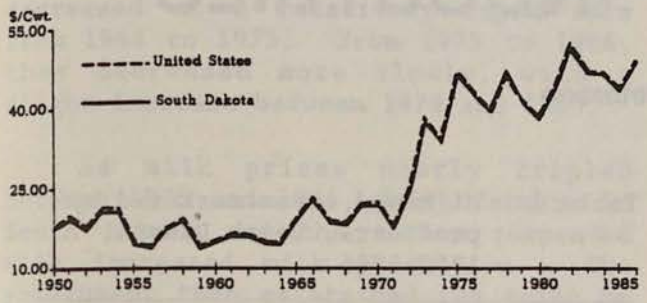
Table 3. Average hog slaughter number and liveweight per head, by quarter, South Dakota, 1981-1986.

Year	Jan-Mar	Apr-June	July-Sept	Oct-Dec	Total
Million head					
1981	7.86	7.30	7.12	8.58	30.86
1982	7.32	7.09	6.44	8.24	29.09
1983	7.49	8.38	5.26	8.97	30.10
1984	7.85	8.23	8.03	9.26	33.37
1985	7.99	9.37	6.51	5.94	29.81
1986	8.26	8.86	8.35	8.78	34.25
Pounds per head					
1981	244	246	252	259	250
1982	250	251	255	256	253
1983	243	259	289	262	263
1984	249	254	264	265	258
1985	251	260	256	246	253
1986	255	261	269	264	262

Source: SDASS (1987b).

Expansion, if it does occur, is apt to come from two major sources: First, those producers already in business may increase their production.

Figure 4. **Average slaughter hog prices, South Dakota and United States, 1950-1986.**



Source: SDASS (1987a).

In general, those producers are capital-intensive, larger scale producers.

Second, entrance into the state by large-scale operations currently is being explored.

CONCLUSION

While both the number of farms with hogs and the total inventory of hogs in South Dakota are currently much below their peaks, the industry remains both viable and important to the state's economy. Some recent growth may continue, further strengthening the importance of the industry to the state. The growth potential has been encouraged by recent profits to hog producers. Production increases by producers already in business and entrance of new firms seem likely in the near future.

FOOTNOTE

[1]The authors wish to thank Brian Schmiesing and Don Peterson for their comments and useful suggestions. We also especially appreciate the excellent editorial services provided by Don Taylor and Larry Tennyson. Gratitude is expressed to Penny Stover for her typing service and Rodney Dean Kappes for his assistance.

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SOUTH DAKOTA'S DAIRY, SHEEP, AND POULTRY INDUSTRIES

Donald L. Peterson

In this Chapter, historical trends in dairy, sheep, and poultry production and consumption in South Dakota are presented and discussed. Each commodity is addressed separately.

DAIRY

Dairy is South Dakota's third largest livestock industry, generating gross farm sales of almost $200 million in 1986. Beef was first, with $887 million in 1986 sales, and swine was second, with $320 million. Relative to total farm income, dairy has increased gradually from 5.9% ($50 million) of the state's total farm income in 1950 to more than 7.5% ($198 million) in 1986. The peak amount occurred in 1985 with $212 million or 7.1% of South Dakota agricultural income.

While dairy is important as an income source for South Dakota, the state ranks 20th in the nation in milk production.

Income and prices

The price received for milk increased from $2.56/cwt. in 1950 to $4.68/cwt. in 1970, and then increased steadily to $12.43/cwt. in 1980. In 1984, an all-time high average price of $12.73/cwt. was received. By 1986, the average milk price had fallen to $11.60/cwt. Milkfat prices have varied accordingly.

In 1986, virtually all cash receipts from milk production were from wholesale sales of fluid milk (Table 1). By contrast, the corresponding figures in 1960 and 1950 were only 68% and 10%, respectively. Cream sales plummeted from 87% of total sales in 1950 to 7% in 1970. In 1950, 38 million pounds of fluid milk were sold directly to consumers. In 1980, 5 million pounds were sold, and, today, such sales are virtually nonexistent (1985 was the last year of officially recorded sales).

Table 1. Milk and cream marketed by producers, South Dakota, 1950-1986.

	Million pounds			
Year	Sold to plants as milk	Sold to consumers as milk	Cream	Total
1950	118	38	1,004	1,160
1960	680	5	660	1,345
1970	1,410	5	100	1,515
1980	1,635	5	a	1,640
1984	1,645	4	a	1,649
1985	1,760	3	a	1,763
1986	1,706	a	a	1,706

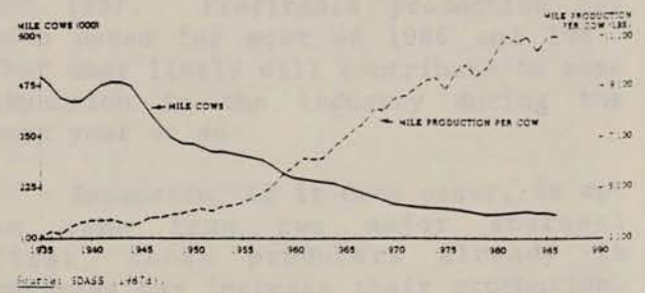
[a]Values no longer reported.

Source: SDASS (1987b).

Milk production

Milk production in South Dakota has increased from about 3,100 lbs./cow in 1935 to more than 11,100 lbs./cow in 1986 (Figure 1). These production levels are 75-80% of the national averages in these respective years. The most rapid changes in milk production per cow occurred between 1955 and 1975. Since 1975, South Dakota production has increased, but at a slightly slower rate with considerable variation from year to year.

Figure 1. Milk cows and milk production, South Dakota, 1935-1986.



Between 1935 and 1986, the number of milk cows in the state decreased 68% from 500,000 to 162,000. Nationally, during this period, cow numbers decreased 55%. South Dakota cow numbers decreased at a relatively rapid rate from 1948 to 1975. From 1975 to 1986, they decreased more slowly, with a slight increase between 1979 and 1983.

As milk prices nearly tripled between 1970 and 1984, dairy farmers in South Dakota and the nation responded with increased milk production. The government then maintained the price by purchasing unconsumed stocks of butter, cheese, and non-fat dry milk. As a result, the Commodity Credit Corporation stocks of dairy products increased from 8 million lbs. of butter and cheese plus 442 million lbs. of non-fat dry milk in 1975 to 1,684 million lbs. of butter and cheese plus 1,718 million lbs. of non-fat dry milk in 1983 (USDA, 1986).

Despite domestic give-away programs and Public Law 480 exports, these stocks were still at 1,186 and 1,328 million lbs., respectively, in 1985. These excessive stocks prompted the USDA to introduce the Dairy Herd Buyout Program in 1986. Because of the buyout, South Dakota dairy cows dropped to their lowest number in recorded history--149,000 head on January 1, 1987.

Other trends in South Dakota's dairy industry have paralleled those of the nation. The number of dairy farms in South Dakota has decreased, falling from 30,500 in 1960 to 5,200 in 1986 (Table 2). At the same time, average herd size increased from 11 cows in 1960 to 39 in 1986. Nationally, average herd size increased from 7 in 1944 to 44 in 1986.

Table 2. Numbers of dairy farms and dairy cows per farm, South Dakota and U.S., 1944-1986.

Year	South Dakota			U.S.
	Dairy farms	Number of cows	Cows per farm	(cows per farm)
1944	n/a	n/a	n/a	7.0
1950	n/a	475,000	n/a	n/a
1960	30,500	336,000	11.0	n/a
1970	13,000	235,000	18.1	n/a
1978	7,400	210,000	28.4	28.6
1980	6,800	206,000	30.3	n/a
1984	6,000	206,000	34.3	42.5
1985	5,600	207,000	37.0	n/a
1986	5,200	204,000	39.2	43.8

n/a = not available (with existing resources)

Source: SDASS (1987d) and Crane (1987).

Table 3. Consumption of dairy products, U.S., 1911-1986.[a]

Year	Pounds per capita				
	Fluid milk	Butter	Cheese	Cottage cheese	Ice cream
1911	311.5	18.6 H	4.0	0.7	2.3 L
1916	317.9	17.3	3.8 L	0.7	4.3
1921	340.0	16.3	4.2	0.4 L	7.6
1929	330.0	17.6	4.7	1.2	10.7
1945	389.5 H	10.9	6.7	2.6	15.7
1972	264.0	4.9	13.1	5.5 H	17.3
1977	240.0	4.3 L	16.1	4.7	17.5
1978	236.0	4.4	16.9	4.7	17.4
1983	215.0 L	5.1	20.6	4.2	17.9
1984	217.0	5.0	21.7	4.3	17.6
1985	220.0	4.9	22.4	4.1	18.0
1986	221.0	5.0	23.0 H	4.1	18.2 H

[a]The years for which data are shown in the table include those in which all-time high (denoted "H") and all-time lows (denoted "L") have occurred for each commodity.

Source: Crane (1987).

Consumption of dairy products

The consumption of dairy products has changed significantly over the past half century. The quantity of fluid milk, the largest consumer item, increased from 312 lbs./person in 1911 to a peak of 390 lbs./person in 1945 (Table 3). Consumption then began to decline, falling to a low of 215 lbs./person in 1983. Since then, fluid milk consumption has increased modestly.

In terms of per-capita consumption, butter was the main manufactured product from milk until 1942. Butter consumption was at its peak in 1911 with 18.6 lbs. consumed per person. By 1942, butter consumption had fallen to 15.8 lbs./person. Ice cream consumption increased from 2.3 lbs. to 15.8 lbs./person during the same period.

Between 1945 and 1972, the consumption of cheese and cottage cheese grew to exceed the consumption of butter (Table 3). Butter consumption apparently bottomed out in 1977, at 4.3 lbs./person, and is now about 5 lbs./person/year. Meanwhile, cheese and ice cream consumption have increased to 23 and 18.2 lbs./person, respectively,

in 1986. Cottage cheese consumption has decreased modestly from 5.5 lbs./person in 1972 to 4.1 lbs./person since 1985.

Production of manufactured products

Butter was once the major use of milk and milkfat. In South Dakota, the amount of butter produced is now so small and produced by so few plants that butter data are no longer recorded by the South Dakota Agricultural Statistics Service. In 1970, South Dakota produced 25.2 million lbs. of butter (Table 4). By 1984, the last year butter statistics were published, butter production had dropped to 3.8 million lbs. (SDASS, 1987).

From 1970 to 1985, South Dakota cheese production increased by more than 260%. In 1970, South Dakota cheese production, excluding cottage cheese, was 50.3 million lbs. This grew to a high of 131.8 million lbs. in 1985, but has since fallen to 127.2 million lbs. in 1986. The number of cheese plants fell from 19 in 1970 to 16 in 1980, but then increased again to 17 in 1985. Of the cheese produced in South Dakota in 1986, 62.4% was American Cheddar, 33.2% was Italian, and the remaining 4.4% was other American cheeses.

Summary

While South Dakota is not a major dairy state nationally, dairy products make an important contribution to the economy of South Dakota. In 1986, farm sales of dairy products amounted to $198 million, accounting for nearly 8% of total farm income. The major share of the milk produced in the state is sold as fluid milk and cheese, and 17 plants now produce cheese. The numbers of both dairy farms and dairy cows have declined over time, but the average herd size has been increasing; this allows remaining dairy farmers to increase the efficiency of milk production.

SHEEP

South Dakota had the fifth largest sheep inventory in the nation by January 1, 1987. Sheep enterprises generated $38 million of gross income in 1986 for South Dakota producers, accounting for 1% of total farm income. Sheep numbers

Table 4. Production of manufactured dairy products, South Dakota, 1970-1986.

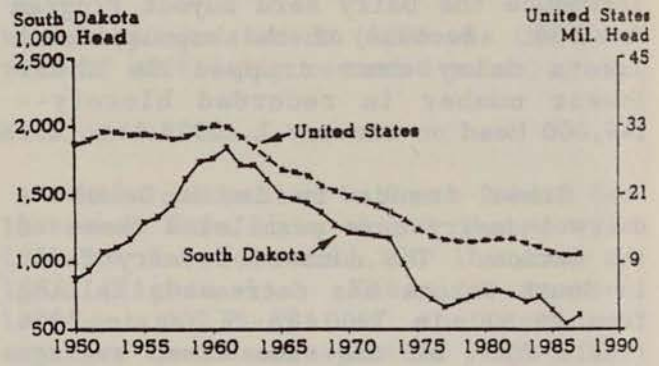
	Millions of pounds				
		Cheeses			
Year	Butter	Cheddar	Other American	Other	Total
1970	25.2	38.9	1.1	10.3	50.3
1980	10.7	31.5	24.2	23.2	78.9
1985	n/a	83.1	8.4	40.3	131.8
1986	n/a	79.4	5.6	42.2	127.2

n/a = not available

Source: SDASS (1987b).

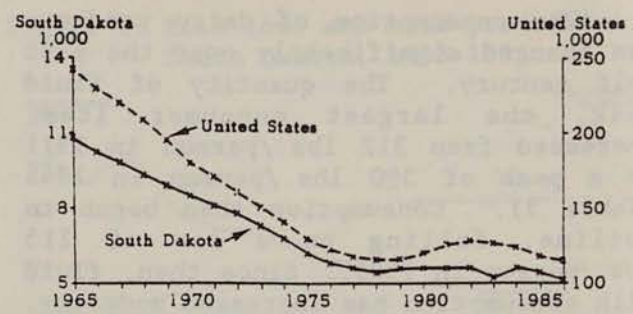
in the state reached their peak in 1961 at 1.8 million head (Figure 2). By January 1, 1987, the total sheep count diminished to 605,000. The lowest count was 540,000 in 1986. The number of South Dakota farms with sheep operations has been on a long-term decline since 1965 (Figure 3).

Figure 2. Inventories of all sheep and lambs, South Dakota and United States, 1950-1987.



Source: SDASS (1987c).

Figure 3. Sheep producers, South Dakota and United States, 1965-1986.



Source: SDASS (1987c).

Prices

Prices received for sheep and wool in South Dakota have followed national prices closely (Figure 4). However, even with the uptrend during the 1970s, returns have not been sufficient to maintain the sheep numbers that once existed in the state. The income generated per ewe in 1986 was $83.12, but costs were $80.72, leaving only $2.40 profit per ewe (Larson, 1987).

Production

The number of lambs going to commercial slaughter in South Dakota has decreased from 377,000 in 1970 to 358,000 in 1986 (Table 5). However, due to an increase in weight per head, the amount processed has actually increased from 40.6 million to 42.2 million lbs.

As a result of a 51% decrease in the inventory of breeding ewes, the total South Dakota lamb crop has dropped 39% since 1970. At the same time, the lamb crop percentage has increased from 102 to 127%.

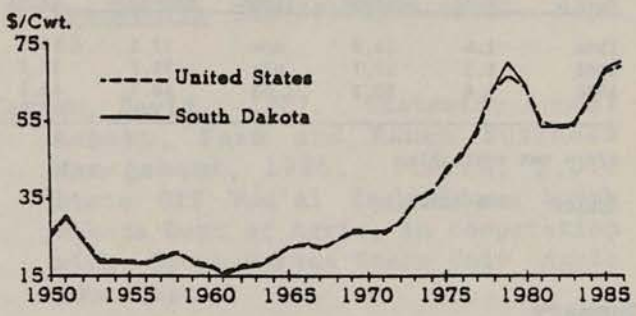
Wool production decreased 55% between 1970 and 1986. This happened both because of fewer shorn sheep (down 51%) and a drop in fleece weight from 9.3 lbs. to 8.4 lbs. Nationally, wool production decreased 52.3% between 1970 and 1986, from 177 million lbs. to 84 million lbs., grease basis. On a clean basis, production was down 49% from 88 million lbs. to 45 million lbs. Net wool imports were down 37% from 153 million lbs. to 96 million lbs., clean basis.

Wool consumption

Total wool consumption in the U.S. fell 43% from 240.3 million lbs. in 1970 to 136.7 million lbs. in 1986 (Table 6). The year of lowest consumption was 1974 when total consumption was only 93.5 million lbs.

The amount of wool used in apparel increased 70% from 74.9 million lbs. in 1974 to 126.8 million lbs. in 1986. This, of course, reflects changing fashions and preferences in the apparel industry. During this same period, however, wool in carpets has decreased 46%.

Figure 4. Average slaughter lamb prices, South Dakota and United States, 1950-1986.



Source: SDASS (1987c).

Table 5. Sheep and wool production, South Dakota, 1970-1986.

	Production		Slaughter		Wool	
Year	Breeding ewes ('000)	Total lamb crop ('000)	Sheep and lambs ('000)	Total liveweight ('000 lb)	Sheep shorn ('000)	Wool produced ('000 lb)
1970	848	865	377	40.6	1,055	9,300
1980	550	690	412	46.8	755	6,782
1985	480	550	335	38.7	656	5,592
1986	413	525	358	42.2	520	4,372
Percent change 1970-86	-51	-39	-5	+4	-51	-55

Source: SDASS (1987c).

Table 6. Total raw wool use, U.S., 1970-1986.

	Million pounds		
Year	Apparel	Carpet	Total
1970	163.7	76.6	240.3
1973	109.9	41.4	151.2
1974	74.9	18.6	93.5
1980	113.4	10.0	123.4
1984	129.0	13.1	142.1
1985	106.1	10.6	116.6
1986	126.8	10.0	136.7

Source: USDA (1987a).

This reflects a substitution of man-made fibers for wool in carpets.

Since 1984, total per capita U.S. fiber consumption has increased by 18% (9.8 lbs.) (Table 7). Of this, man-made fibers increased 3.5 lbs., cotton 3.4 lbs., and wool 0.2 lbs.

Table 7. Consumption of fibers, U.S., 1984-1986.

Year	Pounds per capita				
	Wool	Cotton	Silk & linen	Man-made	Total
1984	1.4	16.8	n/a	37.2	55.4
1985	1.5	17.7	n/a	38.7	57.9
1986	1.6	20.2	2.60	40.7	65.1

n/a = not available

Source: USDA (1987a).

Table 8. Poultry inventory and production, South Dakota, 1970-1986.[a]

Year	Chicken inventory ('000)	Chickens produced ('000)	Eggs produced (million)	Turkeys raised ('000)	Turkeys produced ('000 lb)
1970	5,250	3,777	914	1,121	15,806
1980	2,375	1,263	464	1,277	28,349
1985	1,950	n/a	391	1,723	42,903
1986	1,850	n/a	395	1,968	51,955

n/a = not available

[a]Data on broiler production in South Dakota are not collected, and hence are omitted from the table.

Source: SDASS (1987a).

Summary

While South Dakota is a major sheep producing state, and sheep is the fourth largest livestock industry in the state, the long-term outlook is not for expansion. In the past 25 years, synthetic fibers have tended to replace wool, although in recent years wool has made a modest comeback. Lamb and mutton have lost relative importance in the meat industry, resulting in decreased demand for sheep.

POULTRY

The poultry industry has changed significantly in South Dakota since 1970. Small laying flocks scattered over many farms have been replaced by a few large flocks. Egg production has decreased to less than 40% of what it was in 1970. By contrast, the turkey portion of the industry has increased dramatically since 1970, bringing South Dakota to 17th in the nation for turkey production.

Production

In 1986, South Dakota ranked 35th in total number of chickens, indicating that the state is not a major egg producing state. In 1970, the state had about 5.25 million chickens, excluding broilers (Table 8). From that date, there has been a steady decline to 1.85 million birds in 1986. This has followed the national trend, although year-to-year changes have been less erratic in South Dakota.

Total egg production in the state decreased from 914 million eggs in 1970 to 395 million eggs in 1986. Income from chickens and eggs has fallen from $21 million in 1970 to an amount so small and spread among so few producers that it is no longer reported.

Turkey production in South Dakota has grown rapidly, with more than a 300% increase in weight produced since 1970. South Dakota now ranks 17th nationally, with nearly 2 million turkeys being raised here in 1986.

Gross income from turkeys has increased 643% during these 16 years, from $3.48 million in 1970 to $22.34 million in 1986. In 1986, turkeys generated just under 1% of total farm income in South Dakota.

Consumption

Nationally, per-capita consumption of chicken is growing rapidly. For example, it is expected to increase from 59.1 lbs. in 1986 to 66.0 lbs. in 1988 (Table 9). The consumption of chicken now exceeds that of pork. Turkey consumption is growing relatively faster than chicken, with nearly a 12% annual rate of increase. Turkey and chicken consumption will exceed beef consumption in 1987 for the first time in history. If current trends continue, consumption of chicken alone will exceed that of beef in the 1990s.

Per-capita egg consumption, on the other hand, has been on a long-term decline since 1970, dropping from 313 to 256 eggs/person/year.[1] Eggs is the the only one of the 10 major domestically produced food groups which has suffered a decrease in per capita-consumption since 1970.

Table 9. Meat consumption, U.S., 1986-1988.

Meat	Pounds per capita 1986 actual	1987 preliminary	1988 forecast
Chicken	59.1	63.1	66.0
Turkey	13.4	15.1	16.9
Total	72.5	78.2	82.9
Beef	79.8	75.9	72.8
Pork	58.6	58.6	63.4
Total	138.4	134.5	136.2

Source: USDA (1987b).

Summary

Since 1970, both South Dakota and the U.S. have experienced a decline in chicken and egg production and rapid increases in turkey production. Changes in tastes and preferences provide positive prospects for expansion of white meat production and sales. By contrast, egg consumption has been declining, with severe competitive pressures being experienced by individual producers. Egg producers also appear to be doing less national promotion of their product than are beef, pork, and poultry meat producers.

FOOTNOTE

[1]These are the estimated numbers of eggs for the 39.1 and 32.0 lbs., respectively, of eggs officially reported by the USDA (1987b).

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Agricultural production resource management

Careful management of resources is essential for long-term profitability in agriculture. The authors of these five Chapters address several management issues related to finance, land, irrigation, reduced tillage, and alternative farming systems.

The financial stress of the 1980s brings to the forefront the critical importance of sound financial management in agriculture. Burton Pflueger provides a detailed examination of the extent and causes of farm financial stress in South Dakota. Management strategies used by South Dakota producers to increase (restore) farm and ranch profitability are discussed.

South Dakota farmland prices have declined by more than half from their peaks in 1981 and 1982. Larry Janssen discusses this key change in the context of longer-term changes in farmland ownership, financing, values, and rents. Recent farmland sales trends and rental practices are also discussed.

Rangeland and pasture are the principal land uses in South Dakota. Martin Beutler discusses long term trends in livestock grazing in South Dakota and the reliance of livestock on rangeland resources. Recent information on rangeland ownership, rents, and sale prices also is provided.

Environmental concerns and economic pressures are two major reasons for greater producer interest in reduced tillage and alternative farming systems. Tom Dobbs and Don Taylor review farming practice trends and discuss the economics of reduced tillage practices in South Dakota. They also discuss on-going research on the economics of alternative farming systems in South Dakota and surrounding states.

Don Taylor then provides an overview of the historical development, key characteristics, current economics, and prospective future for irrigation in South Dakota. Don summarizes results from SDSU economic research to provide answers to seven key questions about irrigation development and management in South Dakota.

AGRICULTURAL FINANCIAL MANAGEMENT IN SOUTH DAKOTA

Burton W. Pflueger

The deep financial stress experienced by the South Dakota and U.S. agricultural economies during the 1980s clearly highlights the critical importance of sound financial management in agriculture. The term "agricultural financial management"--meaning the application of principles and tools of finance to managerial problems in agriculture--has become rather commonplace. Producers frequently can be heard using terms such as "balance sheet" and "cash flow" as they visit in coffee shops and auction barns or sit across from their spouses at kitchen tables.

Producers are especially conscious of the "bottom line" and questions such as "Will it pay?" have become commonplace. Managers are giving priority to improving their management as perhaps never before. Many have made changes in their operations that have enabled them to continue to produce profitably.

The financial stress of the 1980s has brought into sharp contrast issues of short-term survivability versus long-term profitability of farming operations. Some borrowers, faced with high interest payments, have not been able to easily understand and accept lenders' efforts to reduce the default exposure of agricultural loans secured by assets that are declining as collateral values. These and other survivability-profitability issues have served to generate tension between some producers and their lenders.

The purpose of this Chapter is to document financial stress experienced during the 1980s in South Dakota that has heightened the need for sound agricultural financial management. Further, documentation is provided on management strategies used by South Dakota producers to increase farm and ranch profitability.

AGRICULTURAL FINANCIAL STRESS IN SOUTH DAKOTA

Producers experiencing severe financial stress during the 1980s were compelled to search aggressively for ways to alleviate the repayment burden of high debt levels. At the same time, many of the agricultural lenders who had extended credit to these producers were faced with a heavy incidence of loan defaults and a generally weakening financial viability. Lenders' policies came under serious re-examination, and some lending institutions were forced out of business.

The potential for loan losses continues to be a major concern for lending institutions. Agricultural producers also need to be concerned about such losses. Those who remain in business will have to pay the cost of loan defaults experienced by their lending institutions. Producers judged to be more vulnerable to possible loan losses must expect to pay proportionately greater shares of lender costs.

A recent U.S. Department of Agriculture (USDA) survey conducted by the National Agricultural Statistics Service focused on operators of farms and ranches with $40,000 or more of annual agricultural sales (Hanson, 1987). This study provides insights on the nature and extent of financial stress faced in South Dakota and other states. Financial stress is treated in terms of the debt service abilities and debt positions of individual farming operations.

The term, debt service ability, reflects the financial liquidity of a business operation. Emphasis is placed on cash flow considerations, i.e., the ability of a farm business to generate adequate revenues to meet expenses as

the cost items become due. The cost items include principal and interest, production, cash replacement, and family living expenses.

Debt service ability is calculated as cash flow before interest expense, divided by interest expenses, plus estimated principal payments due. Depending on the proportion of principal and interest that had been paid on schedule, the debt service ability of farms was categorized as full, partial, or none.

"Debt position" was defined in the study as the ratio of total debt to total assets (i.e., "d/a"). Debt categories were established for individual farms as follows: no debt (d/a = 0), low debt (d/a = 0-0.4), high debt (d/a = 0.4-0.7), very high debt (d/a = 0.7-1.0), and insolvent (d/a > 1).

In evaluating the degree of financial stress of a farm operation, joint attention was given to debt servicing ability and debt position. An operation in a position of high debt, but also with a very strong cash flow, received a lower financial stress rating than an operation with a lower level of debt and a weak cash flow. Debt problems occur when debt obligations exceed what can be serviced with the earnings of a farm or ranch business, not only because debt obligations are large.

Farm operations were classified by their potential for loan default. Operations were considered susceptible to loan default if "their debt burden and debt service met one of the following conditions: (1) they were technically insolvent (debts larger than assets) and obviously in danger of financial failure, (2) they had very high debts and could not make all principal and interest payments, or (3) they had high debts and could not make payments on any of their farm business loans" (Hanson, 1987).

The results of the assessment of the potential for loan default in early 1987 on U.S. farms are summarized in Table 1. About 16% of all U.S. farms were determined to be vulnerable to loan default. These farms hold 33% of all agricultural debt ($28.3 billion). The potential loan losses on these farms amount to $6.3 billion.

The percentages of small and medium commercial farms in the U.S. with potential loan losses are considerably higher than for large and corporate size farms (Figure 1). For example, more than 30% of small and medium farms have potential loan losses, whereas less than 15% of large and very large farms do. The percentage of corporate size farms with potential loan losses is slightly higher at 16%.

More detailed data on the potential for loan default during 1984-1986 for South Dakota and 11 nearby states are shown in Table 2. Data are shown separately for "small" farms with annual gross sales of $40,000-$99,000 and "commercial" farms with sales of $100,000-$999,000.

In terms of the overall potential for loan default, South Dakota ranks 9th or 10th among the 12 states in the region. This outcome reflects, among other things, generally greater losses in asset values in other states compared to those in South Dakota. See Chapter 13 for a discussion of changing farmland values in South Dakota.

The financial position of small farms in South Dakota, however, is considerably weaker than that in any of the other 11 states. For example, 19% of small farms in South Dakota have potential farm losses (Table 2). The corresponding percentage for the second-ranking state (Nebraska) is only 12%. Similarly, 7.7% of small farms in South Dakota are financially insolvent (i.e., debts exceed assets), whereas only 5.4% of second-ranking Nebraska small farms are financially insolvent.

With data from a second USDA (1987) study, South Dakota's farms were categorized by their liquidity, i.e., their ability to meet outstanding debt obligations as the obligations become due. Liquidity was measured by the ratio of net to gross cash farm income. Three categories of liquidity, in descending order of financial strength, were established as follows:

- Category I, net cash farm income

Table 1. Assessment of commercial farms with potential for loan default, United States, 1987.

Debt service category	Debt/asset ratio: No debt (0)	Low debt (0-0.4)	High debt (0.4-0.7)	Very high debt (0.7-1.0)	Insolvent (more than 1.0)	Farm numbers and debt
Full debt service	Financial strength: 526,700 farms (84 percent of total) $56.7 billion debt (67 percent of total)			Potential loan losses: 104,100 farms (16 percent) $28.3 billion debt $6.3 billion potential lender losses (33 percent)		334,400 farms $37.7 billion
Partial debt service						112,200 farms $28.9 billion
No debt service						184.200 farms $18.5 billion
Farm numbers and debt	120,900 0	294.700 $26.4 billion	122,900 $29.1 billion	55,000 $17.5 billion	37,300 $12.1 billion	630,800 farms $85.1 billion

Source: Hanson (1987).

equal to 20% or more of gross cash farm income;

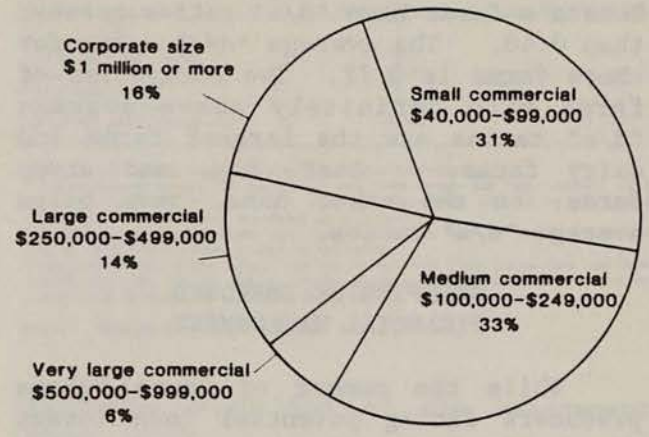
- Category II, some positive net cash farm income but less than 20% of gross income; and

- Category III, negative net cash farm income.

For all of South Dakota's farms in 1986, 63% are in Category I, 13% in Category II, and 24% in Category III (Table 3). The 24% of farms with negative cash farm incomes may have been in that position not only because of low farm commodity prices, but also because of decisions by their managers to sacrifice some farm income so that they could accept off-farm employment. Such decisions were made by some producers to more assuredly enable them to meet farm debt payment obligations.

These data for South Dakota show medium farms with sales of $40,000-$250,000 to have stronger liquidity than either smaller or larger farms. This outcome contrasts with that for the U.S. as a whole (Figure 1). The liquidity status of beef, hog, sheep, and dairy farms is slightly weaker than that for cash grain farms. Of the various farm types examined, crop farms with other than cash grain were definitely in the weakest liquidity position.

Figure 1. Total potential loan losses, by farm sales class, United States, 1986.



Source: USDA (1987).

Financial solvency data, similar to those for liquidity, are shown for South Dakota's farms in 1986 in Table 4. Financial solvency is reflected by total debt/total asset ("d/a") ratios. The financial solvency categories are the same as those in the earlier-reported USDA study, except that the "high debt," "very high debt," and "insolvent" categories were merged in this analysis.

Table 2. The potential for farm loan default, South Dakota and selected nearby states, 1984-1986.[a]

State	State rank for loan default 1984-86		Small farms with potential loan losses 1984-86		Small farms with debts exceeding assets 1984-86	Commercial farms with potential loan losses 1984-86		Commercial farms with debts exceeding assets 1984-86
	Average	1986	Average number	Percent	Percent	Average number	Percent	Percent
Iowa	1	1	n/a	n/a	n/a	12,581	20	8
Minnesota	2	2	4,188	11	3.5	11,511	24	10
Wisconsin	3	4	2,389	9	2.8	7,689	18	5
Texas	4	3	2,636	3	0.9	6,097	17	6
Missouri	5	5	3,093	6	0.8	5,741	24	12
Nebraska	6	10	1,783	12	5.4	5,393	17	6
Kansas	7	7	2,097	8	2.8	5,233	18	8
Illinois	8	6	2,231	9	2.8	4,778	12	4
Indiana	9	8	2,371	7	2.6	4,073	18	5
South Dakota	10	9	1,756	19	7.7	4,080	19	6
North Dakota	11	11	n/a	n/a	na	3,793	18	4
Oklahoma	12	12	1,977	6	1.6	3,212	18	6

n/a = not available

[a]"Small" farms were defined to have annual gross sales of $40,000-$99,000 and "commercial" farms sales of $100,000-$999,000.

Source: Hanson (1987).

Of all of South Dakota's farms, 18% had no debt in 1986 (Table 4). Many of these farms are below average in size (e.g., 25% of farms with sales below $40,000 have no debt).

On the other hand, 39% of South Dakota's farms have "d/a" ratios greater than 0.40. The average "d/a" ratio for these farms is 0.72. Two categories of farms with definitely above average "d/a" ratios are the largest farms and dairy farms. Beef, hog, and sheep farms, on the other hand, have below average "d/a" ratios.

BENEFITS OF IMPROVED FINANCIAL MANAGEMENT

While the number of South Dakota producers facing potential loan losses has declined over the past three years, the potential for loan loss is still serious. Producers in South Dakota are taking advantage of several opportunities to improve their management skills. Management has fast become the most important aspect of agricultural production operations.

Successful managers continuously strive to achieve the goals and objectives for the business and for the manager and his/her family. Research shows that the success of any business is dependent upon a goal-directed management plan. It is difficult to reach an objective if the objective is unknown. An old phrase perhaps captures this best: "If you have no idea of where you are going, any road will take you there." Also, without a clearly defined set of goals, there is no time frame associated with when to reach the determined destination.

Goal-directed management is the central focus of the Planning for Tomorrow - Today financial planning and analysis program offered to farmers and ranchers throughout the state by the South Dakota Cooperative Extension Service (Pflueger and Hedin, 1987). The following evidence shows that attention

Table 3. Farm characteristics, by liquidity ratio, South Dakota, 1986.

	Ratio of net to gross cash farm income[a]		
	Over 0.20	0.01-0.20	Negative
Frequency distributions across liquidity categories (%)			
All farms	62.5	13.1	24.4
Sales above $250,000	39.4	32.1	28.5
Sales $40,000 - $250,000	69.4	15.7	14.9
Sales below $40,000	55.9	7.4	36.7
Cash grain	67.3	10.0	22.7
All other crops	0.0	23.6	76.4
Beef, hog, sheep	59.5	15.8	24.8
Dairy	66.5	6.1	27.4
All other livestock	38.3	61.7	0.0
Average dollar values ('000), farms in different liquidity categories			
Crop sales	18.2	12.9	8.1
Livestock sales	55.5	91.9	29.4
Other farm income	16.5	49.5	10.1
Gross cash farm income	90.2	154.3	47.8
Total operating expense	55.9	139.7	57.9
Net cash farm income	34.3	14.6	-10.21
Nonfarm income	10.5	5.5	26.3
Total assets	258.7	398.5	253.1
Total debt	63.4	134.6	101.1
Average ratios, farms in different liquidity categories			
Debt/asset	0.24	0.45	0.40
Debt service	0.12	0.25	0.19
Oper. exp./gross income	0.62	0.91	1.21
Interest/gross income	0.08	0.09	0.24

[a]The first, second, and third columns reflect farms in liquidity categories I, II, and III, respectively

Source: USDA (1986).

to management in today's agriculture can be financially rewarding.

Some of those participating in the Planning for Tomorrow - Today program have been experiencing severe financial difficulties. Others have not been.

Regardless of prior financial condition, program participants use the FINPACK microcomputer software package (Hawkins, et al., 1985) to project the financial implications of: (1) continuing with their current farm plans versus (2) adopting various alternative plans offering prospect for enabling fuller achievement of family goals and objectives. Underlying management strategies considered include reducing farm cash expenses, reducing annual debt commitments, expanding current enterprises to more efficient size, adding new enterprises to more fully utilize available resources, adding off-farm employment to use excess labor at certain times of the year, and participating in various government programs.

The results of about 300 farmers and ranchers from throughout South Dakota participating in the Planning for Tomorrow - Today program are summarized in Table 5. The "pre-participation" data reflect the average projected value for each financial measure for program participants--assuming that the participants carried out their respective existing farm plans. The "post-participation" data reflect average values for the specific improved farm plans ultimately chosen by the respective program participants. While Extension Specialists provided assistance to program participants in using the FINPACK farm and financial management computer software package, each participant determined the alternate farm plan that appeared to most fully satisfy his/her family goals and objectives.

Use of the FINPACK farm and financial management tool resulted in roughly a 35-45% increase in earnings for program participants. One strategy for achieving this outcome reflected in the table is a decrease in farm cash expenses. The amount of capital saved by reducing the cash expenses was available for application to other areas of the business to further improve the financial viability of the management plan.

Table 4. Farm characteristics, by financial solvency category, South Dakota, 1986.

	Total debt/total asset ratio		
Frequency distributions across solvency categories (%)	No debt	0.01-0.40	Over 0.40
All farms	17.9	43.0	39.3
Sales above $250,000	9.7	30.0	60.3
Sales $40,000 - $250,000	13.1	50.3	36.6
Sales below $40,000	24.8	34.7	40.5
Cash grain	15.1	48.8	36.1
All other crops	0.0	0.0	100.0
Beef, hog, sheep	21.4	44.8	33.8
Dairy	9.6	21.7	68.7
All other livestock	0.0	38.3	61.7
Average dollar values ('000), farms in different solvency categories			
Crop sales	11.1	17.5	14.2
Livestock sales	33.0	59.6	57.2
Other farm income	5.0	14.1	31.4
Gross cash farm income	49.1	91.2	102.7
Total operating expense	35.7	64.9	84.4
Net cash farm income	13.4	26.3	18.3
Nonfarm income	11.1	11.5	10.9
Total assets	207.3	322.9	221.5
Total debt	0	44.7	159.4
Average ratios, farms in different solvency categories			
Debt/asset	0.00	0.14	0.72
Debt service	0.03	0.10	0.26
Oper. exp./gross income	0.73	0.71	0.82
Interest/gross income	0.03	0.07	0.15

Source: USDA (1986).

Table 5. Selected financial measures, pre- and post-participation by farmers and ranchers in the Planning for Tomorrow - Today program.

Financial measures	Pre-participation	Post-participation
Cash expenses as a percent of gross farm income	75.6	67.8
Net profit[a]	22,850	31,190
Profit margin (%)[b]	17.5	26.3
Management earnings ($)[c]	17,045	24,365
Annual net worth change ($)[d]	16,200	22,350

[a] "Net profit" equals net cash farm income less depreciation.
[b] "Profit margin" equals the sum of net cash farm income and farm interest paid less the value of an operator's labor and management divided by the gross value of farm production, expressed as a percentage.
[c] "Management earnings" reflect net cash farm income less (1) depreciation and (2) an annual 6% interest charge on net worth.
[d] Annual net worth change equals the sum of net cash farm income and non-farm income less the sum of family living expenses, income and social security taxes, and non-farm debt interest payments.

Source: Pflueger and Hedin (1987)

CONCLUSION

Program participants have demonstrated that successful producers can best determine the most viable management strategy for their individual operations. Because each operation differs by resource base, alternatives available, and management capabilities, the application of financial management concepts will result in various strategies being employed on various agricultural operations. The case has been made, and data support the finding that

Continued on p. 80

SOUTH DAKOTA AGRICULTURAL LAND MARKET TRENDS

Larry L. Janssen

South Dakota farmland prices have declined sharply for five consecutive years. Farmland values and sale prices per acre in mid-1987 are less than one half of the amounts reported in late 1981 and early 1982. Mid-1987 South Dakota farmland values are about the same as those in 1976 and the same as real (inflation-adjusted) farmland values in 1962. Recently reported data on farmland sales from several regions of the state indicate the downward spiral in per-acre sale prices has slowed or stopped.

Pflueger ...

management is a key to success in today's agricultural environment, and can help to reduce the amount of financial stress present within the sector.

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Changing farmland values reflect underlying past trends and expected future changes in farmland net returns. South Dakota cash rental rates for farms and cropland increased rapidly during the 1970s, peaked in 1982-1983, and declined 20 to 25% by 1987. Farmland rental rates did not decrease as rapidly as farmland sale prices in the 1980s.

These and other farmland market trends are important to agriculture because:

- Farm real estate represents three fifths of the total value of farm business assets in South Dakota (an average of $240,000 in 1986);

- More than 80% of South Dakota farm operators are indebted;

- Farm operators own two thirds of South Dakota's agricultural land and also hold 90-95% of farm sector debt;

- Changes in farmland values have major impacts on (1) the wealth and credit (collateral) base of farmland owners, (2) credit policies established by agricultural lenders, and (3) property tax assessments to support local governments; and

- The rental market, a key element of resource management and control in agriculture, covers nearly 38% of South Dakota's agricultural land.

Long-term and recent trends in South Dakota's agricultural land markets are discussed further in this Chapter. Emphasis is placed on trends in land ownership and financing, land values and sales prices, and cash and share rents.

LONG-TERM AND RECENT TRENDS IN FARMLAND OWNERSHIP AND FINANCING

The behavior of farmland markets over time is conditioned by trends in

farmland ownership and financing. In South Dakota, almost all cropland (18.8 million acres) is privately owned and 78% of the 23.4 million acres of permanent pasture and rangeland is privately owned (USDC, 1983). The remaining rangeland and pasture--owned by federal, state, and tribal governments--is typically leased to ranchers.

More than two thirds of South Dakota's privately held agricultural land is owned by farm operators. Retired persons and persons engaged in nonfarm occupations each own about 15% of the rest (Daugherty and Otter, 1983).

The proportion of agricultural land owned by farm operators has not changed much since World War II. During this same period, however, the number of farm owner operators has sharply declined and the number of nonoperator landlords has increased. Typical farm operators own larger amounts of land, and they rent from more landlords than did their parents or grandparents. A majority (55%) of South Dakota's farmland owners are non-operator landlords.

The trend to increased part-ownership and more nonoperator landlords has emerged for two reasons: first, farm operators have needed to expand their landholdings to obtain larger sized units; second, nonfarm investors, retired farmers, and off-farm heirs have simultaneously continued to hold land in their investment portfolio but did not have the expertise or the willingness to farm.

About 2-3% of agricultural land changes ownership each year. Farm owner-operators continue as the major buyers and sellers of South Dakota farmland.

From 1983 to 1987, 65% of the state's farmland sold was purchased by established farmers and ranchers expanding their businesses. Buyers just getting started in farming purchased 12% of tracts sold, while nonfarm investors purchased 17% of tracts sold. The remaining tracts (6%) were purchased by other types of buyers.

A major structural change in credit financing has taken place since World War II in South Dakota's farmland market. From 1945 to 1955, only half of the state's farmland sales were credit financed. Between 1970 and 1982, the proportion rose from 81 to 94%. The average percentage of purchase price borrowed increased from 50 to 57% during the earlier period to 76 to 83% during the latter period.

In 1987, however, the proportion of credit financed sales has declined to about 60% of transfers (USDA, 1987). Increased numbers and proportions of sales are fully cash financed. Average downpayment requirements on credit financed purchases have increased, and loan maturities have shortened. These features represent major reversals from trends observed between 1945 and 1982.

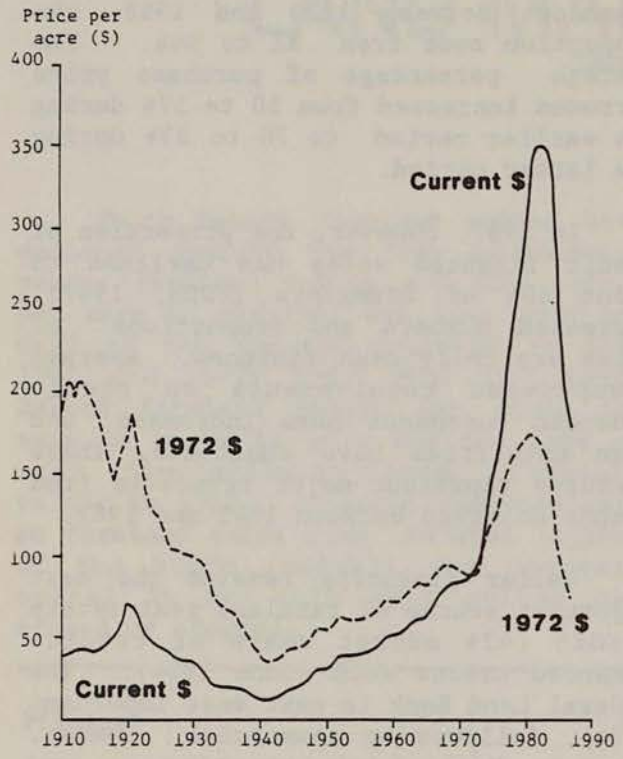
Seller financing remains the most important source of farmland real estate credit (47% market share of credit-financed tracts sold since 1984). The Federal Land Bank is next most important (25%), followed by commercial banks, Farmers Home Administration, and insurance companies.

LONG TERM TRENDS IN FARMLAND VALUES AND RENTALS

Farmland values have fluctuated considerably in the 20th Century in South Dakota (Figure 1). Average per acre farmland values increased from $39 in 1910 to an early peak of $71 in 1920. Values then declined for the next 21 years to a low of $12 in 1941. Farmland values then began a steady upward trend, reaching $87 in 1971. During the export boom period of the 1970s, land values "exploded," reaching a peak of $349 per acre in early 1982. The annual rate of increase in South Dakota farmland values was 4-5% from 1950 to 1971 and 12-14% from 1971 to 1982.

Farmland values and sale prices have sharply declined since 1982. In 1987, farmland values are less than half of their peak value only five years earlier. This is the greatest five-year decline in this century. The decline is more dramatic if one views farmland values in terms of real purchasing power--with land values adjusted for the effect of inflation. In real terms (1972 dollars), farmland values in mid-1987

Figure 1. South Dakota farm real estate prices, 1910-1987.



have come down to 1962 levels. Further, and perhaps somewhat surprisingly, real farmland values were higher during 1915 to 1920 than they have been at any time since then (Swinson and Janssen, 1985).

A main determinant of farmland value trends over time is current and expected trends in farmland net returns (rental rates). South Dakota farmland values and rents have moved, annually, in the same direction for 58 of the past 67 years (1921-1987). The ratio of gross cash rent-to-value varied from 5.7 to 7.6% from 1950 to 1984 and has been above 8% since then (Table 1). Cash rents did not increase as rapidly as land prices in the 1970s and have not declined as rapidly in the 1980s.

During the 1970s, farmland rental rates were rapidly rising, reflecting rising exports and commodity prices. Farmland buyers bid up the price of farmland to the point that rates of return to farmland, in the year of purchase, were less than rates of return on other long term investments such as corporate bonds. Farmland buyers were

Table 1. South Dakota agricultural land cash rents, 1950-1987.

Year	Cash rent ($/acre)	Rent as a percent of land value	Year	Cash rent ($/acre)	Rent as a percent of land value
1950	3.50	7.5	1981	20.90	5.8
1955	4.50	7.6	1982	21.30	5.7
1960	5.35	7.4	1983	22.90	6.3
1965	6.50	7.3	1984	21.65	6.9
1970	8.50	7.5	1985	20.35	8.4
1975	11.40	6.2	1986	20.90	8.4
1980	19.20	5.7	1987	18.40	10.2

Source: USDA (1987).

essentially competing for the right to obtain expected future increases in net returns, with the additional income used to help make the loan payments. When expected increases in net returns did not materialize in the early 1980s, market prices of farmland also declined.

Net returns per acre declined because of the combined impacts of "tight" money policies, rising interest rates, reduced inflation rates, higher federal deficits, increased value of the dollar relative to major trading partner currency values, and reduced export markets. Since 1985, the sharply lower loan rates associated with federal wheat and feed grain programs have contributed toward lower farm commodity market prices. At the same time, net returns to many grain producers enrolled in the commodity program have stabilized or even increased due to record yields and record deficiency payments per acre. Federal wheat and feed grain program provisions are now critical variables influencing cropland sale prices.

RECENT FARMLAND SALES TRENDS

Information on recent (1981-1987) farmland sales trends was developed from a data base of more than 7,500 farmland sales of 40 acres or more provided by the Federal Land Bank of Omaha (Table 2). The average farmland tract sold of 300 acres was evenly divided between cultivated land and pasture. Substantial regional variation in average size of tract sold and the proportion of cultivated land and pasture is evident. Tracts sold in eastern South Dakota--averaging 125 to 200 acres each--had 67 to 76% cultivated acres. Tracts sold in western South Dakota averaged 74%

Table 2. South Dakota farm real estate sales data, by region, 1981-1987.

Region[a]	Sales tract data: Average acres per tract	Sales tract data: Cropland as a % of total acres sold	Acreage sale price ($/acre)[b]: Peak[c]	1983	1985	1987[d]	Percent decline from peak to 1987
Southeast	125	76	958	763	525	400	59
East-central	160	73	698	676	414	294	58
Northeast	200	67	548	451	351	271	51
North-central	280	65	391	350	306	204	48
Central	345	57	328	310	261	149	56
South-central	400	50	272	252	230	119	56
Western	1,130	26	186	178	120	62	66
State	300	50	428	350	269	174	59

[a]See Figure 2 for a map of regions. "Western" in this table reflects the southwest and northwest regions, excluding the Black Hills.

[b]The average prices per acre are weighted by acres sold per tract in each region and for the state.

[c]Peak prices occurred in 1981 or 1982.

[d]These are farmland sales reported from January to July 1987.

Source: Compiled from a data bank of "reported farmland sales" provided by the Federal Land Bank of Omaha.

rangeland and were more than 1,000 acres each.

The average per acre price of farmland varies widely within South Dakota and within each region. Most of the price variation within a given year can be attributed to differences in land productivity and use in various parts of the state. Federal commodity program acreage bases and the potential for the entry of marginal cropland into the Conservation Reserve Program (CRP) also are contributing factors.

The peak prices, which occurred in 1981-82, ranged from $186 per acre in western South Dakota to $958 per acre in southeastern South Dakota. Since then, sale prices have dropped substantially in all regions of the state. From 1981 to 1985, the sharpest percentage declines occurred in the eastern regions, reflecting the impact of declining export markets for feed grains and soybeans. From 1985 to mid-1987, the sharpest percentage declines occurred in the western, south-central, and central regions of the state (Janssen, 1987).

Examination of quarterly farmland sales data for 1986 and 1987 (not shown here) shows that cropland sale prices have stopped declining in the southeast, east-central, and north-central regions. The rate of decline in cropland sale prices has slowed considerably in other regions. Rangeland prices continued to decline, but this trend is partly explained by much larger amounts sold in late 1986 and early 1987. Substantial percentages of sales in 1986 and 1987 are acquired properties sold by lending institutions primarily to local farmers and ranchers.

RECENT FARMLAND RENTAL TRENDS

A 1986 SDSU farmland rental survey completed by 1,155 renters and landlords provides a great deal of information on farmland rental practices in South Dakota. Some key findings are presented below. (For more details, see Janssen and Peterson, 1986; Peterson and Janssen, 1986; Johnson, et al., 1986; and Peterson, 1987.)

Nonoperator landlords are a majority of agricultural landowners in South Dakota. However, they own and lease less than half as much farmland as typical owner-operators do. A majority of nonoperator landlords are 65 years of age or older, and more than a fourth reside in another state. A majority (53%) of landlords have only one leasing agreement.

Most renters are between 35 and 64 years of age and also own some farmland. Multiple leasing is prevalent, with a majority of renters having three or more leasing agreements. More than 70% of renters have one or more leases with unrelated landlords. Nearly 60% of renters have one or more leases from immediate family members or close relatives.

Nearly half of acres rented are from unrelated landlords, 29% from family members and close relatives, and 20% from tribal, state, and federal governments. Government and tribal leases are primarily for rangeland in western and central South Dakota.

The major types of farmland leases in South Dakota are share and cash leases for cropland and hayland and cash leases for pasture. Nearly two thirds of landlords and renters have one or more cropshare leases, 50% are involved in

cash leases for crop/hayland, and 35% have pasture leases (Table 3). Nearly two thirds of leases are annual and renewable, but the typical lease has been in effect for 10-13 years. Almost half of cash leases are written agreements, but only 30% of cropshare agreements are written.

Cash rents are quite variable within each region and highly variable among regions in the state. Average cropland and pasture cash rents per acre in western South Dakota are 25-30% of average cash rents reported in southeastern South Dakota (Figure 2). Cropland and pasture rental rates in 1986 are typically 7.5-9.5% of cropland and rangeland values in each region.

Share rental agreements also vary across South Dakota. Statewide, the most frequently used share arrangement involves a 2/3 tenant share of the crop (Figure 3). Typical tenant output-shares vary from 2/3 to 3/4 on spring wheat farms in northwestern and north-central South Dakota to 3/5 or 1/2 on corn-soybean farms in southeastern South Dakota.

A 3/5-2/5 tenant-landlord share agreement is most frequently used in counties along the east and southeastern borders of the state. Most of the 1/2-1/2 tenant-landlord share agreements are reported in Clay, Lincoln, and Union counties.

Share leasing arrangments correlate very closely with cropping patterns. The 3/5 tenant share lease is predominant on tracts in eastern South Dakota where corn and soybeans are the only crops raised. The 3/5 or 2/3 tenant share leases are commonly found on tracts in eastern South Dakota where soybeans, corn, and other grains are rotated. A 2/3-1/3 tenant-landlord share is reported by more than 80% of respondents listing wheat as a major crop on rented land.

The extent of variable inputs shared varies by region and output share. These variations reflect different cropping patterns, yield risks, and cultural practices. With a 1/2-1/2 share lease, most variable input expenses (seed, fertilizer, chemicals and drying) are shared by renters and landlords. With a 3/5-2/5 tenant-landlord share lease, fertilizer and chemical expenses are usually shared. With a 2/3 tenant share lease, fertilizer is typically the only shared expense. Shared inputs are almost always shared in the same proportion as output.

Table 3. Selected characteristics of farmland leases in South Dakota, 1986.

Lease characteristic	Type of land and lease: Cropland and hayland, Share lease	Cropland and hayland, Cash lease	Pasture, cash lease
Relative importance of leases (%)			
By number of leases	40	35	25
By acres leased	39	26	34
Average acres leased	414	354	647
Average length of lease (year)	13	10	11
Percent of landlord and renter respondents with the indicated lease-type	65	50	35
Incidence of lease-types (%)			
Oral	70	51	62
Written	30	49	38
Annual	68	64	67

Source: Peterson (1987).

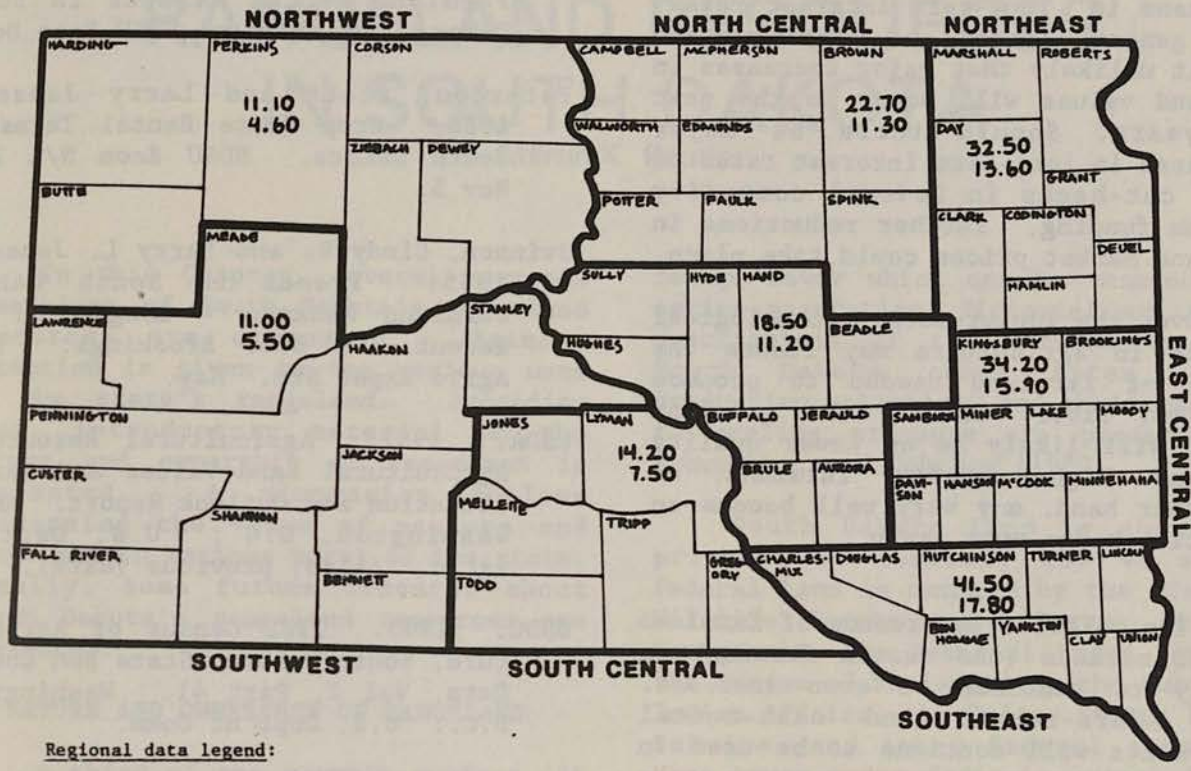
Overall, farmland leasing provides an effective means for acquiring and controlling resources by farm operators and maintaining ownership control by landlords. Sources of stability in the leasing market are caused by relatively long-term duration of landownership and rental patterns, the local nature of leasing markets, and generally compatible tenant-landlord relationships. Rental market institutions do evolve incrementally, however, reflecting changes in technologies and market participant preferences.

FUTURE FARMLAND MARKET TRENDS

Farmland market price trends are fundamentally related to current net returns to farmland and expected changes in future net returns. Many factors--long term interest rates, financing terms, technological changes, export markets, federal monetary and fiscal policies, trade policies, and farm programs--affect both actual and expected net returns.

The recent stabilizing of cropland sale prices and the increased number of tracts sold suggest that sale prices have largely adjusted to impacts of current federal farm programs. Current

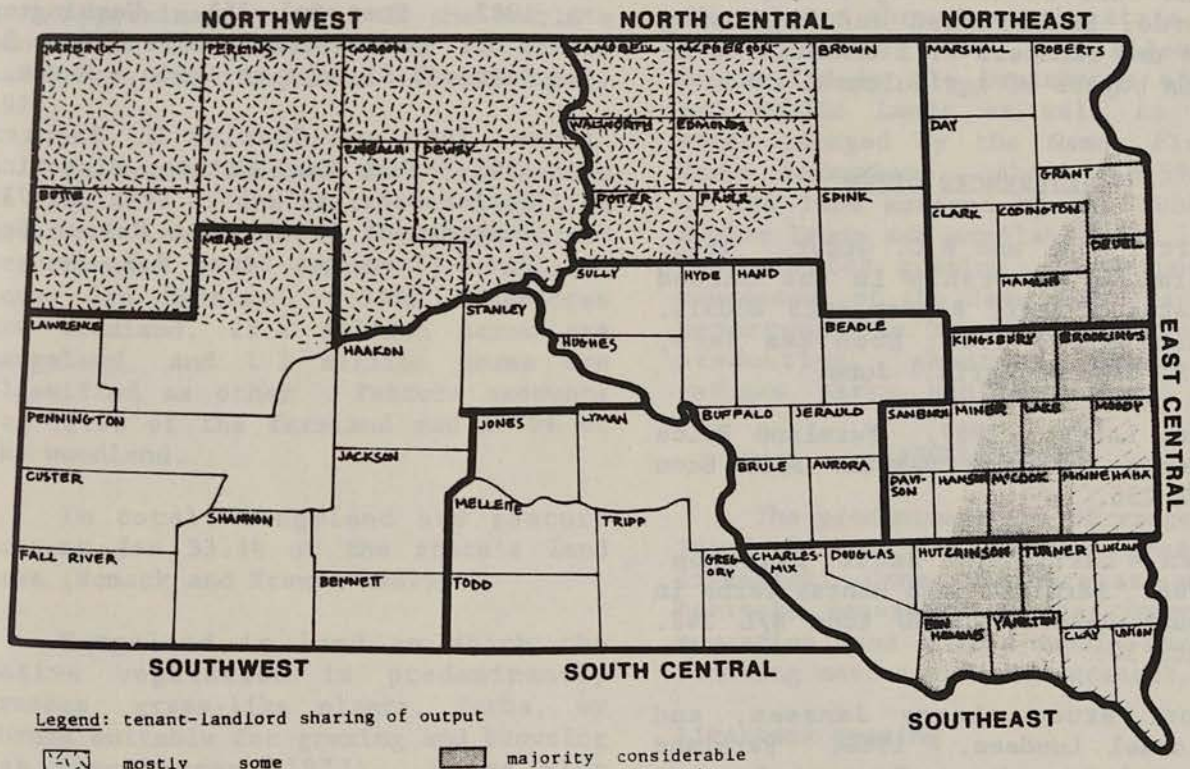
Figure 2. Average farmland cash rents ($ per acre), by region, South Dakota, 1986.



Regional data legend:

Top number: cropland cash rent
Bottom number: native pasture and rangeland cash rent

Figure 3. Common cropland share rental terms, by region, South Dakota, 1986.



Legend: tenant-landlord sharing of output

mostly some 2/3 - 1/3, 3/4 - 1/4

2/3 - 1/3 is dominant

majority considerable 2/3 - 1/3, 3/5 - 2/5

majority some 3/5 - 2/5, 1/2 - 1/2

levels of grain carryover, probable increases in long-term interest rates, and general lender and buyer caution make it unlikely that major increases in farmland values will occur in the next 3-5 years. Should there be major increases in long-term interest rates or major cut-backs in federal commodity program funding, further reductions in farmland market prices could take place.

Over the longer term, technological changes in agriculture may reduce the amount of farmland needed to produce food and fiber. If so, the greatest impact will likely be on lower quality farmland. Higher quality farmland, on the other hand, may very well become an inflation-hedge once again.

The relative importance of farmland rental markets (and custom farming) is likely to continue or even increase. Both share-rental and cash-rental agreements will continue to be used in most regions of the state, with some increase in the use of written agreements. As many farm family heirs desire to retain ownership of farmland while not farming themselves, a gradually increased proportion of farmland will be owned by non-operator landlords. Established and beginning farmers and ranchers will continue to be the main buyers of agricultural land.

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RANGELAND RESOURCES IN SOUTH DAKOTA

Martin K Beutler

In this Chapter, several economic dimensions of South Dakota's rangeland resources are discussed. Primary attention is given to the various uses of the state's rangeland. Preceding that, introductory material on the nature and ownership of rangeland is presented. A discussion follows concerning the value of pasture and rangeland in various parts of the state. Finally, some future concerns about South Dakota's rangeland resources are presented.

NATURE AND OWNERSHIP OF RANGELAND

A third of the earth's surface, 34 billion acres, is land. About 15% is covered with icecaps, permanent snow, or fresh water; 28% is forest; 10% is cultivated; and 3% is taken in urban or industrial development.

Approximately 44% of the world's land area is classified in the broad category of rangeland (Baumberger, 1977).

In South Dakota, the distribution is similar. Of the state's 48.6 million acres of land area, 4.8 million acres are covered with water, 18.8 million acres are farmland, 0.3 million acres are woodland, 23.4 million acres are rangeland, and 1.3 million acres are classified as other. Pasture accounts for 12.3% of the farmland and 57.9% of the woodland.

In total, rangeland and pasture account for 53.3% of the state's land area (Womack and Traub, 1987).

Rangeland is land on which the native vegetation is predominantly grasses, grass-like plants, forbs, or shrubs suitable for grazing and browsing use (Baumberger, 1977). Range also includes lands which are re-vegetated naturally or artificially to provide a forage cover which can be managed like native vegetation. Pictorial and verbal descriptions of the various types of South Dakota range sites, their production potential, and their response to grazing pressure are presented in Schumacher and Johnson (1980).

South Dakota land is about 90% private, 6% federal, and 4% state. Federal land is managed by the Fish and Wildlife Service, the Bureau of Land Management, the National Parks Service, the Bureau of Reclamation, the Bureau of Indian Affairs, the United States Forest Service, and other federal agencies. Most acres under federal control are in western South Dakota and are primarily rangeland. Livestock grazing is the primary use of this multiple-use resource.

State-owned land is widely distributed throughout the state. State land includes over 1 million acres controlled by the Department of School and Public Lands as well as 232,247 acres managed by the Game, Fish, and Parks Department. About 840,590 acres of the land managed by the School and Public Lands are available for lease to ranchers for grazing. Land under the management of the Game, Fish, and Parks Department is used mainly for game production, shooting areas, game refuges, parks, and recreation.

RANGELAND USES

The predominant use of rangeland in South Dakota is for the grazing of livestock. Other uses are as: wildlife habitat, watershed source, recreation, education, and a seed-supply source for renewing native and tame grasses.

Livestock grazing

About 90% of the feed for beef cattle and 82% of the feed for sheep

that are not in feedlots comes from rangeland or pasture (Dodds and Goetz, 1981). Given the amount of land suitable to ranching and the number of beef cattle and sheep in the state, ranching will continue to be an important agricultural industry in South Dakota.

Rangelands have received increased pressure from livestock production, but the exact amount of forage available for grazing by livestock is difficult to determine because of fluctuations in precipitation and range condition. The amount of forage available determines the number of beef cows and sheep which can use the resource.

The most recent estimates of range condition and the total number of "animal unit months" available in the state are shown in Table 1. One "animal unit" (AU) represents the feed needs of one 1,000-pound beef cow or five sheep. One "animal unit month" (AUM) equals the amount of forage required to feed one AU for one month.

Most South Dakota rangeland is in excellent-to-good range condition (68.4%). The western region has the highest percentage of rangeland in the excellent and good classifications (74.2%). The Black Hills area has the lowest percentage (34.6%).

Per county, the number of acres required per AUM (given a six-month grazing period) are presented in Figure 1. Higher rainfall amounts and better soils imply fewer acres/AUM in the southeast. More acres/AUM are required moving from the southeast to the northwest. Fewer acres/AUM are required on pasture land acreages due to the presence of tame grasses with higher forage yields.

The exact number of livestock using South Dakota's rangeland in any year is difficult to determine. However, from 1930 to 1975, the number of AUs from beef and sheep production on South Dakota rangeland was estimated to increase from 0.4 to 2.3 million (Figure 2). In 1975-76, adverse weather conditions and low cattle and sheep prices resulted in a large decrease in the use of rangeland forage. Total estimated use in AUs fell to 1.5 million

Table 1. Range condition estimates and available AUMs, South Dakota, by Soil Conservation Service technical guide area.

Technical guide area	Range condition (percentage distribution) Excellent	Good	Fair	Poor	Available AUM's
Eastern	7.9	52.6	35.2	4.3	771,260
East-central	6.3	56.8	32.9	4.0	2,799,815
West-central	8.0	61.5	28.2	2.3	4,405,677
Western	10.6	63.6	22.6	3.2	2,034,404[a]
Black Hills	8.2	26.4	70.0	3.6	n/a
South Dakota	8.2	60.2	28.5	3.1	10,011,156

n/a = not applicable

[a]Includes estimated AUMs for the Black Hills.

Sources: USDA (1985) for range condition and Baumberger (1977) for available AUMs.

in 1977. Since 1978, rangeland use in South Dakota has ranged between 1.5 and 1.8 million AUs. Estimated use for 1987 is 1.6 million AUs.

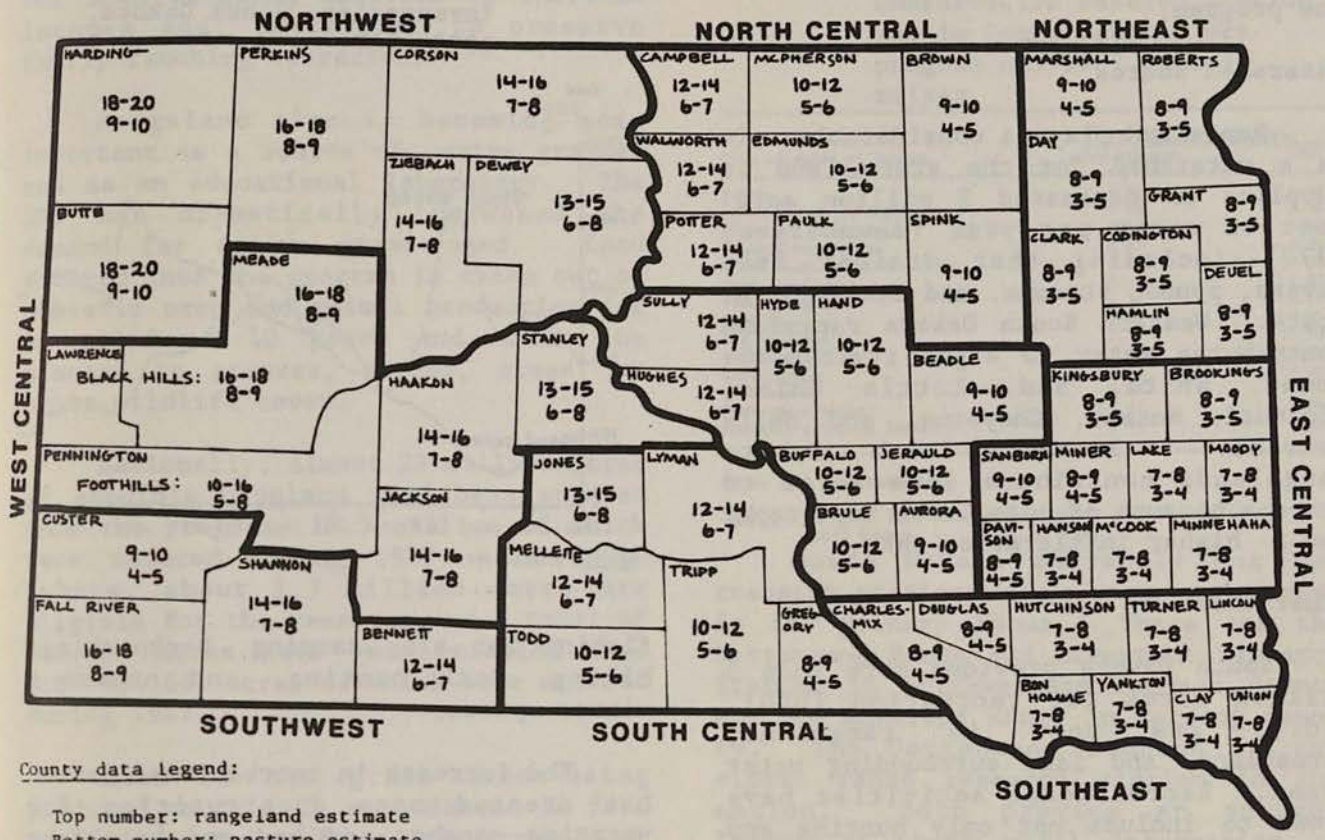
The estimated number of beef cows on rangeland increased from 226,000 in 1930 to a record high of 2,129,000 in 1975 (Figure 3). During the 1976-77 sell off, beef cow numbers dropped 35% to 1,383,000 head. Beef cow numbers in 1987 are estimated to be 1,491,000.

On January 1, 1987, South Dakota ranked fifth nationally in the number of beef cows that had calved (SDASS, 1987). The 1982 Census of Agriculture (USDC, 1983)--while approximate--shows a greater number of farms with beef cows in eastern than western South Dakota (Figure 4). However, the average number of cows per farm is greater in the west.

Between 1930 and 1942, estimated stock sheep numbers increased from 979,000 to 2,064,000 (Figure 3). From 1942 to 1950, stock sheep numbers fell more than 1.2 million head to 739,000 as a result of: attractive sale prices and problems with higher production costs, scarcity of labor, diseases, and pests. By 1961, stock sheep numbers had risen to 1,574,000. However, with the introduction of synthetics and increased competition from other meat sources, stock sheep numbers have since declined. Estimated inventories of stock sheep for 1987 total 550,000 head.

The record low number of stock sheep was recorded in 1986 at 460,000. The record high was in 1942 at 2,064,000 head. On January 1, 1987, South Dakota ranked fifth in the total number of

Figure 1. Estimated average acres required per animal unit month, South Dakota, by county, 1987.



County data legend:

Top number: rangeland estimate
Bottom number: pasture estimate

Source: Personal communication, South Dakota Soil Conservation Service, Huron, November 1987.

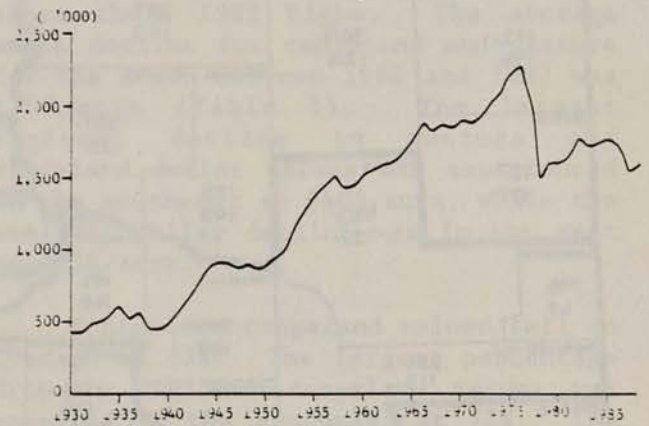
sheep and lambs in the U.S. (SDASS, 1987).

Wildlife habitat

Wildlife in South Dakota supplies a variety of recreational opportunities to the state. The South Dakota Game, Fish, and Parks Department estimates that hunting and fishing licenses brought $6.3 million to the state in 1986. Incomes from hunting and fishing license fees are expected to reach $6.1 and $7.5 million, respectively, in 1987 and 1988. The Game, Fish, and Parks Department also report total expenditures in the state on hunting wild game of $66 million in 1980 (including the costs of travel, lodging, meals, supplies). Prairie dog hunting was estimated to bring in over $3 million to the state in 1986. In light of this, more ranchers are discovering the income earning potential of creating private hunting reserves on their rangeland.

Wildlife populations are dependent upon habitat. More emphasis is being

Figure 2. Estimated total beef cow and stock sheep animal units, South Dakota, 1930-1987.



Source: SDASS (1987).

placed on preserving land which can be used to support wildlife. The Conservation Reserve Program (CRP) included in the 1985 Farm Bill is expected to contribute greatly toward maintaining suitable wildlife cover. Nearly 1 million of the 1.7 million eligible acres

in South Dakota have been entered into the program.

Watershed source

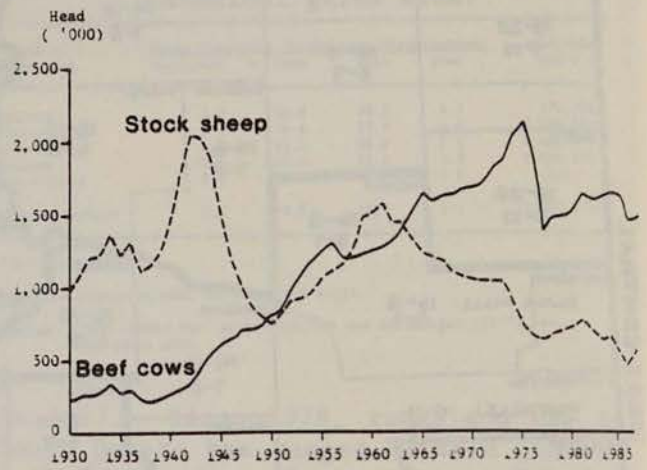
Rangeland plays a considerable role as a watershed for the state, and it supplies an estimated 2 million acre-feet of water per year (Baumberger, 1977)--including that drained into rivers, ponds, streams, and lakes in the state. Western South Dakota rangeland contributes water to eight rivers: the Grand, White, Bad, Little White, Missouri, Moreau, Cheyenne, and Belle Fourche. Eastern South Dakota rangelands contribute less water to streams because of more level topography and a higher infiltration rate.

Other uses

South Dakota provides more than 5 million acres for recreation (USDI, n.d.), and most is rangeland, forestland, and land surrounding water areas. Recreational activities have grown to include not only hunting and fishing but also camping, backpacking, hiking, rock hunting, and numerous winter sports.

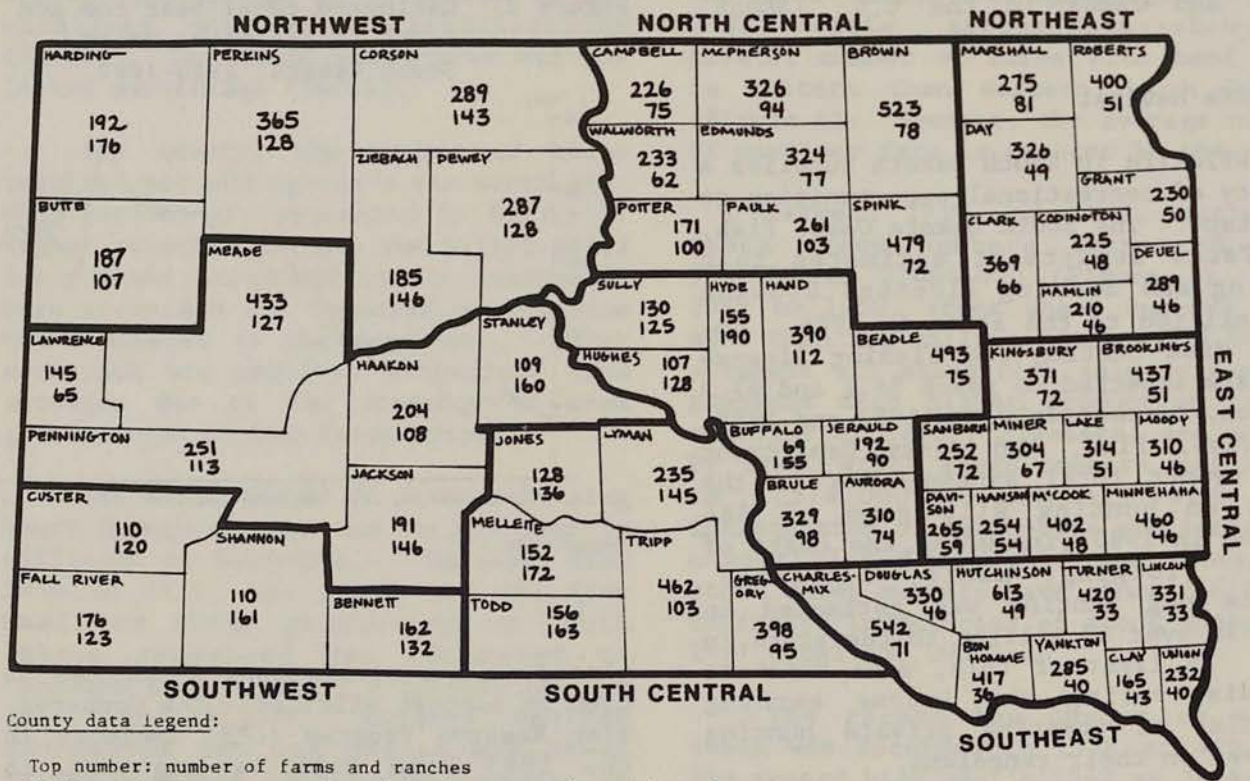
The increase in recreational demand has created more opportunities for vacation ranches and bed and breakfast

Figure 3. Beef cow and stock sheep inventories, South Dakota, 1930-1987.



Source: SDASS (1987).

Figure 4. Farms and ranches with beef cows and average number of beef cows per farm and ranch, South Dakota, by county, 1982.



County data legend:

Top number: number of farms and ranches
Bottom number: average number of beef cows per farm and ranch

Source: USDC (1983).

establishments. These are alternatives for some ranching families to increase incomes and, therefore, to preserve family ranching operations.

Rangeland also is becoming more important as a source of native grasses and as an educational laboratory. The CRP has dramatically increased the demand for native grass seed. Land entered into the program is taken out of domestic crop and animal production for a period of 10 years and must be planted to grasses, shrubs, trees, or other wildlife cover.

Nationally, almost 23 million acres of erodible cropland have been entered into the program, 10.5 million of which were entered during 1987. In South Dakota, about 1.7 million acres are eligible for the reserve, and a total of 949,553 acres have been enrolled thus far--724,684 acres of which were entered during 1987.

Much of the grass seed being produced to fulfill seed demand is from existing stands of native grasses on rangeland areas. Grass seed from these native stands is also being used to plant additional acreages of harvestable grass seed to meet the demand of the CRP and other uses in the near future.

An example of what the CRP program has meant to grass seed producers is demonstrated in Table 2. Except for alfalfa, the minimum price increase in 1987 compared to the pre-CRP program years is 15%. For many grasses, seed prices have increased several times over.

This renewed interest in grass seed production and concerns about the leanness of beef, erosion, and conservation of the range resource have resulted in more emphasis on preserving rangeland as a natural laboratory. Most of the literature available today on grass seed production is from work completed in the mid-1960s. This information requires updating for today's economic, social, and political environment. Preserving areas of rangeland where experiments can be performed is essential for this type of information updating.

Table 2. Prices of grasses approved for conservation reserve program use in South Dakota, pre-program and 1987 average prices.

Type of grass or legume	Average prices ($/lb) Pre-program	1987
Brome	0.90	1.15
Intermediate wheatgrass	0.55	1.50
Pubescent wheatgrass	0.55	1.50
Western wheatgrass	0.85	1.85
Green needlegrass	0.75	10.00[a]
Tall wheatgrass	0.40	1.00
Sideoats grama	1.50	10.50[a]
Alfalfa	0.85	0.85
Big bluestem	1.50	10.50[a]
Indiangrass	1.50	10.50[a]
Switchgrass	0.15	10.00[a]
Sweetclover	0.16	0.20
Reed canarygrass	0.87	1.00
Garrison creeping foxtail	1.00	1.25

[a]Pure live seed basis only.

Source: November 1987 telephone survey of seed dealers in South Dakota.

South Dakota currently has two research stations where range management is the primary focus. These are the Cottonwood Range and Livestock Research Station in northwestern Jackson County and the Antelope Range in Harding County. The Cottonwood Station is the oldest range research station in the nation. Both provide an outdoor laboratory where vital information on current range condition and management practices can be examined.

PASTURE AND RANGELAND VALUES

Pasture and rangeland values have continued to decline in South Dakota since their 1982 highs. The average price decline for rangeland and pasture for the state between 1982 and 1987 was $207/acre (Table 3). The largest regional decline in pasture and rangeland dollar values was experienced in the southeast at $405/acre, while the smallest dollar decline was in the west at $108/acre.

Statewide, rangeland values fell an average of 62%. The largest percentage drop in regional rangeland values was recorded in the southeast at 72%. The smallest percentage decline was in the north-central region at 50%. In the western region, prices fell 66%. Rangeland values in South Dakota remain highest in the southeast and lowest in the west.

Cash rents for hay and pasture land were compiled from a recent land rental

survey (Janssen and Peterson, 1986) (Table 4). Rents for alfalfa are considerably higher than rents for native hay or native pasture throughout South Dakota. Rental rates are generally highest in the southeast and lowest in the southwest.

Cash rents generally declined from 1985 to 1986. Annual percentage declines for alfalfa varied from zero in the southwest to 13% in the northeast. Cash rents are higher in the southeast because of more adequate moisture, which produces higher yielding forage crops than in the dryer regions of the state.

FUTURE CONCERNS

Rangeland is and will continue to be an important resource to South Dakota. It remains the cornerpost for cattle production--the number-one agricultural income producer in the state--as well as for sheep production.

Concerns relating to the future of South Dakota rangeland include: monitoring rangeland values and rental rates, modifications to the formulas which are used to establish federal, state, and tribal grazing fees, uses of the CRP acreages when that program terminates, government policies toward prairie dogs and black-footed ferrets, new grazing systems and other range improvement practices, and governmental policies covering other "multiple use" concerns of federal- and state-owned rangeland.

Research is underway for monitoring land values and rental rates, and for discovering what determines rangeland values. An evaluation of the fee and non-fee costs associated with grazing livestock on both public and private land (including changes to public-land grazing fee formulas) is also planned.

In another study, the value of an AUM of grazing to the economy of South Dakota is being estimated. This involves determining both the value of an AUM as an income-producing unit to the rancher and the impact of AUM production on the community in which the rancher lives.

Table 3. South Dakota pasture and rangeland sale prices, South Dakota, by region, 1980-1987.

Region	Average sale price ($/acre)[a]								Percent decline from 1982
	1980	1981	1982	1983	1984	1985	1986	1987[b]	
Southeast	521	525	562	457	412	285	257	157	72
East-central	540	404	469	411	343	338	235	187	60
Northeast	310	352	392	295	333	250	198	162	59
North-central	276	293	254	269	241	212	194	126	50
Central	243	268	272	258	220	208	152	116	57
South-central	181	227	237	217	204	180	87	96	59
West	131	161	163	121	122	104	74	55	66
South Dakota	314	318	335	290	268	225	171	128	62

[a]Land tracts included are those tracts where pasture and rangeland represent 50 to 100% of total acres sold. Typical percentages of pasture and rangeland to total acres sold are 86 to 92% in western South Dakota, 71 to 80% in central South Dakota, and 62 to 80% in eastern South Dakota.

[b]The 1987 data are for the first six months only.

Source: Compiled from a data bank of "reported farmland sales" provided by the Federal Land Bank of Omaha.

Table 4. Average cash rent for alfalfa, native hay, and pasture, South Dakota, by region, 1985 and 1986.

Region	Rental rate ($/acre)					
	Alfalfa		Native hay		Native pasture	
	1985	1986	1985	1986	1985	1986
Southeast	35.40	35.00	18.50	17.70	18.50	17.80
East-central	30.70	30.00	18.20	18.00	16.30	15.90
Northeast	31.80	27.80	17.50	16.60	14.70	13.60
North-central	18.20	17.60	12.00	11.80	11.70	11.30
Central	17.50	17.00	14.140	13.30	11.90	11.20
South-central	12.00	11.70	10.20	9.90	8.40	7.50
Southwest[a]	13.20	13.20	n/a	n/a	5.50	5.50
Northwest	10.40	10.20	6.20	5.90	4.70	4.60

n/a = not available

[a]The "southwest" region in this table covers the "southwest" and "west-central" regions shown in Figure 1.

Source: Janssen and Peterson (1986).

Interests in the protection, maintenance, and improvement of South Dakota's rangeland resources are diverse. Many individuals, organizations, and agencies will watch the decision-making process closely as future uses of these most valuable resources are determined.

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REDUCED TILLAGE AND ALTERNATIVE FARMING SYSTEMS: POTENTIAL FOR INCREASING AGRICULTURAL PROFITABILITY

Thomas L. Dobbs and Donald C. Taylor[1]

The high prices associated with the boom in U.S. agricultural exports during the 1970s stimulated conversion of forage lands to crop production and the use of more intensive farming practices, such as increased use of chemical fertilizers and pesticides. This extension and intensification of U.S. crop production heightened concerns in some quarters about adverse environmental consequences, e.g., increased soil erosion and greater runoff and percolation of fertilizers and plant protection chemicals. In fact, the offsite sedimentation problems and contamination of surface and groundwater supplies resulting from some "conventional farming" practices have become increasingly evident over the past decade.

These "external" costs have generated public pressure to find alternatives to conventional farming systems. Moreover, the rising energy prices during the 1970s and early 1980s have led farmers to seek alternatives to the energy-intensive farming practices which evolved since World War II. The weak farm prices of the 1980s also have greatly heightened interest in cost-reducing technologies.

Thus, producers are increasingly asking, "What practices might reduce costs--even with some yield reduction--without reducing net farm income?" This Chapter is devoted to one response by the SDSU Economics Department to these circumstances. Attention is focused on trends in and economic research being conducted on alternative tillage practices, rotation systems, and levels of farm chemical use.

FARMING PRACTICE TRENDS

One response to the economic forces cited above is the exploration of various types of reduced tillage practices. A common component in all reduced tillage systems is the elimination of the moldboard plow. Intermediate forms of reduced tillage involve land preparation via disc-harrows and subsurface chisel plows. The most complete form of reduced tillage is "no-till," in which a crop is seeded into soil left untilled after the prior harvest.

Many forms of reduced tillage result in a residue cover being left on the soil surface after planting. If at least a 30% residue cover remains, the system is termed "conservation tillage".

Reduced tillage practices generally require less fuel than do conventional practices. Hence, the steeply rising energy prices of the 1970s encouraged growth in reduced tillage. In fact, use of reduced tillage practices has grown in the U.S. ever since the 1960s (USDA, 1986, p. 31).

In the Northern Plains Region as a whole, 29% of the farms were reported to be using at least some reduced tillage practices in 1983 (USDA, 1986, p. 31). According to the U.S. Department of Agriculture, roughly a quarter of South Dakota's corn acreage was farmed by some form of reduced tillage in 1985 (Szmedra and Delvo, 1986). In a 1985 survey by the SDSU Economics Department, 69% of South Dakota farmer respondents reported using some type of conservation tillage on at least part of their acreage (Allen, 1987).

Another farmer response to economic forces of the 1970s and 1980s has been to explore the use of alternative farming systems labeled by such terms as organic, low-input, reduced input, sustainable, and regenerative. In general, these terms describe farming systems in which use of petrochemical based inputs is either eliminated or greatly reduced. To maintain soil productivity and tilth, to supply plant nutrients, and to control insects and weeds, greater reliance is placed on crop rotations, crop residues, animal wastes, legumes, mechanical cultivation, and aspects of biological pest control. In this Chapter, we simply use the term alternative farming systems to encompass systems fitting under this general description.

There are very few statistics on the extent of use of alternative farming systems. Certainly, alternative farming systems are far less common at this time than are reduced tillage practices. Individual farmers and a few researchers, such as those at the Rodale Research Center in Pennsylvania (Domanica, et al., 1986, pp. 76-77), have experimented for several years with alternative farming systems. Some farmers in South Dakota, in fact, have been involved in their own on-farm experimentation with such systems. Moreover, there has been a noticeable growth of interest in the economics of alternative farming systems in the last few years. Continued low commodity prices, large remaining crop surpluses, and federal plans to reduce target price levels are all inducing searches for economical uses of farm land which entail reduced costs.

The economics of reduced tillage practices and alternative farming systems are very much interrelated. Farmer decisions about crop rotations and tillage practices are not made in isolation from each other. However, in the next section of this Chapter, we look specifically at the economics of reduced tillage practices. In the following section, we turn to the economics of alternative farming systems. These two topics start to come together explicitly in that section.

ECONOMICS OF REDUCED TILLAGE PRACTICES

A rather extensive literature exists on the economics of reduced tillage practices. For example, Swenson and Johnson (1982) report on a survey of 19 farmers in North Dakota who practiced no-till with spring wheat and barley. In another study, Williams, et al. (1987) developed enterprise budgets for wheat and sorghum in western Kansas involving seven cropping systems with various combinations of tillage practices and crop rotations. Crop enterprise budgets were also developed for several tillage systems in Nebraska (Agnet, n.d.); the budgets covered winter wheat, corn, and grain sorghum in 1980 and 1982 in four regions of the state. In South Dakota, a series of budgets was developed by Firm Enterprises Data Systems (FEDS, n.d.) for corn, winter wheat, and spring wheat in four regions under various tillage practices in 1978 and 1979.

Research in the SDSU Economics Department on the economics of reduced tillage during the past five years has been in three phases. The first, undertaken during 1982-84, involved the development of synthesized budgets for four crops grown under three tillage systems. A follow-up study involved a rather large-scale assessment, via two mail surveys, of farmer experience with reduced tillage in South Dakota. The third study, currently in progress, involves a more in-depth economic analysis of reduced tillage practices followed by 25 to 30 of the state's farmers.

In the synthesized budget study, a special computer program was used to build budgets for corn, soybeans, spring wheat, and oats grown under each of conventional tillage, minimum tillage, and no-till systems in east-central South Dakota (Allen, 1984 and 1985). The budgets were developed using locally applicable research findings and the judgments of several SDSU crop and machinery specialists.

In the budgets developed, contrasts in the numbers of field operations between conventional and reduced tillage practices are greater for the row crops than for the small grains (Table 1).

For example, corn produced under conventional tillage is assumed to require eight field operations, whereas under no-till only three times over the field are required. Fewer field operations (only 1) are eliminated for small grains when switching from conventional tillage, to minimum tillage, to no-till.

For each crop and tillage system, the per-acre variable and fixed costs of production were estimated. In addition to machine repair, fuel, and lubrication costs, the variable costs included plant protection, fertilizer, seed, storage, drying, insurance, and certain miscellaneous farm overhead costs. In addition to depreciation, taxes, insurance, and interest costs associated with machinery, the fixed costs covered land, family labor, and interest charges.

Without exception, the variable production costs are higher with no-till practices than with conventional tillage (Table 2). The increment in variable costs ranges from 9 to 13% for the row crops and from 20 to 45% for the small grains. The greater herbicide, pesticide, and fertilizer expenditures with no-till more than counterbalance the reduced machinery repair, fuel, and lubrication costs with no-till. The pattern of higher variable costs with reduced tillage is also shown in the western Kansas (Williams, et al., 1987), North Dakota (Swenson and Johnson, 1982), and Nebraska (Agnet, n.d.) reduced tillage study results. In some regions in the South Dakota FEDS study, variable costs are higher with reduced tillage. In other regions, however, opposite results are shown.

The fixed costs, on the other hand, are from 6 to 20% less with no-till practices than with conventional tillage. The lower fixed costs arise primarily from the lower annualized costs of machinery ownership with no-till production. In the two other reduced tillage studies in which attention was given to fixed costs (for North Dakota and Nebraska), the fixed costs with reduced tillage were also less than those with conventional tillage.

Table 1. Field operations assumed for selected crops and tillage systems, synthesized budgets, east-central South Dakota, 1984.

	Number of times over the field[a]											
	Corn			Soybeans			Spring wheat			Oats		
Field operation	CT	MT	NT	CT	MT	NT	CT	MT	NT	CT	MT	NT
Shred stalks	1	1		1	1							
Plow	1			1								
Spread fertilizer							1	1	1	1	1	1
Disc-harrow	2	1		1			1	1		1		
Chisel		1			1		1			1	1	
No-till plant		1	1		1	1						
Conventional plant	1			1								
Cultivate	2	1		1	1							
Minimum till drill								1	1		1	1
Conventional drill							1			1		
Spray			1			1	1	1	1	1	1	1
Swath										1	1	1
Combine	1	1	1	1	1	1	1	1	1	1	1	1
Total	8	6	3	6	5	3	6	5	4	7	6	3

[a]In the column headings, conventional tillage, minimum tillage, and no-till are abbreviated CT, MT, and NT, respectively.

Table 2. Per-acre costs for selected crops and tillage systems, synthesized budgets, east-central South Dakota, 1984.

	Variable costs		Fixed costs		Total costs	
Crop and tillage system	$	Ratio to conventional	$	Ratio conventional	$	Ratio to conventional
Corn following corn						
Conventional till	95	1.00	85	1.00	180	1.00
Minimum till	96	1.01	77	0.91	173	0.96
No-till	107	1.13	68	0.80	175	0.97
Soybeans following corn						
Conventional till	69	1.00	79	1.00	148	1.00
Minimum till	69	1.00	70	0.89	139	0.94
No-till	75	1.09	64	0.81	139	0.94
Spring wheat following soybeans						
Conventional till	58	1.00	76	1.00	134	1.00
Minimum till	68	1.17	75	0.99	143	1.07
No-till	84	1.45	71	0.93	155	1.16
Oats following corn						
Conventional till	61	1.00	82	1.00	143	1.00
Minimum till	61	1.00	80	0.98	141	0.99
No-till	73	1.20	77	0.94	150	1.05

The combined effects of the higher variable production costs and lower fixed costs with no-till are, of course, reflected in the total per-acre costs of production. The total costs with no-till are 3 to 6% less for the row crops and 5 to 16% more for the small grains. The findings with reduced tillage for row crops versus small grains in the western Kansas, North Dakota, Nebraska, and South Dakota FEDS studies are generally, though not identically, the same.

In the follow-up assessment of farmer experience with reduced tillage in South Dakota, nearly 1,000 producers provided responses to two mail surveys covering 1985 tillage practices. One mail survey involved 320 farmers in seven of nine South Dakota crop reporting districts. The second survey, undertaken by the SDSU Plant Science Department in collaboration with the SDSU Economics Department, involved about 650 farmers in the other two crop

reporting districts (the east-central and southeast).

Selected highlights from these studies (Allen, 1987) follow:

The rates of adoption for reduced tillage in Table 3 reflect the percentages of the 320 farmers who reported using reduced tillage on at least part of the planted area for their respective crops. The rates of reduced tillage range from 97% for winter wheat to 29% for corn.

The numbers of field operations reported in Table 3 pertain to the total sample of farmer respondents. The average numbers of times over the field for all farmers range from 5.5 to 7.0 for the various row crops and from 3.7 to 4.6 for the small grains. The wide variations among farmers in the times over fields are reflected by some farmers, for several crops, using only one field operation (sometimes, however, resulting from custom hire work) and other farmers with the same crop using as many as 8 to 12 field operations.

The 320 farmers were asked to provide their opinions on the benefits of reduced tillage. More than 80% agreed with the propositions that reduced tillage helps to conserve moisture, lower fuel costs, and reduce labor requirements (Table 4). Nearly 75% did not agree that reduced tillage helps control diseases and pests. Opinions on whether yields are usually lower or higher with reduced tillage were about equally divided. The responses by farmers in the North Dakota study are quite similar to these.

The 320 farmers were also asked to rate the importance of each of several potential problems with reduced tillage on a scale of 0 to 10. A zero was intended to reflect the absence of a problem and a 10 the presence of an important problem.

The most critical problem reported with reduced tillage concerns weed control (Table 5). The chances of crop losses being greater and chemical use being too technical with reduced tillage are the two potential problems perceived as least critical. For some problems--

Table 3. Farmer tillage practices, selected crops, South Dakota, 1985.

Crop	Percentage reduced tillage	Number of field operation		
		Low	Average	High
Winter wheat	97	1	4.6	8
Sorghum	88	3	5.5	8
Barley	71	1	3.9	8
Oats	68	1	3.7	7
Spring wheat	63	1	4.3	8
Soybeans	46	1	5.9	11
Corn	29	2	7.0	12
All farmers	69	n/a	n/a	n/a

n/a = not applicable

Table 4. Farmer opinions on the benefits of conservation tillage practices, South Dakota, 1985.

Possible benefit	Percentage of respondents		
	Agreeing	Disagreeing	Not responding
Helps to conserve moisture	91	3	6
Fuel costs are lowered	86	7	7
Reduces labor requirement	84	10	6
Machine costs are reduced	64	26	10
Total cash costs are lowered	54	32	14
More profitable than conventional tillage	52	30	18
Yields are usually lower	39	41	20
Helps control diseases and pests	11	74	15

Table 5. Farmer opinions on the importance of potential problems with conservation tillage, South Dakota, 1985.

Potential problem	Average rating
Weed control is a special problem	8.0
New machine investment is too high	6.9
Use of chemicals is undesirable	6.8
Too many problems in general	5.7
Technology is difficult to manage	4.9
Chemical use is too technical	3.9
High risk of crop losses	3.7

e.g., the reduced technology being difficult to manage--the opinions of farmers varied greatly, with more than 20% of the responses being "0" or "1" and another 20%+ being "7" or greater.

A third phase in the SDSU economic research involves a thesis study in which 25 to 30 of the mail survey respondents are being personally interviewed. The study is intended to provide insights on both the farm-level economics of and the problems encountered in adopting various types of reduced tillage practices with spring wheat, winter wheat, corn, and soybeans.

ECONOMICS OF ALTERNATIVE FARMING SYSTEMS

Although research across the U.S. on alternative farming systems has been quite limited up to now, the literature on such systems has recently begun to expand. Hence, the broad outlines of economic potential for alternative systems are becoming clearer and, consequently, needed directions for future research are being identified.

Cacek and Langner (1986, p. 28) conclude, on the basis of a review of various studies, that organic farming "can compete economically with conventional farming in the Corn Belt and the semi-arid Northwest". However, they indicate that further research is needed on the economics of organic farming in other geographic regions. In another article, Madden (1985, p. 272) states that "Research studies have documented that organic farming methods can provide yields roughly comparable to those of conventional farms." He goes on to indicate that in those cases where crop yields associated with organic farming systems are lower than for conventional systems, production expenses may be enough lower to make organic or regenerative farming systems as profitable as conventional systems (and possibly more profitable).

Research recently begun at SDSU now is starting to shed light on the economic potential for alternative, or "organic", farming systems in the Northern Plains. SDSU's Plant Science and Economics Departments currently are involved in investigations centered on a set of crop trials begun at the Northeast Research Station near Watertown during the 1985 crop year. The SDSU farming system studies at the Northeast Station are grouped into two sets of comparisons.

In Farming Systems Study I, an alternative rotation which involves no chemical fertilizers or herbicides is compared with conventional and ridge till rotations. Soybeans, corn, oats (as a nurse crop for alfalfa), and alfalfa are included (in that order) in the 4-year alternative rotation. Corn, soybeans, and spring wheat (in that order) are included in both the conventional and the ridge till rotations.

Three systems are compared in Farming Systems Study II. The alternative rotation in this case contains soybeans, spring wheat, oats (as a nurse crop for sweet clover), and sweet clover. The sweet clover is included strictly as a green manure crop; it is mowed and chiseled, but not harvested. As in Study I, no chemical fertilizers or herbicides are used in the alternative rotation. Conventional and minimum till rotations in Farming Systems Study II include soybeans followed in turn by spring wheat and barley. (A fourth system in Farming Systems Study II, continuous no-till winter wheat, is not discussed here because of major questions about the longer term viability of that system.)

Only three years of production data are available as of Fall 1987. Due to transition effects and climatic variations, it is too soon to draw any firm conclusions from this set of crop trials. Production practices and yields will be monitored for several years in this study.

Nevertheless, an initial set of enterprise budgets has been estimated for the farming systems under examination. These budgets are based upon a combination of experience to date, reviews of literature and historical data, and scientific judgment. An attempt was made to estimate "normalized" practices and yields which might prevail on average, after an initial transition period. Detailed budgets and associated assumptions are reported by Dobbs, et al. (1987a, 1987b).

An overview of initial results from the alternative farming systems study is shown in Tables 6 and 7. Yield assumptions are shown in Table 6. The following per-acre costs and returns are shown in Table 7: (1) direct costs other than labor; (2) gross income; (3) income over all costs except land, labor, and management; (4) income over all costs except land and management; and (5) income over all costs except management. Costs and returns were based upon estimated 1987 input and product prices and participation in the 1987 federal farm program for wheat and feed grains.

The results show the alternative systems to have significantly lower direct costs other than labor than the other systems. All systems cover full costs (including land) when 1987 farm program provisions are in effect. The various net income figures for the alternative system are $5 to $15/acre lower than those for the other systems in Farming Systems Study I, and nearly the same as those for the other systems in Study II. These results indicate that the alternative systems provide definite opportunities to lower cash operating costs. In at least some situations, there may be little or no sacrifice of net income by adopting alternative systems. Further research will provide better understanding of the full range of conditions under which the alternative systems may be economically competitive.

Analyses conducted thus far have been based on the assumption that products marketed from the alternative systems bring the same per unit prices as products from other systems. In some cases, however, produce certified to be "organic" can be marketed at a price premium.

PLANS FOR ON-GOING RESEARCH

The comparative profitability prospects of farming systems currently being studied at SDSU obviously could change with different yield and other assumptions. Sensitivity analyses now underway will provide insights on how different yield, fertilizer and herbicide, farm program, and other conditions affect the relative profitability of various farming systems and tillage practices.

Yields will be monitored and enterprise budgets will be adjusted over time as SDSU's farming systems studies progress. Further refinement of cost estimates for various tillage practices is being undertaken. The refinement is through an analysis of data obtained from interviews with 25 to 30 farmers who are using reduced tillage practices with various crops. Interviews with a limited number of farmers who have experience with alternative farming systems also have been conducted, and more are anticipated in the future. The role of livestock enterprises in alternative farming systems is also receiving attention in "whole farm" analyses currently underway.

These and other areas will require research to develop SDSU Extension Service recommendations on which farming systems and tillage practices are best suited to particular agro-climatic conditions and kinds of farms in South Dakota. This research, coupled with farmers' own experiences, may hold potential for increasing the profitability of South Dakota agriculture.

Table 6. "Normalized" yields, alternative farming systems study.[a]

System and crop	Farming system: Alternative	Conventional	Ridge till
Farming System Study I			
Corn	75	82	84
Soybeans	28	30	31
Spring wheat	n/a	42	42
Oats	70	n/a	n/a
Alfalfa	3.6	n/a	n/a
Farming System Study II			
Soybeans	27.5	30	30
Spring wheat	40	42	42
Oats	70	n/a	n/a
Barley	n/a	70	65
Sweet clover	b	n/a	n/a

n/a = not applicable

[a]Yields are expressed in bushels or tons per acre.

[b]Not harvested.

Table 7. Results of farming systems analyses based upon "normalized" yields and cropping practices and 1987 Farm Program and price assumptions.[a]

System	Direct costs other than labor	Gross income	Net income over: All costs except land, labor, and management	All costs except land and management	All costs except management
Farming Systems Study I[b]					
Alternative (soybeans-corn-oats-alfalfa)	42	121	49	36	10
Conventional (corn-soybeans-s. wheat)	63	143	54	45	19
Ridge till (corn-soybeans-s. wheat)	65	145	58	51	25
Farming Systems Study II[b]					
Alternative (soybeans-s. wheat-oats-s. clover)	30	96	41	31	5
Conventional (soybeans-s. wheat-barley)	57	124	40	30	-
Minimum till (soybeans-s. wheat-barley)	61	122	38	30	4

[a]The cost and income data are in dollars per acre.

[b]Crops are shown in the order in which they occur in each rotation

FOOTNOTE

[1]The findings on SDSU's reduced tillage research reported in this chapter are based on the work of our former colleague, Herb Allen, who is now retired. We acknowledge with appreciation his willingness to allow us to report some of the findings from his research in this volume. Lyle Weiss was involved in developing crop enterprise budgets for the SDSU alternative farming systems work cited in this chapter. Mark Leddy has also been deeply involved in the alternative farming systems research, and is currently completing an M.S. thesis on the topic. We also wish to acknowledge reviews and helpful suggestions on this chapter by Herb Allen, James Smolik, and Larry Janssen. The SDSU Plant Science Department research on alternative farming systems is under the overall direction of Dr. Smolik.

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IRRIGATION WATER AND ENERGY USE: INVESTMENT, OPERATION AND PRICING POLICIES

Donald C. Taylor[1]

This Chapter is intended to provide an overview of the historical development, current economics, and future prospects for irrigation in South Dakota. It is based on the results of research undertaken in the SDSU Economics Department during the past seven years. See the abstracted list of publications at the end of the Chapter which shows selected reports of results of the research.[2]

The Chapter consists of three sections. In the first, an overview of the historical development of irrigation in South Dakota is presented. The second section is focused on seven policy questions which have been addressed in the Department's economic research on irrigation water and energy use. The concluding section represents a look into the future.

SOUTH DAKOTA IRRIGATION

Irrigation was first introduced into South Dakota in the late 1800s. The initial development involved private irrigators establishing and using simple gravity-diversion structures along tributaries of the Cheyenne River in the western part of the state. By the time the federally-supported Belle Fourche Project in west-central South Dakota was completed in 1914, the total irrigated area in the state had grown to about 90,000 acres.

During the next nearly 60 years, the state's total irrigated area increased by less than 60,000 acres. A retarding influence was the Great Depression in the 1920s and 1930s.

Under the impetus of strong farm commodity prices, rather severe and widespread drought in the mid-1970s, and the availability of new irrigation technology, however, the irrigated area in the state expanded rapidly. The 2.3-fold increase in irrigation in South Dakota between 1969 and 1978 represented a faster relative rate of irrigation development than that in any other Great Plains state (Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, Texas, and Wyoming), and nationally was second only to that in Georgia.

The area irrigated in South Dakota during the 1980s has more or less stabilized at roughly 400,000 acres. Some references show a smaller area (e.g., USDA, 1986) and others a larger area (IS, 1987). Reasons for the interruption in irrigation growth include low farm commodity prices relative to irrigation pumping energy and other production costs, several successive years of quite widespread above-average precipitation, and natural circumstances less favorable for irrigation development in areas yet to be developed for irrigation.

Today, South Dakota ranks about 20th nationally in its total irrigated acreage.

Distinguishing features of South Dakota irrigation follow (Taylor, 1983 and 1984):

Private financing dominates. The vast majority (more than 80%) of South Dakota's irrigation has been developed by individuals and groups using private financing. This contrasts with much of the West where irrigation was developed earlier with the aid of federal monies.

Extensive surface irrigation. During the 1970s, the newly irrigated area in South Dakota from groundwater sources was 55% greater than that from surface sources. Nevertheless, only about 50% of today's total irrigated

area in the state draws water from groundwater sources. This is much less than the 85% average for the 10 Great Plains states.

High lift from surface sources. The average lift of pumped surface water in South Dakota (about 130 ft.) is 3.7 times the average for the Great Plains states. The average lift for pumped groundwater in South Dakota (about 120 ft.), on the other hand, is below average for the region.

Center pivots dominate. Center pivot systems dominate South Dakota and North Dakota irrigation more than any other irrigation method dominates any other Great Plains state. More than 70% of the current irrigated area in each state involves center pivot systems. In no other Great Plains state is the percentage greater than 40. Two features of the 1970s undoubtedly help to explain the dominance of center pivot irrigation in the two Dakotas. This was a time when (a) the relative rate of expansion of irrigation in these two states exceeded that in the other Great Plains states where irrigation had been developed earlier, and (b) the center pivot technology had become well-developed and was readily available on the market.

Electrical energy dominates. In 1970, electricity powered pumps for about a third of South Dakota's total privately-developed irrigated acreage. Propane and diesel were each responsible for about a fourth of the state's total irrigation. Since then, the relative role of electricity has expanded greatly. Today, more than 75% of the state's privately-developed irrigated area has sprinklers energized by electricity.

Corn dominates. The principal crop grown under irrigation in South Dakota--corn--covers well over half (58%) of the total irrigated area in the state. In the Great Plains, only in Nebraska is the percentage higher (75%). Corn accounts for slightly less than 50% of the irrigated area in third-ranking North Dakota and for about 30% of the irrigated areas in fourth- and fifth-ranking Colorado and Kansas. In Montana and Oklahoma, at the other extreme, corn accounts for less than 5% of the respective total irrigated areas.

ECONOMICS RESEARCH ON SOUTH DAKOTA IRRIGATION

The research on South Dakota irrigation undertaken by the SDSU Economics Department during the past seven years has focused on various applied dimensions of water and energy use. This research has been concentrated on east-central (Brookings County), southeastern (Clay, Turner, and Union counties), south-central (Todd County), and north-central (Walworth County) South Dakota.

Selected findings from this research are presented in relation to seven specific questions faced by those involved in South Dakota's irrigation sector in the late 1980s and early 1990s.

In most instances, the answers to the questions are considerably more complex than can be explained within the space of this single Chapter. The complexity arises from variations in the micro-production economic environment for different producers[3] and variations from time to time and from place to place in factors beyond producer control (e.g., input and commodity prices, weather). For a more detailed treatment of the questions, readers are advised to consult copies of the referenced reports.

1. Are investments in new irrigation systems likely to be profitable?

The answers to this question and the others were studied in specific relation to the production economic conditions prevailing over 1982 to 1986 on typical farms in the respective research sites. The results of the research generally show prospect for only a very modest return from investments in new irrigation systems--particularly with the above-average precipitation experienced in South Dakota during 1981-1986 (Taylor, 1985; Taylor, 1987b).

The prospective profitability of irrigation system investments is generally above-average for irrigators

with established acreage bases who participate in government grain commodity programs. Farmers who rely on irrigated crop production as feed input for livestock enterprises also may find a stronger economic justification for investing in new irrigation systems.

Investments in new irrigation systems involving pumping lifts of 150 ft. or greater and by more highly leveraged farmers (i.e., those having greater debt) were generally shown in the research to be economically unsound. A substantial increase in farm commodity price levels and a few successive years of below- rather than above-average precipitation, however, could bring a definite improvement to the economics of investing in new irrigation systems.

2. Does it pay to operate already installed irrigation systems?

In the face of "unfavorable" farm commodity-farm input price relationships, some farmers may question whether they should operate already-installed irrigation systems. In seeking the answer to this question, irrigators need to pay particular attention to the moisture status of their irrigated crops and how high irrigation water is lifted (Taylor, 1987b).

In general, irrigators have little reason to operate irrigation systems when moisture from precipitation is ample to meet immediate crop moisture needs. An exception could be farmers having irrigation systems with pump design capacities that are barely adequate--especially if above-normal temperatures are in prospect. In such cases, pumping so as to build up moisture reserves in the soil profile for later crop use could be economically advantageous.

When an irrigator's crops are moisture-stressed and the yields are thereby potentially reduced, he is generally well-advised to operate his irrigation system. The underlying reason is the high value of even a small percentage loss in yield from not irrigating a crop that is under moisture stress. For example, the value of a 2% yield loss for a center pivot of corn is at least $600 to $1,000, depending on the crop yield and the crop price.

A possible exception to this general pattern, however, involves high lift (more than say 200-300 feet) pumping. In such cases, the energy costs for lifting and pressurizing the irrigation water may more than counterbalance the added value associated with the higher yields under irrigation.

3. How much less do crop yields under low sprinkler pressures have to be for a farmer to be well-advised to invest in a high- rather than low-pressure irrigation system?

Pumping costs are less for water distributed under reduced pressure. When sprinkler pressures are reduced, however, water application rates are greater. Unless soil textures are relatively coarse and field topographies fairly level, the potential arises for soil crusting and thus increased surface runoff and soil erosion. Yields can, therefore, be less with low pressure.

In examining the tradeoff between reduced energy costs and possibly reduced yields with reduced sprinkler pressures, "high" and "low" water distribution pressures of 75 and 30 pounds per square inch (psi) were assumed. The results of the study show a 4% breakeven yield loss (Taylor, 1986).

This outcome shows that if prospective yield-losses under low-pressure water distribution are anticipated to be as much as 4%, a farmer would be well-advised to pass up the energy savings associated with low-pressure water distribution and, instead, to purchase a high-pressure system. While this 4% breakeven loss will not apply exactly to every situation, the fact that the case study breakeven loss is as small as 4% suggests the need for extreme caution in selecting low-pressure spinklers if soils are fine-textured and/or the topography is uneven.

4. How much can an irrigator afford to pay to convert a high-pressure center pivot to low-pressure?

In determining the economics of downgrading sprinkler pressures, the costs of converting from high- to low-pressure (e.g., for renozzling, pump

modifications) are compared to the prospective savings in energy gained from the conversion. A farmer contemplating a possible conversion to low-pressure, and who does not anticipate a yield loss from the reduced pressure, needs to consider (a) how much the water pressure is reduced, (b) the amount of irrigation water pumped, (c) the price paid for energy, and (d) the rate of interest and number of years over which the conversion investment is amortized (Taylor, et al., 1985).

One situation examined in the research involved a 40 psi reduction in pressure, 10 inches of water pumped, an electricity cost of $0.08/kWh, a 4-year amortization at 14.5% interest, and 130 irrigated acres. Under these conditions, the breakeven investment for converting a center pivot from high- to low- pressure is $3,630. If the cost for converting this system were less than $3,630,[4] an irrigator could expect to earn higher profits by making the conversion. Otherwise, making the conversion would likely reduce profits.

With any proportional change in either pressure reduction, inches pumped per year, or electricity charges, the breakeven expenditure changes in the same proportion. With an 8-year (rather than 4-year) amortization period, the breakeven investment is $4,748. With a 10% (rather than 14.5%) rate of interest, the breakeven expenditure is $3,996.

The costs of converting irrigation systems from high- to low-pressure depend on irrigator-specific circumstances. In general, however, the results of the research suggest that irrigators with favorable soils and topographies may be well-advised to examine the possibilities of reducing sprinkler pressures. If yield losses might accompany the reduced sprinkler pressures, however, a great deal of extra caution would need to be exercised before deciding to downgrade sprinkler pressures.

5. Should irrigators participate in electric load control programs?

Rural electric cooperatives (RECs) and others who supply electric power to irrigators can cut their wholesale purchased power costs if they are able to reduce their peak power demands. Many RECs, therefore, are establishing load control programs with incentives for irrigators to limit pumping during periods of peak power demand. A common incentive involves the waiving of monthly demand charges for irrigators who agree to come under load control.

The results of evaluating two load control programs show that irrigator incomes are highly sensitive to yield losses caused by load control power interruptions to irrigation systems when crops are under yield reducing moisture stress (Taylor, 1987a).

For seasonal "all-or-none" load control programs, the maximum breakeven losses are no greater than 2% to 7% for high-pressure center pivot systems and even less for low-pressure and gated-pipe systems. Faced with such limited breakeven losses, only those irrigators having substantially over-sized pumping capacities and/or a willingness to incur substantial risk could rationally decide to participate in a seasonal "all-or-none" load control program. Committing themselves to not pump at any time during the irrigation season when peak power demand is being experienced--even though their irrigated crops may be under yield reducing moisture stress--would be economically disastrous for most irrigators (unless very, very large incentives were offered by RECs).

For load control programs with provisions for voluntary program withdrawals by irrigators, the maximum individual month-by-month breakeven yield losses are even less than those above (a maximum in any one month of 1.8% in the cases examined). Being able to manage irrigation water so as to avoid a level of moisture stress leading to anything less than a 1.8% yield loss during a particular month is an unrealistic management objective for any irrigator.

Incentives adequate to compensate irrigators for yield losses resulting from load control power interruptions to irrigation systems when irrigated crops are under yield reducing moisture stress would need to be at least five times as

much as monthly demand charges. Most RECs cannot economically justify such incentive levels.

A clear conclusion, therefore, emerges from this yield loss analysis. RECs are well-advised to realistically resign themselves to the fact that irrigators will not be able to remain under load controls when their irrigated crops are encountering yield reducing moisture stress. Thus, provision for the voluntary withdrawal of irrigators from load controls is an essential feature of workable and effective irrigation load control programs.

In conclusion, most irrigators are very unlikely to find it economically advantageous to participate in seasonal "all-or-none" load control programs. For load control programs with provisions for voluntary irrigator withdrawals, the answer may be different. As long as (a) load management incentives more than counterbalance the "personal costs" of load control participation and program withdrawal penalties, and (b) irrigated crops are not under yield reducing moisture stress, irrigators are well-advised to be under load controls. But, if moisture stress should arise, and the irrigators' REC is simultaneously experiencing a peaking of power demand, the irrigators should opt out of load control. By continuing to pump, irrigators can mitigate the economically damaging yield losses that otherwise would result from load control power interruptions to their irrigation systems.

6. Are changes in the level of kWh energy charges likely to affect REC electric power sales to irrigators?

To explore this question, derived demand functions for electricity to energize irrigation pumps were estimated for each of several representative irrigated farms. Starting with a price of 1¢/kWh, the price of electricity was raised by successive 1¢ increments until the use of electric power to pump irrigation water just became uneconomic (Taylor, 1987c).

Without exception, as electricity prices are increased, quantities of electric power used by irrigators tend to decrease. This outcome arises as a result of irrigators shifting from energy-intensive (e.g., high-pressure sprinklers) to energy-extensive (e.g., low-pressure sprinklers) irrigation technologies, reducing the scale of irrigated production, substituting diesel fuel for electric power, and shifting from irrigation water-intensive (e.g., alfalfa) to irrigation water-extensive (e.g., soybeans) crops.

Although the quantities of electricity demanded by irrigators become less as electricity prices are increased in every farm-resource situation examined, the specific pattern of price-quantity relationships is unique for each situation. The different response by different irrigators to rising electricity prices arises because many of the economic and technical circumstances facing individual irrigators are different. Examples of differing economic factors are whether irrigators are participants in the government grain commodity program and whether they use debt- or equity-capital to finance the purchase of new irrigation equipment. Examples of differing technical factors are irrigation water pumping lift and the extent to which currrent irrigation equipment is physically depreciated.

Thus, no matter what the level the kWh energy charge, any increase (decrease) in the charge is likely to lead some irrigators to reduce (increase) the amount of electric power used to energize their irrigation pumps. Except where pumping lifts are very great (e.g., 300 ft), however, some electric power is likely to continue to be used for pumping irrigation water--even if current kWh energy charges were to be increased several-fold. To the extent that rates go up, however, the degree of responsiveness of irrigators in using less electric power increases.

7. Can changes in the form of irrigation electric rate structures be used to impact the sharing of irrigator income and REC revenue risks during years of unusual pumping?

The short-run implications of unusual precipitation on REC revenues are almost inevitably the opposite of

those on irrigator income.[5] For example, unusually light precipitation implies increased irrigation pumping. REC revenues thereby increase. But irrigator incomes go down because payments for electric power for irrigation pumping increase and, more importantly, because yields on the irrigator's dryland acres decrease (Taylor, 1987b; Taylor, 1987d).

If the negative impacts on irrigators from drought are great enough to force the irrigators out of business, both the irrigators and their parent RECs stand to lose. Thus, a rate structure that provides for the sharing of risks between RECs and irrigators of unusual precipitation (pumping) can be expected to be in the best long-term economic interests of both irrigators and RECs.

Two components of electric rate structures can be used to contribute to the realization of such risk-sharing: fixed up-front annual minimum and monthly demand charges and declining kWh energy block-rate charges. During years of unusually great irrigation pumping, the spreading of the fixed up-front costs over more kWhs results in lower average total costs per kWh. Thus, some of the irrigator's burden of greater pumping is shifted to the REC. A declining energy block-rate charge also results in lower average kWh energy costs with greater pumping. Conversely, when pumping during an irrigation season is unusually little, both features contribute to an above normal overall average cost per kWh for the electric power used by an irrigator. In this case, part of the burden of reduced revenues from irrigation to the REC is shared by irrigators.

SOUTH DAKOTA'S IRRIGATION SECTOR: ITS FUTURE

This concluding section includes attention to three facets of the future: prospects for an expansion in the state's irrigated area, types of investment and operations decisions by the state's private irrigators, and REC electric power pricing policies.

What are the prospects for future irrigation development in South Dakota? Any substantial resumption of irrigation growth is almost sure to depend on at least one of two developments.[6] Compared to the mid-1980s, farm commodity prices must rise relative to farm input prices. Otherwise, the economics of crop production are generally too unfavorable for many farmers to justify major investments to develop new irrigation resources.

A complementary factor critically influencing the pace of irrigation development is the weather. A return to the drought-like conditions of the mid-1970s for two or three successive years could do much to rejuvenate the pace of irrigation development. One constraining factor, however, is that the remaining sites in the state for possible irrigation development are generally less favorable than those already developed. Pumping lift is particularly critical in this regard. Further, if energy price increases were to resume once again, the potential pace of irrigation development would be curbed.

Barring changes in farm price relationships and/or the weather, private irrigators who invest in irrigation equipment are more likely to convert existing high-pressure sprinklers to low-pressure than they are to invest in new irrigation systems. Only those irrigators with relatively coarse soil textures and fairly level field topographies, however, will be well-advised to consider downgrading sprinkler pressures.

In the face of "unfavorable" farm commodity-farm input price relationships, some farmers may question whether they should operate already-installed irrigation systems. Unless field moisture supplies are ample to meet immediate crop moisture needs, most farmers will be well-advised to operate their irrigation systems. Possible exceptions to this general guideline, however, are irrigators with high pumping lifts (more than 200-300 ft).

To alleviate the need for major new investments in electric generation and transmission facilities, the electric utility industry can be expected to exert major efforts to control peak loads. An essential feature of effective and workable load control programs for

irrigation will be provision for irrigators to voluntarily withdraw from load controls when irrigated crop moisture shortages and peak electric demands coincide with one another.

If RECs are forced to increase their kWh energy charges, they can expect some reduction in the collective purchases of electric power by irrigators. The behavior of various irrigators in reducing electric power usage, however, will not be the same. Irrigator-specific conditions (e.g., financial leveraging, pumping lifts, the linkage of irrigated crops with other farm enterprises, precipitation levels, or the extent of physical depreciation of existing irrigation equipment) will determine how much the price of electricity has to rise before individual irrigators cut back on electric power use and, once the "threshold" prices are reached, the extent to which power usage is cut back.

To facilitate the long-term survivability of both RECs and their irrigator customers, RECs will want to adopt electric rate pricing policies to enable the mutual sharing of risks during years of unusual pumping. Irrigation electric rate structures with fixed up-front charges and declining kWh energy block rates will contribute to realizing this objective.

FOOTNOTES

[1]The author acknowledges with thanks the helpful comments of those who reviewed an earlier draft of this chapter: Thomas L. Dobbs, Agricultural Economist; Robert A. Kohl, Soil Scientist; Paul D. Weeldreyer, Irrigation Agronomist; and Hal D. Werner, Irrigation Engineer. The responsibility for remaining errors of fact or judgment, of course, rests with the author.

[2]Single copies of these reports will be forwarded upon request to the Economics Department.

[3]Critical micro-production economic aspects for individual irrigators include debt-to-asset ratios, cash flow requirements, pumping lifts, nature of soils and topography, precipitation levels, family labor availability, the linkage of irrigated crops with other farm enterprises, non-farm sources of family income, attitudes toward risk, and views about future commodity and input price levels, government farm programs, and the weather.

[4]The costs of converting different systems, of course, vary. A typical conversion cost with low water lift is in the range of $3,000 to $4,000.

[5]REC irrigation power revenues are negatively impacted by irrigators who participate in government grain commodity programs with acreage set-aside requirements, the same as when precipitation is unusually heavy.

[6]The vast majority of South Dakota's privately installed irrigation equipment is at least 10 years of age. Unless this equipment is replaced as it becomes obsolescent, the state's total irrigated area could quite conceivably contract.

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Taylor, Donald C. 1983. The 1970s: A Decade of Growth in South Dakota Irrigation. SDSU Econ Res Rep 83-4. Sept.

Describes changes during the 1970s in the state's total irrigated area, the area irrigated from ground water versus surface water, water distribution systems, sources of irrigation energy, and the amounts of water applied to major irrigated crops. Presents comparable data for each of nine other Great Plains states.

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Legal issues facing South Dakota producers

Legal issues assume increasing importance in today's agriculture. Selected legal issues facing South Dakota producers and agribusinesses are discussed by the authors of these three Chapters.

Provisions in the Food Security Act of 1985 call for South Dakota and other states to change lender requirements for protection against the unauthorized sale of farm products. States are required to adopt prenotification and/or central filing systems. Jamie O'Brien discusses these procedures in South Dakota and their importance to agricultural lenders, farm and ranch producers, and farm product buyers.

The number of farm bankruptcies in South Dakota has dramatically increased in the 1980s. Mark Goodenow discusses the major purposes of federal bankruptcy legislation and presents an overview of liquidation bankruptcy (Chapter 7) and reorganization bankruptcy options (Chapter 12, 11, or 13) that can be used by farmers and ranchers.

Estate planning is neglected by many farm and ranch families. Pat Lyons discusses the importance of estate planning and the critical importance of having a will.

CENTRAL FILING IN THE SALE OF SOUTH DAKOTA FARM PRODUCTS

Jamie L. O'Brien

An important issue in agricultural lending is the "perfection" of a security interest. A lender typically requires collateral (security) from a borrower as a condition for granting a loan. The collateral is listed in the security agreement associated with the loan.

To perfect a security interest in farm products, South Dakota law requires lenders to file a Uniform Commercial Code (UCC) financing statement with the Office of the Secretary of State. Until the passage of the Food Security Act of 1985 (FSA 85), one of the main purposes of perfecting a security interest was to protect a lender from a borrower selling collateral without the lender knowing about or consenting to the sale.

The FSA 85, passed by the U.S. Congress, requires South Dakota and other states to change lender requirements for protecting against the unauthorized sale of farm products. To be protected, lenders previously were only required to perfect a security interest.

At present, perfection of a security interest is not enough to protect lenders against the unauthorized sale of farm products. Under FSA 85, a state is required to adopt a prenotification and/or central filing system. These procedures and their importance to agricultural lenders, farmers and ranchers, and farm product buyers are examined in this Chapter.

CONFLICT BETWEEN FSA 85 AND SOUTH DAKOTA LAW

Under South Dakota law, to perfect a security interest when loan collateral is a farm product, a lender must file a UCC financing statement with the Office of the Secretary of State (SDCL 57A-9-401). A perfected security interest provides a lender with the maximum secured creditor protection against third parties.

South Dakota law provides that a person buying farm products from a person engaged in farming operations will not take clear title to those goods if the goods are subject to a perfected security interest (SDCL 57A-9-307[1]). If a farmer sells farm products covered by a security agreement without authorization by the lender and does not remit the proceeds to the lender, the lender may sue the buyer (SDCL 57A-9-306[2]). Thus, if the debtor defaults, the buyer may have to pay twice for the farm products involved.

A perfected secured creditor does not, however, take priority over all third parties. Section 1324 of FSA 85, which applies to all sales of farm products from December 24, 1986 forward, supercedes the South Dakota law. FSA 85 provides for a buyer to take farm products free of a perfected security interest unless the state adopts prenotification or a central filing system. If a state does not adopt one of these alternatives, persons buying farm products from a person engaged in farming operations will take title free and clear of the security interest.

Prenotification system

Under the prenotification system, if the buyer receives a proper written notice from the lender or seller within one year before the sale, and the buyer does not comply with the payment instructions in the notice, the buyer takes title subject to a perfected security interest (Meyer, 1986b, p. 153). With the prenotification system, the lender must provide notice to the buyer.

At present, lenders in South Dakota may chose to use the prenotification system. This arrangement presents some troublesome problems. Lenders are required to send notices to all potential buyers. Under Section 1324 (h), farmers may be required by security agreements to specify who the buyers of their farm products will be (Meyer, 1986b, p. 154). Further, if the farmer were to sell to a buyer not on the list and neither notifies the lender seven days before the sale, nor remits the proceeds within 10 days after the improper sale, the farmer shall be fined $5,000 or 15% of the value of the farm products, whichever is greater (Meyer, 1986a, p. 7).

Another problem arises because lenders are required to prove that a buyer actually receives notice of the security interest. To meet this requirement, they have to send the prenotification in "receipt requested" mail. This means an additional cost to the lender.

The prenotification system also may prove to be burdensome to buyers who have to examine hundreds of lists to determine if farm products are subject to a perfected security interest. If the buyer purchases products for which he received notice of a security interest, he will take title subject to the security interest, and the lender will have recourse against the buyer.

Central filing system

The term "central filing system" is defined in Section 1324(c) (2) as "a system for filing effective financing statements or notice of such financing statements on a statewide basis and which has been certified by the United States Department of Agriculture ..." (Meyer, 1986a, p. 13).

An effective financing statement must be signed by both the lender and the debtor. The statement must contain the addresses of the secured party and the debtor, the social security number of the debtor, and a description of the farm products. The statement is effective for five years and can be continued within six months of expiration (Meyer, 1986a, p. 13).

The Office of the Secretary of State has many duties with a central filing system. It must maintain a master list organized according to each farm product. Each farm product is to be organized alphabetically by the last name of individual debtors, numerically by Social Security number or taxpayer identification number, geographically by county, and by crop year (Meyer, 1986a, p. 14).

The Secretary of State is required also to maintain a list of all buyers of farm products who register with the office. The Secretary of State is then required to distribute regularly to each buyer on the list written notice of those farm products that are noted on the form filed by the buyer (Meyer, 1986a, p. 14).

In states with an approved central filing system, buyers will purchase farm products subject to a lender security interest if: (1) the buyer does not register or request notice from the Office of the Secretary of State, and (2) the secured party has filed an effective financing statement. A buyer who has received notice must follow payment instructions listed on an effective financing statement before he can purchase the farm product free and clear of any security interest (Meyer, 1986a, p. 15).

SOUTH DAKOTA'S CENTRAL FILING SYSTEM

South Dakota has complied with federal law by creating a central filing system. The state was authorized to create a central filing system by the state legislature in 1986 (SDCL 57A-9-403.7).

An application for certification of the state's central filing system was filed with the United States Department of Agriculture (USDA) on July 25, 1987. In early October, the central filing system for South Dakota was certified by the USDA. On November 3, 1987, the central filing system became fully operational. Thus, from November 3, 1987, forward, a lender can choose whether to comply with the prenotification or central filing system.

The central filing system created by South Dakota has incorporated both the effective financing statement (EFS) and the Uniform Commercial Code (UCC) financing statement. Thus, two types of law are involved, South Dakota law for the UCC Statement and federal law for the EFS. By filing only a EFS, a lender does not have a perfected security interest. By filing only a UCC financing statement, a lender is not protected if a farmer sells farm products to a buyer without the lender's knowledge. To perfect a security interest in farm products, a UCC financing statement must be filed with the Secretary of State. To be protected against an unauthorized sale of farm products, the lender must file the EFS with the Secretary of State.

However, South Dakota has designed a form that can satisfy the requirements of both the EFS under Section 1324 of the FSA 85 and the UCC financing statement under SDCL 57A-9-402. Thus, a lender can perfect a security interest and comply with the FSA 85 by filing one form with the Office of the Secretary of State.

The central filing system does present one disadvantage to lenders. With the South Dakota system, buyers of farm products can obtain information on farm products subject to perfected security interests by computer, telephone, or microfiche.

Buyers of farm products also can register with the Secretary of State's Office. Registered buyers receive a master list once every four weeks. If they are registered, they are responsible only for the information on the last list received from the Secretary of State's Office.

Thus, if a lender files a UCC financing statement and an EFS on farm products after a master list is sent out, a buyer of farm products who is registered with the Office of the Secretary of State could buy those products and receive clear title. Although lenders have a perfected security interest and have filed an EFS, they are not protected against farm product buyers who are registered with the Secretary of State's Office until the farm products in which they have a security interest appear on the master list sent to the registered buyer.

CONCLUSION

Although FSA 85 has required South Dakota to make changes, those changes have modernized our filing system. South Dakota now has a public notice system that is more reliable and predictable than it has ever been.

The central filing system should provide the lender with adequate protection. The lender will be able to perfect a security interest and protect the interest against a sale to a third party by filing one form centrally with the Office of the Secretary of State.

The new system provides buyers with a system in which they can easily determine which farm products are subject to a security interest. They can thereby protect against becoming liable to a secured party. The new system has prospect for benefiting both buyers and lenders.

FOOTNOTE

[1]Information on South Dakota's central filing system is partly based on conversations during October and November, 1987, with the Secretary of State's Office, Pierre, South Dakota.

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THE FEDERAL BANKRUPTCY ACT

Mark S. Goodenow

Overuse of credit and unexpected changes in the economy may result in an unplanned trip to bankruptcy court. In a typical year, well over 200,000 Americans file for bankruptcy (Franscona, 1987). In South Dakota, 564 farm bankruptcy petitions were filed in 1986 (Janssen and Schmiesing, 1987).

Bankruptcy laws are designed to provide relief and protection to a debtor, while satisfying the claims of creditors as fairly as possible. Originally, English law regarded the debtor as a wrongdoer. The term "bankruptcy" derives from the custom of breaking the workbench of a merchant or craftsman who was unable to pay his debts, thereby demonstrating to the public that he was no longer in business (Ginsberg, 1986).

Knowing that European courts usually sent debtors off to debtors' prisons, the framers of our Constitution determined to be more compassionate in balancing a creditor's rights with a debtor's desire for relief from debts. The U.S. Constitution (Article I, Section 8) empowers Congress to "establish uniform laws on the subject of bankruptcies." Nevertheless, even today the bankruptcy laws created by Congress carry some stigma for the debtors who voluntarily or involuntarily use them.

The Federal Bankruptcy Act (Title 11, U.S. Code) provides an organized procedure under the supervision of a federal court for dealing with insolvent debtors.[1] Debtors are considered insolvent if they are unable or fail to pay their debts as they become due.

The Act is designed to accomplish several major purposes. One is to assure that the debtor's property is fairly distributed to the creditors so that some creditors do not obtain unfair advantage over others. The Act also protects all creditors against business activities by the debtor that would unreasonably diminish the debtor's assets to which they are entitled.

The honest debtor is also given a measure of protection against creditors. Under some circumstances, the debtor is given additional time, free of pressures that creditors might otherwise exert, to pay off his debts. If the debtor makes a full and honest accounting of his or her assets and liabilities, the debtor may have most, if not all, of the debts discharged and thus have a fresh start (Clarkson, et al., 1983).

The Bankruptcy Act covers several types of bankruptcy proceedings. Most important to individuals and organizations are (1) straight bankruptcy or liquidation, (2) business reorganizations, and (3) consumer debt adjustments through reorganization.

LIQUIDATIONS

A liquidation proceeding, traditionally called "straight bankruptcy," is brought under Chapter 7 of the Bankruptcy Act.

The debtor may be an individual, partnership, or corporation. After the filing of either a voluntary or involuntary petition with the Bankruptcy Court, the court will appoint a trustee to oversee the process.[2] The debtor must disclose all the property he/she owns and surrender it to the bankruptcy trustee. The trustee separates out certain property that the debtor is permitted to keep and then liquidates and distributes[3] the remainder of the debtor's assets.

Rules determine the relative rights of the secured and unsecured creditors in the assets of the debtor. Some creditors may be paid in full while others may only receive a small portion or nothing of what is owed them.[4] The debtor will then be discharged

(relieved) completely of any further obligations to the unpaid creditors.[5]

REORGANIZATIONS

Sometimes creditors and debtors benefit more from a continuation of a bankrupt business than from a liquidation of the debtor's property. Chapters 11, 12, and 13 of the Bankruptcy Act provide mechanisms whereby a debtor's financial affairs can be reorganized, rather than liquidated, under the supervision of the Bankruptcy Court.

Chapter 11 proceedings are available to virtually all business enterprises, including individual proprietorships, partnerships, and corporations. Chapter 12 of the Bankruptcy Act is designed to assist family farmers to reorganize their farming operations and to reduce difficulties they would experience under Chapters 11 or 13. Chapter 13 is available only to individuals who want to reorganize their personal consumer debt without the total liquidation required by Chapter 7.

Chapter 11

A Chapter 11 petition for reorganization can be filed voluntarily by the debtor (an individual, partnership, or corporation) or involuntarily by concerned creditors. Once a petition is filed and "relief" is ordered (the court accepts the petition as valid), the court appoints one or more committees of creditors. Creditors are divided into classes (secured, unsecured, and equity). Each class has specific voting rights on any proposed reorganization plan.

The court also appoints a trustee who can take control of the debtor's business and develop a plan of reorganization. In most cases, the debtor will remain in control and work up a reorganization plan.

The reorganization plan is essentially a contract between a debtor and his/her creditors. It may involve recapitalizing or giving creditors some equity in the business in exchange for the debt owed them. The plan must: (1) divide the creditors into classes, (2) set out how each creditor will be satisfied, (3) state which debts will not be paid in full or extended over time, and (4) treat all creditors in a given class equally.

The plan is then submitted to the creditors for approval. Approval requires acceptance by one half of the creditors in each class and creditors who hold at least two thirds the dollar value of each class. Once approved, the plan goes before the court for confirmation.

If the plan is confirmed, the debtor's responsibilities are reduced to those stated in the plan. The court or creditors may reject all the offers made by the debtor and the court may then transfer the case to Chapter 7 Liquidation.

Chapter 12[6]

This chapter is limited to a qualifying farmer/rancher (individual/family, partnership, or family farm/ranch corporation) with no more than $1.5 million of debt, of which 80-100% of the total debt has to be in the farm/ranch business. A majority of gross income must be from the farm/ranch business.

Farm/ranch corporations or partnerships must have at least 80% of their assets in farming/ranching and a majority of their ownership must be in the hands of related persons with at least one actively farming or ranching (Wilson, 1987).

Since the enactment of Chapter 12 in November of 1986, most farmers who qualify have elected to use Chapter 12 rather than Chapter 11 or 13 (Janssen and Schmiesing, 1987).

Chapter 12 is modeled after Chapter 11 and generally follows the same steps as outlined above. However, there are important differences. For example, after the filing of the petition with the court, the debtor has only 90 days to present a reorganization plan. The Court then has 45 days to confirm or reject the plan. This is substantially faster than any other bankruptcy action.

Another important difference is that the creditors lose the power to participate in the development of the reorganization plan or the approval or disapproval of the final reorganization plan. Debtors are also allowed to sell assets without the consent of secured creditors whose liens are on the assets.

Another key difference is the requirement of "adequate protection" as applied to Chapter 12 cases. "Adequate protection" is represented by assurance to secured property creditors that they will receive at least fair rental value from the lands in which they have an interest. Secured creditors are required to accept the current market value of collateral as the total maximum amount of outstanding debt. This in effect leads to the "write down" of the debt to the current market value of the asset.

As partial protection for the creditors, a trustee is required in every Chapter 12 reorganization. The trustee takes an active role with the debtor in overseeing the management of the business and the development of the reorganization plan.

CONSUMER DEBT ADJUSTMENT

Chapter 13 of the Bankruptcy Act provides a way for individuals who do not want to be declared bankrupt to pay their debts in installments under the protection of a federal court. Only individuals with regular incomes who owe individually liquidated, unsecured debts of less than $100,000 and secured debts of less than $350,000 are eligible to file under Chapter 13. Sole proprietors of businesses can use Chapter 13 if they meet the dollar limits.

Chapter 13 proceedings are initiated only by the voluntary petition of the debtor. Following the filing of the petition, the court calls a meeting of creditors. The debtor submits a plan of payment. If the creditors accept it and the court is satisfied that it meets the legal requirements and is in the best interest of the creditors, the court will approve the plan. The court then appoints a trustee to see that the plan is carried out. After the debtor has fulfilled the plan, the court issues an order that discharges the debtor from any remaining debts.

CONCLUSION

Federal bankruptcy laws provide a variety of ways of dealing with the stress of economic failure. Properly used, the laws help both the debtor and creditor through difficult readjustments. Bankruptcy is only one of many options available. The decision to exercise your right to court protection is serious. It should be taken only after consultation with an experienced professional.

FOOTNOTES

[1]Although the Bankruptcy Act is a federal law, South Dakota laws on secured transactions, liens, judgments, and exemptions also play a role in a federal bankruptcy proceeding.

[2]An involuntary bankruptcy occurs when the debtor's creditors force the debtor into bankruptcy proceedings.

[3]An individual debtor in South Dakota does not have the option of choosing between the exemptions provided under South Dakota law (43 SDCL 45) or the federal exemptions. He or she must take the South Dakota exemptions. Examples of exempted property are family pictures, burial lots, family Bible and schoolbooks, all clothing, and one year's provisions.

[4]The amount of payment to a creditor depends, among other things, on whether the creditor is secured or not and the current value of the debtor's assets.

[5]Certain debts may not be discharged because of the nature of the claim or the conduct of the debtor, e.g., alimony, child support.

[6]This Chapter went into effect on November 26, 1986. It includes a sunset provision which requires that unless Congress extends it, Chapter 12 will expire November 26, 1993.

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WHAT IF . . . ESTATE PLANNING

Patrick A. Lyons

What if you died tomorrow? Would your affairs be in order? Would your dependents be adequately provided for? The answers to these and a host of other questions are addressed in comprehensive estate planning.

In this Chapter, we treat one of these aspects: the implications of not having versus having a will. Unfortunately, thousands die annually without ever considering, "What if...?"

INTESTATE DEATH...DEATH WITHOUT A WILL

When someone dies without a will, called an intestate death, state law dictates what shall occur. First, an administrator must be appointed by the court to care for the affairs of the deceased. State law establishes an order of preference for who shall be appointed. The surviving spouse is the first listed, then a child, a parent, and so on.

Who do you think is most fit to collect the debts owed your estate, pay the bills and taxes, and distribute the balance to the heirs? If you die without a will, that decision is left up to the preference list and the judge.

When the deceased is survived by minor children, a guardian must be appointed. If the deceased is also survived by a spouse, the spouse will be named as guardian for the property inherited by the minor children. The guardian is then responsible to expend the property for the benefit of the minor children, and is periodically accountable to the court.

A more serious dilemma arises when both parents die and are survived by minor children. Who will raise the children? If neither parent has a will, the court must decide. State law provides only that the court is to be guided by what appears to be in the best interests of the children. Can you envision the scene in the courtroom? Your parents, spouse's parents, brothers, sisters, friends, and co-workers all vying for the right to raise your children? How is the judge to choose?

Ultimately, all of the deceased's property included in the probate estate must be distributed to the heirs. If no guidance is provided through a will by the deceased, the estate must be allocated according to the formula set out in state law (briefly summarized in Table 1). The probate estate includes all property owned by the deceased on the date of death, except property held as "joint tenants with rights of survivorship" and life insurance payable to a named beneficiary.

Goodenow ...

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Table 1. Law of intestate distribution, South Dakota.

If decedent is survived by:	The property is distributed as follows:
Spouse only	First $100,000 to the spouse; of any amount in excess of $100,000, one half goes to the spouse, one half to the father and mother in equal shares, and if either is dead his/her share goes to the other; but if neither survive, then such portion goes in equal shares to the brothers and sisters of the decedent in equal shares. If there is no surviving parent, brother or sister, then the entire estate goes to the surviving spouse.
Spouse and one child	One half to the surviving spouse, and one half to the child.
Spouse and more than one child	One third to the surviving spouse and the remainder in equal shares to the children and to the lawful issue of any deceased child, by right of representation.
No spouse, but child, children, grandchild, or grandchildren	All to the surviving child, or in equal shares to the children and to the lawful issue of any deceased child or children, by right of representation.
No spouse, no child or children, but parent, or parents	All to decedent's father and mother in equal shares, or if either is dead, then all to the other.
No spouse, no child or children, no parents, but brothers and/or sisters	In equal shares to the brothers and sisters, and to the children or grandchildren of any deceased brother or sister by right of representation.
No spouse, no child or children, no parents, no brothers nor sisters, nor descendents of a deceased brother or sister	To the closest next of kin.

Source: S.D.C.L. Chapter 29-1.

THE ALTERNATIVE: ESTATE PLANNING

The alternative to an intestate death is comprehensive estate planning.

An attorney skilled in estate planning should be contacted as the first step. Prior to actually meeting with your attorney, you may receive and be asked to fill out an asset inventory. This inventory serves two useful purposes: (1) it enables your attorney to determine whether there will be potential death tax or liquidity problems, and (2) it allows you to determine whether your estate at death will be sufficient to enable your dependents to maintain an adequate lifestyle. If a problem is anticipated, a professional insurance salesperson may be contacted to explain various types of life insurance and help you tailor a policy to meet your needs.

In addition to determining whether you have adequate life insurance coverage, it would be wise to review your existing policies to verify that you have designated current primary and secondary beneficiaries. The insurance policy is a contract that provides, among other things, that the owner of the policy pay the annual premium. Then, on the death of the insured, the insurance company will pay the face value of the policy to the named primary beneficiary. So long as a beneficiary is named, that's who gets the money; conflicting provisions in the will have no effect. It is particularly crucial from, or death of, a beneficiary occurs.

During the estate planning process, it is a good idea to review the form(s) of ownership that you are using for all assets owned with other persons and to determine the implications to the settlement and distribution of your estate. Two forms of multiple ownership are commonly used in South Dakota: "tenants in common" and "joint tenants with rights of survivorship".

For example, if two individuals, Tom and Bob, own property as "tenants in common", at Bob's death, his share of the property is inheritable. It passes according to his wishes as expressed in his will (to his wife, Sarah, for instance, who then becomes a "tenant in common" with Tom). Conversely, if Tom and Bob own the property as "joint tenants with rights of survivorship", on Bob's death, Tom would automatically and instantly own Bob's share of the property, regardless of what Bob had included in his will.

These two forms of multiple ownership are fairly easily distinguishable. The law requires that a "joint tenancy with rights of survivorship" can be created only if precisely those words appear on the document of title. Identifying the form of ownership is not required for tenancy in common. Normally, all that will appear on the document of title are the names of the multiple owners.

The backbone of the estate plan is the will. Although it is possible for you to write your own will (using a will-writing-kit, for example), this approach is not advisable. Your attorney is best able to assist you in evaluating your estate and the needs of your dependents, and in insuring that your estate planning objectives are met.

Thus, having a will brings several advantages. You can determine the distribution of your assets that most fully suits the unique needs of your individual dependents. You can designate the person or persons who you feel are best qualified to administer your estate, and you can identify the individual(s) you want to raise your minor children.

POST-ESTATE PLANNING CONSIDERATIONS

Once you have a will, you should store it in a fire-proof, tamper-proof location, such as a safe deposit box. You should inform the individuals designated to handle your estate of the will's existence and its location. The will should be reviewed periodically. If updating or other changes are needed, do not attempt to change the will yourself. You could destroy the will's validity. Return to your attorney for professional assistance.

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Economic planning for the future

Economic planning for the future is essential for producers, agribusinesses, and state and local policy-makers. The authors of these two Chapters focus on key considerations involved in successful planning.

Strategic planning--which answers the long-range management question, "Where are we going?"--should be the first major step in the management process of an organization. Mary Schmiesing discusses the importance of and procedures used in developing a strategic plan for farm and agribusiness firms.

The search is on for new employment and income generating opportunities in rural America! Tom Dobbs discusses the essential role of economic feasibility analysis as a tool to identify economically rewarding activities. He examines the basic components of economic feasibility studies: (1) costs, (2) market potential, (3) product pricing, and (4) profit potential.

Lyons ...

Regardless of your age, wealth or health, a will provides the necessary guidance so crucial at such a difficult time--at your death. There is no time like the present to plan for the future.

STRATEGIC PLANNING FOR SOUTH DAKOTA AGRICULTURE AND AGRIBUSINESS

Mary O. Schmiesing

Rapid changes and increasing complexity in agriculture, including the continuing farm crisis, are forcing agribusiness managers and farm operators to reevaluate their planning processes. They are asking what can be done to hedge against future devastating changes in their environment, such as precipitous interest rate fluctuations and decreasing consumer demand for their product or service. Legislators and special interest groups are questioning what their role should be in protecting those whose livelihood is rooted in agriculture.

Strategic planning provides an organized framework for asking and answering questions concerning the environment in which an organization exists. The term **environment** refers to the factors or forces surrounding an agribusiness which affect its actions: economic, political, technological, sociocultural, customers, competitors, and others.

For instance, should a farmer first ask how many acres of corn to plant, or should he first ask if there is a customer for his corn? At what point should he look at the price of fertilizer, and when should he be concerned with land prices? Should he prepare for genetic break-throughs in corn production, or should he continue with ag chemicals? When should he worry about corn production in Brazil, and why should he hedge?

Each of these questions is important when put into an organized framework for strategic planning. Strategic planning allows one to assess the environmental climate and **anticipate** changes. Without an orderly planning process, the farm business owner can only react to environmental changes.

An in-depth study of the strategic planning process is beyond the scope of this Chapter. Rather, this Chapter provides a framework which farmers, agribusiness managers, and others can use to examine the necessity for strategic planning in their agriculture programs or enterprises. The terms "farm business manager" and "agribusiness" are consistently used throughout this paper; one can substitute the words "farmer" and "corporation", if desired.

DEFINITION OF STRATEGIC PLANNING

Strategic planning is part of the overall strategic management process consisting of planning, strategy formulation, implementation, and control. These four phases are sequential and are necessary for the continued successful operation of any business, from family farm to regional cooperative.

However, the first step, strategic planning, often is given mere lip service, especially in smaller operations. A proper assessment of the farming or business operation at this first stage is critical, for all other processes flow from strategic planning.

The primary role of strategic planning is ensuring that the agribusiness or farm enterprise is aimed in the proper direction. In other words, strategic planning answers the long-range question, "Where are we going?".

Before responding to this question, however, the farm business manager needs to answer three questions, in order:

1. What is our current direction?

2. Which emerging factors in the

external environment will influence our current direction?

3. Should we change our course?

The first question focuses on the long-range or ultimate goal of the agribusiness. The second requires a situational analysis of the external and internal environments in which the agribusiness operates. A thorough analysis of the environment is critical for answering the third question. In fact, the answer to this question provides the firm's response to the overall question, "Where are we going?"

Question 1: The ultimate goal

A farm business owner must define his business in terms that describe the current direction and main reason for existence of the farm. This ultimate goal, or mission statement, is crucial, even for family farm managers. If they don't know where they are going, how will they know when they get there?

This statement should be a response to external forces, such as customer needs (an outward focus) rather than production or operational capabilities. After all, farmers can raise sheep, but if the demand for mutton is decreasing, many farmers will not be in business in the long-run...no matter how efficiently they operate. Therefore, the purpose or mission of the agribusiness actually becomes an internal response to the outside environment. How does the farm or ranch respond to the changing demands and needs of its customers?

An illustrative mission statement reflecting a customer-driven, long-range goal is the following, "This ranch will provide superior quality beef to regional packing plants in an efficient manner consistent with range preservation practices and long-term financial solvency." Providing "superior quality beef" is a customer-driven phrase reflecting a prior assessment of the nature of demand for the product. The term "efficient manner" involves internal production decisions that will ensure "superior quality beef" for the customer. "Range preservation" and "long-term financial solvency" imply a commitment to conservative management practices that will allow a continuing supply of "superior quality beef" to satisfy customer demand.

The driving force or direction of this goal is "superior quality beef." The other phrases are internal checks and balances that ensure demand will be met. A commitment to this mission statement will influence every decision made by the rancher. This goal provides direction for the agribusiness.

A second illustrative mission statement is the following, "This grain elevator will merchandise member-patron grain in a manner which ensures a long-run competitive rate of return on patron equity and maintains the solvency of the business." The phrase "merchandise member-patron grain" is the customer-driven statement. The phrase "long-run competitive rate of return" implies an internal, operational response on how the grain will be merchandised. The focus is on long-run return and solvency, not short-run quarterly or annual profits.

Question 2: Situational analysis

At this point, the second question of strategic planning needs to be addressed, "Which emerging factors in the external environment will influence the direction?" Since the mission statement essentially is customer-driven, anything that might change the attitude, needs, or demands of the customer should be examined.

External environment. The external environment in which the farm or agribusiness exists can be divided into two parts: the **societal** environment and the **task** environment (Wheelen and Hunger, 1986). The societal environment consists of general forces that are evolving and may affect the firm in the long run. These forces may be grouped into four areas: socio-cultural, economic, technological, and political-legal.

When examining these forces, the farm business manager needs to ask what factors are evolving, even now. Once these factors are listed in each force area, a pattern of the future environment can begin to emerge.

For instance, assume that the number of farm families continues to decline, while the size of remaining farms increases (socio-cultural force). As many debt-ridden farmers leave their land, the disposable income of remaining farmers may increase (economic force). Computers and videophones will be used to conduct business in sparsely populated areas in the near future (technological force). Groundwater contamination will likely bring future government curbs on ag chemical usage (political-legal force).

The task environment consists of different groups that may directly impact the operations of the agribusiness in the short-run: customers, stockholders or member patrons, employees, competitors, creditors, special interest groups, trade associations, suppliers, governments, and communities. Conversely, the agribusiness also has a direct impact on these groups.

Gathering information on each of these groups is critical for the proper assessment of the firm's future task environment. In other words, the agribusiness manager needs to assess the future direction of each of these groups if he is to make an informed judgment on the direction of his firm.

Forecasting the future. Various methods are available for assessing information gathered on the societal and task environments. The agribusiness manager's objective at this point is to make an accurate forecast of future trends. Most of the top 1,000 U.S. corporations use multiple techniques for analyzing environmental information for emerging trends.

The most-frequently used methods, in order, are trend extrapolation, brainstorming, scenarios, and statistical modelling (Klein and Linneman, 1984). Perhaps trend extrapolation is the first step because it shows what would happen to the agribusiness if present trends continued into the future. However, using history alone to predict the future is naive because of the increasing volatility in our global environment. Thus, brainstorming and scenarios are legitimate follow-up exercises.

For instance, by using trend extrapolation, the agribusiness manager may forecast increasing isolation for farm families. Using traditional methods of delivering services, he may conclude that the costs exceed the benefits in serving sparsely populated areas. Yet, as a result of brainstorming and scenarios, the manager may find untapped opportunities for providing service via the computer, video monitor, or other emerging technology.

Opportunity or threat. Once a reasonable forecast of the external environment is achieved, the farm business manager can determine if any of the societal forces and/or task groups represent an opportunity or threat to the firm. An opportunity exists if an area or task group represents a potential niche for the firm, one that has not previously been explored. Most emerging environmental forces should be seen as opportunities, although changes in farm businesses may be necessary. Threats, on the other hand, usually show up among the task groups as potential adverse short-run impacts on the firm.

Once the opportunities and threats have been identified and the assumptions of future trends have been agreed upon, the farm business manager is equipped to prepare three scenarios of the future: a most likely scenario, a best-case, and a worst-case. This sets the parameters within which the agribusiness will respond. It also paves the way for conducting feasibility analyses in formulating a master strategy using the most likely scenario as well as two contingency plans based on the best- and worst-case scenarios.

Internal environment. As stated earlier, the mission statement of the firm involves an internal response to the external environment. The farm business manager must carefully and impartially assess the internal strengths and weaknesses of the enterprise. Perhaps the most common approach to this task involves dividing the firm's resources (labor, funds, and physical capital) into different functional areas: marketing, production or operations, finance or bookkeeping, research or testing, human resources, and systems or communications.

When this is done, the manager simply asks questions concerning each function until a list of attributes is compiled for each area mentioned above. Agribusiness firms with more than one product area may compile a functional list for each area. For instance, a farm supply cooperative that also operates a feed mill and sells bulk fuel might generate three functional lists, one for each of the firm's operations.

After the list is completed for each functional area, the farm business manager should indicate which of the attributes are strengths and which are definitely weaknesses that need correcting or adjusting.

When the external and internal environments of the firm have been examined, the farm business manager is ready to determine if there are strengths within the agribusiness that could be matched with emerging opportunities in the environment. The key object is to match internal strengths with external opportunities. Of course, the farm business manager must also ask if the threats can be avoided and the weaknesses corrected or minimized.

Question 3: The strategic question

Now, and only now, is the agribusiness manager prepared to address the third question of strategic planning, "Should we change our course?" If not, the farm business manager is reaffirming that the direction implied in the current mission statement is still valid for formulating long-range and short-range strategies. However, if emerging trends represent opportunities for the agribusiness (trends that are not currently addressed in the mission statement), the manager must exert necessary leadership to alter the direction of the firm.

Either way, the manager has now answered the overall question of strategic planning, "Where are we going?"

AFTER STRATEGIC PLANNING

At this point, the next obvious question is, "How will we get there?" This question is answered in the strategy formulation process which flows from strategic planning. Specifically, given the new or reaffirmed mission statement of the agribusiness, the farm business manager can begin to set long-run and short-run objectives for the different product or functional areas, such as production.

As soon as these objectives are set, the farm business manager determines a set of strategies designed to achieve the objectives and keep the agribusiness headed in the right direction. Feasibility analysis, as discussed in Chapter 21, is appropriate at this point. These objectives and strategies, often called the master plan, are developed using the most likely scenario discussed earlier. After the "master" strategic plan is developed, contingency plans may be created using the best- and worst-case scenarios.

SUMMARY

Strategic planning is the first step in the strategic management process for any agribusiness, large or small. Although the question asked appears simple ("Where are we going?"), the background analysis and assessment necessary for providing an answer can often be exhausting. Many agribusiness firms and farm operators gloss over this critical first step.

Through the strategic planning process, the agribusiness manager establishes the direction of the firm for the future. First, the current mission statement is reviewed. Then a thorough situational analysis is conducted. This analysis, often termed a strategic audit, includes an assessment of trends and factors in the external and internal environments of the business.

From this in-depth assessment, the farm business manager is able to create three scenarios of the future: a most likely case, a best-case, and a worst-case scenario. Once this point has been reached, the farmer or agribusiness manager is prepared either to reaffirm

Continued on p. 124

FEASIBILITY ANALYSIS: AN ESSENTIAL TOOL IN AGRICULTURAL AND RURAL REVITALIZATION EFFORTS

Thomas L. Dobbs

Rural America is looking for new employment and income generating opportunities.

This is particularly true in the Great Plains, where the economy remains heavily dependent upon agriculture. In a number of states, including South Dakota, much of the agricultural production is shipped out in raw form, with little in-state "value added" beyond the farm gate. Adding to the need for rural economic diversification has been the downturn in agricultural prices during the 1980s, with its associated "farm depression".

Attempts to diversify cover many fronts. Some are focused on increasing agricultural processing in rural states. Efforts in the alcohol fuels area during the late 1970s and early 1980s are illustrative. Other attempts have been focused on home-based businesses (craft production, bed-and-breakfast, specialized food preparation, accounting, house cleaning, and many other enterprises are examples). Specialty crop production also is receiving increased attention. Some farm families are devoting portions of their acreage to non-conventional crops that might offer higher returns. Likewise, non-conventional animal enterprises such as fish farming are being considered.

Regardless of the enterprise, it is critical that economic feasibility be carefully examined at the outset.

Many enterprises fail after substantial sums of money are spent. Often, though not always, an objective feasibility analysis at the beginning could have pointed to problems in advance. It is true that many events which determine economic success or failure with a new agricultural or rural enterprise cannot be predicted accurately. However, there are some events that can be foreseen or at least anticipated. They can be incorporated into economic feasibility analyses.

The general contents of economic feasibility analyses are outlined in this Chapter.[2] In some cases, individuals can conduct their own feasibility analyses. In others, where investments are large and complex, professional assistance may have to be employed.

Economic feasibility analyses contain the following components: (1)

Schmiesing ...

the current mission statement of the business or to change direction for the future. Either way, the farm business manager can be confident of the enterprise direction and preparation for future changes in the environment.

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cost estimates, (2) an examination of markets for the product or service, (3) an analysis of pricing possibilities, and (4) an examination of profit potential and breakeven points. These components are interrelated and cumulative.

For sound planning and for loan applications, these four components need to be incorporated into a business plan. The business plan contains the economic information on costs, markets, pricing, and estimated profits, along with related information on form of business organization and planned funding sources. It also includes the planned management structure.

ESTIMATING COSTS

Costs need to be separated into "fixed" and "variable" categories. Fixed costs are those associated with the initial investment and those that are on-going regardless of the amount of good or service produced. These are sometimes referred to as "overhead" or "sunk" costs. Variable costs are those that vary with the level of output of the business. They are often referred to as operating costs.

Initial estimates of each fixed and variable cost item must be made. How this is done depends on the type of enterprise under consideration, the particular cost item being estimated, information available, and staff and resources available to make estimates.

Information will often need to be obtained from various professions and disciplines (e.g., engineers, agronomists, economists) and from various types of sources (e.g., already operating enterprises of the same or similar type, published documents, manufacturers, and suppliers). We might settle for less detailed and accurate cost information in preliminary feasibility analyses than might be needed for final analyses upon which loan applications are based.

EXAMINING MARKETS

Many of the small scale enterprises being considered in rural America have quite specialized markets. Therefore, examining the market is more complex than simply assessing the local "going price" and assuming that we can sell an unlimited amount of the product from a new enterprise at that price.

Instead, a market examination process involving the following three general steps is needed: (1) identification of the trade area in which we might realistically expect to sell our product; (2) examination of the population, income, and consumer purchasing characteristics in the trade area; and (3) determination of present and potential competition for the new enterprise.

Special considerations enter into the examination of markets for different types of enterprises. For example, with fruits and vegetables, local markets can become saturated quickly when new enterprises become established and expand. Thus, determination of the marketing territory often involves study of how far the enterprise can reach into regional or national markets. Issues of preservation, storage, and transportation become critical.

To reach into regional or national markets requires cost, quality, or other advantages. For example, are there consumers in regional markets who will substitute our product--at the same price or even at a premium price--for that which they are presently consuming, because of real or perceived quality differences? Or, do we have production advantages, permitting us to undercut the competition on the basis of cost? Will transportation and storage costs be prohibitive as we reach into more distant regional and national markets? And, even if we do make inroads into more distant markets, are new competitors likely to soon emerge who will erode our market share? These are illustrative questions which enter into market examinations for different enterprises.

PRICING THE PRODUCT

Putting a meaningful price on the product or service we intend to sell requires information on both costs and markets. On the one hand, the price

must be sufficient to cover costs and return a reasonable profit. On the other hand, for the product or service to sell, the price must be competitive and be within economic reach of targeted customers.

The need to estimate fixed and variable costs of production was discussed earlier in this chapter. That cost information can be used in formulas for determining minimum practical selling prices. If the prospective business will not provide revenues sufficient to cover costs and meet reasonable profit objectives, it is better not to enter into the venture.

A common mistake of many prospective new businesspersons is failure to include the labor contributions of themselves and their family members as costs when determining selling prices. Even if there is not a direct cash outlay for that labor, the labor usually has some "opportunity cost". In other words, if the family does not become involved in the prospective business, one or more of the family members can often obtain employment paying at least the minimum wage. The "alternative" employment opportunities provide a basis for costing owner and family labor.

Having determined cost (and profit) based selling prices, we can then refer to the results of the examination of markets. Perhaps a lack of competition will make it possible to sell at prices higher than minimums determined by formulas. By making some market-derived judgments about how much product can be sold at various prices, we can derive data to estimate profits for different price-quantity combinations. It may make sense to raise the price above the minimum required level, even if sales are reduced some. The final answer depends on the magnitude of variable costs and the sensitivity of sales volume to prices.

In some cases, cost based formulas may give results that indicate we can not compete in the existing market. The analysis may show that the price we would have to charge to cover costs and provide a reasonable profit would be above that of already existing competitors. If so and unless there are ways of reducing costs below levels originally estimated, the business opportunity being considered has to be dropped.

FIGURING PROFITS AND BREAKEVEN POINTS

Information from the cost, market, and pricing analyses needs to be brought together in a profit and loss statement. Although businesses need to prepare profit and loss statements at the end of each tax year, estimated statements also need to be prepared in the feasibility analysis stage. In light of estimated costs, potential markets, and the planned pricing strategy, what are annual profits expected to be?

Even if initial estimates make the proposed business appear profitable, it is good to determine the breakeven sales volume. We need to know what would happen if we were not able to sell as much of the product as our market analysis has led us to expect. What would be the minimum sales volume (at a given product price) that would allow us to at least cover our costs? The following "breakeven point" formula can be used in answering that question:

$$\text{Breakeven point quantity (in units)} = \frac{\text{Total fixed costs}}{\text{Selling price per unit} - \text{Variable cost per unit}}$$

We again see the usefulness of breaking costs into fixed and variable categories.

Sensitivity analyses should be conducted with such formulas as this. For example, the effect of different selling prices on breakeven volume should be determined. Also, the effects of fixed and variable costs on breakeven volume can be estimated.

PUTTING TOGETHER A BUSINESS PLAN

A sound "business plan" is essential in any new enterprise, first and foremost, to help ensure successful operation. However, if borrowed capital is required, a business plan also is often necessary just to get the business "off the ground". Lenders normally want to see economic feasibility information, described in the previous sections of

this Chapter, brought together in a plan showing the proposed business's goals and how the goals are to be achieved. Formats vary for presentation and organization, but most business plans should contain: (1) the form of business organization to be used, (2) the market analysis, (3) financial statement projections, (4) sources of proposed financing, and (5) the management plan.

Form of business organization

In the business plan, the form of business organization we intend to use should be specified. Among the alternatives are sole proprietorships, general partnerships, family partnerships, limited partnerships, regular corporations, Subchapter S corporations, and cooperatives. Legal, tax, and personal preference considerations will influence the organizational form chosen. Financial and other considerations will also be critical.

Market analysis

Information from the market assessment and product pricing portions of the feasibility analysis must be included in the business plan. The geographic scope of the market, number of intended customers, income and buying habits of customers, magnitude and nature of the competition, and pricing strategy all should be described. In addition, the actual methods for advertising and marketing the product need to be spelled out. Both we, as potential businesspersons, and potential lenders need to have clear visions and understanding of how the product marketing is to be done. Many persons start small businesses with products for which they possess production knowledge. Too often, however, they have little experience with and have given insufficient attention to marketing the product. There is no chance for economic success if the produce is not effectively marketed! (For a more in-depth treatment of this point, see Chapter 20.)

Financial statements

Three types of financial statements need to be included in the business plan. They are (1) projected profit and loss statements, (2) cash flow projections, and (3) balance sheets. Difficult as it is, we must project what profits and losses are likely to be several years down the road. Since most businesses have a gradual build-up phase, it is highly desirable to project the profit and loss picture at the end of each of the first 3 to 5 years. Cash flows should also be projected for the first 3 to 5 years, and they should be broken down quarterly for the first year or two. These cash flow projections are critical in planning, providing for adequate operating funds, and assessing loan repayment prospects. Balance sheets--showing assets, liabilities, and net worth--will also be needed to apply for business financing. In addition to preparing the initial business and personal balance sheets, it is useful to project ahead one or several years with the business balance sheet. This projection provides yet another set of targets and plans, together with the profit and loss and the cash flow projections.

Sources of financing

Planned sources of equity and debt financing need to be identified in the business plan. Several types of financing should be considered. The forms of financing used, of course, depend in part on the form of business organization. Stocks, bonds, and bank loans are among the types of financing used by corporations, for example. Sole proprietorships and partnerships often draw on informal sources--such as borrowing from relatives and borrowing against life insurance policies--in addition to bank financing and other more conventional sources.

Management plan

The final component of the business plan to be discussed here is the management plan. A management plan is partly related to the form of business organization, but it also refers to the larger, overall management strategy. Goals, objectives, and tasks (procurement, personnel management, accounting, production, marketing) required to meet the goals and objectives are identified in the

management plan. An organizational structure (consistent with the form of business organization) is laid out which shows chains of command and delegations of responsibility for accomplishing the various tasks. Where authority rests for various decisions should be identified in the management plan. In a nutshell, the management plan shows how decisions will be made and how those decisions will be carried out in the various operational components of the business.

SUMMARY

Poor investments can often be avoided and the chances of succeeding with potentially good investments can be enhanced if sound feasibility analyses are undertaken. These analyses need to include cost estimates, market assessments, product pricing strategies, and forecasts of profits. Information from a feasibility analysis can be combined with business goals, organizational plans, and production and marketing plans to constitute the overall business plan. Feasibility analyses and resulting business plans are essential tools in agricultural and rural revitalization efforts.

FOOTNOTES

[1]The reviews and helpful suggestions on this chapter by Donald Taylor and Charles Lamberton are very much appreciated.

[2]More detailed treatment of this subject can be found in Dobbs (forthcoming).

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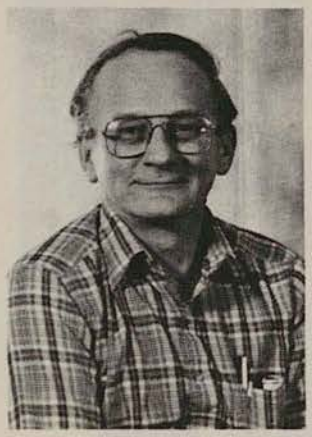

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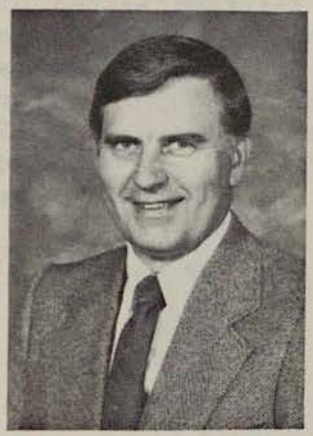

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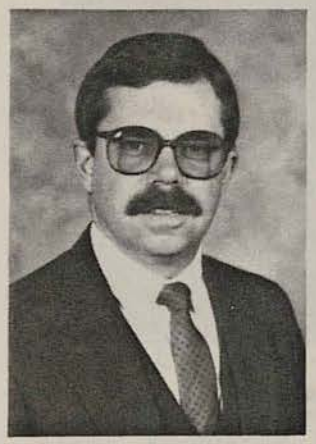

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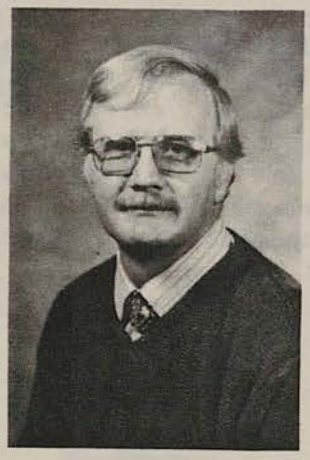

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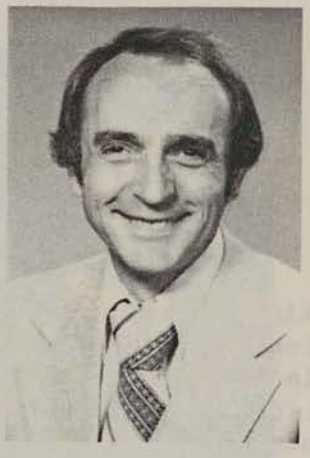

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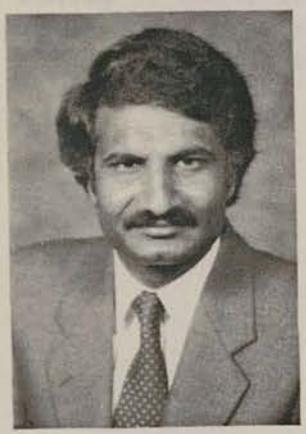

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