AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

**Agribusiness & Applied Economics 637** **October 2008**

# Changes in Agricultural Input Costs and Their Impact on Net Farm Income

**Richard D. Taylor and Won W. Koo**

**Center for Agricultural Policy and Trade Studies**
**Department of Agribusiness and Applied Economics**
**North Dakota State University**
**Fargo, North Dakota 58108-6050**

**ACKNOWLEDGMENTS**

The authors extend appreciation to Mr. Andrew Swenson and Mr. Dwight Aakre their constructive comments and suggestions. Special thanks go to Ms. Judy Normann, who helped to prepare the manuscript.

This manuscript is prepared for Senator Byron Dorgan.

The analysis and views reported in this paper are those of the author(s). They are not necessarily endorsed by the Department of Agribusiness and Applied Economics or by North Dakota State University.

North Dakota State University is committed to the policy that all persons shall have equal access to its programs, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.

This publication is available electronically at this web site: http://agecon.lib.umn.edu/. Please address your inquiries regarding this publication to: Center for Agricultural Policy and Trade Studies, NDSU Dept. 7610, Agribusiness & Applied Economics, P.O. Box 6050, Fargo, ND, 58108-6050, Ph. 701-231-7334, Fax 701-231-7400, e-mail ndsu.capts@ndsu.edu.

Copyright © 2008 by Richard D. Taylor and Won W. Koo. All rights reserved. Readers may make verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

## TABLE OF CONTENTS

Page

List of Tables ..... i

List of Figures ..... ii

Abstract ..... iii

Highlights ..... iv

Introduction ..... 1

Changes in Production Costs and Net Returns ..... 2

Production Costs ..... 2

Gross Returns ..... 9

Net Returns ..... 11

Summary ..... 14

References ..... 15

## LIST OF TABLES


| No. | | Page |
|---|---|---|
| 1 | Production Costs for the Red River Valley, 2004-2007 Historical and 2008-2010 Projected | 3 |
| 2 | Production Costs for the North Central Region, 2004-2007 Historical and 2008-2010 Projected | 4 |
| 3 | Production Costs for the South Central Region, 2004-2007 Historical and 2008-2010 Projected | 5 |
| 4 | Production Costs for the West Region, 2004-2007 Historical and 2008-2010 Projected | 6 |
| 5 | Gross Returns for Wheat in the Four Regions, 2004-2010 | 10 |
| 6 | Gross Returns for Soybeans and Cow-calf in the Four Regions, 2004-2010 | 10 |
| 7 | Gross Returns for Corn in the Four Regions, 2004-2010 | 11 |
| 8 | Net Returns for Wheat, Soybeans, Corn, and Cow-calf, 2004-2010 | 14 |

## LIST OF FIGURES


| No. | | Page |
|---|---|---|
| 1 | Actual and Projected Per Acre Production Costs for the Red River Valley Region of North Dakota | 7 |
| 2 | Actual and Projected Per Acre Production Costs for the North Central Region of North Dakota | 7 |
| 3 | Actual and Projected Per Acre Production Costs for the South Central Region of North Dakota | 8 |
| 4 | Actual and Projected Per Acre Production Costs for the West Central Region of North Dakota | 9 |
| 5 | Actual and Projected Per Acre Cow-calf Production Costs for the West Central Region of North Dakota | 9 |
| 6 | Actual and Projected Per Acre Net Returns for the Red River Valley Region of North Dakota | 12 |
| 7 | Actual and Projected Per Acre Net Returns for the North Central Region of North Dakota | 12 |
| 8 | Actual and Projected Per Acre Net Returns for the South Central Region of North Dakota | 13 |
| 9 | Actual and Projected Per Acre or Per Head Net Returns for the West Region of North Dakota | 13 |

## ABSTRACT

The recent rapid increase in commodity prices is not an unique event. It has happened several times in the past. Commodity prices have always dropped, returning to a more normal level. Production costs, on the other hand, follow commodity prices up but do not follow them down. Net farm income has increased rapidly in most commodity sectors of agriculture. However, production costs have increased substantially during the past few years. Those cost increases will reduce net farm incomes in the future if commodity prices do not continue to increase.



***Keywords:*** net farm income, production costs, gross income.

## HIGHLIGHTS

During the past 100 years, agriculture has experienced several periods of rapid commodity price increases. Each one was followed by a period of financial distress as producers struggle to cover higher production costs brought on, in part by those higher prices. The current high prices may follow a similar pattern. This time things may be different as the increase in prices are caused by the growth in demand from the ethanol industry. That demand should continue as long as energy prices remain high and current governmental policies remain in place.

Gross returns for most crops have increased substantially in recent years to $300 to $400 per acre. Those returns provide for increased net farm income to levels which have not experienced in the past 25 years. However, since 2004 production costs have increased between 50% and 60%. Increasing production costs are tolerable if gross returns are increasing fast enough to cover the additional costs. In 2008, most costs increased 15% to 25%, with fertilizer, chemicals, and seed costs increasing over 70%.

If production costs continue in increase, future returns will be lower than in 2007-2008. As long as commodity prices remain near current levels, net farm income will remain high for several years in the future. However, if commodity prices fall, producers will be faced with very high costs and narrow operating margins very quickly. By 2010, breakeven prices for wheat, soybeans, and corn could be $6.20, $8.00 and $3.60, respectively.

# Changes in Agricultural Input Costs and Their Impact on Net Farm Income

**Richard D. Taylor and Won W. Koo***

## INTRODUCTION

The recent increases in prices of agricultural commodities are viewed, in the popular press, as an event that has never occurred before, but history tells a different story. In the early part of the 20th century, agricultural prices increased dramatically due to a rapid increase in demand caused by immigration and high income growth due to the industrialization of the United States. Production did not respond until World War I. Immediately after the war, excess U.S. production was exported to Europe to replace food production destroyed by the war. In 1922-23 supply out-paced demand and prices collapsed. A more recent boom in agriculture was caused by World War II. Coming out of the Great Depression, agriculture responded quickly to higher prices caused by the war. After the war, prices did not fall as quickly as before but substantial federal aid was provided to the agricultural sector to prevent similar financial distress.

The most recent boom was caused by the Russian grain deal of 1973. Prices increased from $1.76 per bushel for wheat in 1972 to $3.95 per bushel in 1973. Most other commodities followed. North Dakota net farm income increased from $609 million in 1972 to $1.54 billion in 1973. During that time, just like today, energy prices were increasing rapidly. Fuel prices increased 111% between 1973 and 1976, and fertilizer prices increased 118%. Total farm production expenses increased 67% between 1973 and 1976. Decreased commodity prices in late 1976 combined with high production expenses reduced net farm income in North Dakota to $184 million in 1976 or only 11% of the 1973 income level. Production expenses did not drop until 1983, when land, which was selling for an average of $108/acre in North Dakota in 1973, was selling for an average of $436/acre in 1983. The financial crises in agriculture reached much further than just the production sector of agriculture. Many rural banks found themselves in financial distress along with the entire Federal Farm Credit System.

The current boom has many similarities and a few differences when compared with the previous ones. A sudden increase in demand has resulted in a rapid increase in prices, which are followed quickly by rising production costs. The difference is that this increase in demand seems to be longer term based on ethanol production from corn. In addition to the increase in demand for corn, world wheat production has been below average due to crop difficulties in various countries. These production shortfalls have reduced carry-over stocks to historically low levels which have caused volatile prices.

---

*Research Scientist and Distinguished Professor of Agribusiness and Applied Economics and Director, respectively, in the Center for Agricultural Policy and Trade Studies at North Dakota State University, Fargo.

Since 2004, North Dakota wheat prices have increased 88%, while corn and soybean prices have increased 72% and 92%, respectively. A one year price increase, from 2006 to 2007, of 68% for wheat, 83% for corn, and 65% for soybeans triggered the current boom. Prices are expected to increase further in 2008 by 12% for wheat, 25% for corn and 38% for soybeans.

These increases in prices along with higher energy costs have raised production costs substantially between 2004 and 2008. Fertilizer costs have increased 120%, fuel and oil costs have increased 76%, and total production costs have increased 56%. In Agricultural Policy Brief, Number 19, published by the Center for Agricultural Policy and Trade Studies analyzed the state wide impacts of higher commodity prices and higher production expenses. This study divides the state into four regions; the Red River Valley (RRV), the North Central (NC), the South Central (SC), and the West (2008 North Dakota Agricultural Outlook: Representative Farms, 2008-2017). In addition to the four regions, three different crops and a livestock enterprise are examined to determine production costs, gross returns, and net returns for the crops and livestock enterprise. Wheat, corn, and soybeans are included in the RRV, NC, and SC regions while wheat, corn and a cow-calf operation are included in the West Region.

## CHANGES IN PRODUCTION COSTS AND NET RETURNS

### Production Costs

Tables 1-4 show the production costs for the RRV, NC, SC and West regions of the state from 2004 through 2010. Years 2004-2007 are actual data and years 2008-2010 are projections based on the North Dakota Representative Farm Model operational at the Center for Agricultural Policy and Trade Studies (CAPTS). Total production cost for the RRV has increased 50%, 50%, and 61% between 2004 and 2008 for wheat, soybeans and corn, respectively. They are expected to increase an additional 12% for wheat, 12% for soybeans and 8% for corn by 2010.

Seed costs have increased 120%, 90% and 93% for wheat, soybeans, and corn, respectively, for the 2004-2008 period. Fertilizer cost has increased for wheat and corn, while remaining level for soybeans. Interest cost has increased 79%, 76%, and 82%, respectively, for wheat, soybeans and corn for the 2004-2008 period. Most other expenses have increased somewhere between 25% and 50% for the 2004-2008 time period. Land rent has increased 23% between 2004 and 2008. They are projected to increase 21% between 2008 and 2010. The reported land costs and average cost reported by producers. They are substantially less than new land rent contracts.

Table 1. Production Costs for the Red River Valley, 2004-2007 Historical and 2008-2010 Projected

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2004-2008 |
|---|---|---|---|---|---|---|---|---|
| Wheat | ----------dollars/acre---------- | | | | | | | % |
| Seed | 12.07 | 12.53 | 12.87 | 16.02 | 26.43 | 21.94 | 23.03 | 1.19 |
| Fertilizer | 35.06 | 41.89 | 45.28 | 48.33 | 77.32 | 72.49 | 69.81 | 1.21 |
| Chemicals | 22.88 | 20.61 | 18.44 | 24.93 | 30.46 | 37.16 | 40.88 | 0.33 |
| Fuel & oil | 9.08 | 11.12 | 12.61 | 12.78 | 13.93 | 16.71 | 17.55 | 0.53 |
| Repairs | 12.91 | 12.90 | 12.59 | 14.17 | 16.36 | 18.82 | 21.64 | 0.27 |
| Land Rent | 61.27 | 62.30 | 66.30 | 67.84 | 75.26 | 82.78 | 91.06 | 0.23 |
| Insurance | 15.12 | 14.35 | 14.82 | 17.08 | 20.54 | 24.65 | 27.12 | 0.36 |
| Interest | 5.14 | 6.67 | 9.01 | 8.41 | 9.18 | 10.01 | 10.91 | 0.79 |
| Labor | 11.50 | 11.22 | 10.77 | 13.07 | 13.68 | 14.32 | 14.99 | 0.19 |
| Mach depr | 11.04 | 10.49 | 10.88 | 12.28 | 12.89 | 13.54 | 14.22 | 0.17 |
| Other | 8.47 | 9.04 | 9.25 | 10.16 | 10.70 | 11.25 | 11.85 | 0.26 |
| Total | 204.54 | 213.12 | 222.82 | 245.07 | 306.75 | 323.67 | 343.05 | 0.50 |
| Soybeans | | | | | | | | |
| Seed | 30.54 | 34.44 | 35.16 | 38.75 | 58.13 | 55.06 | 56.71 | 0.90 |
| Fertilizer | 5.89 | 4.35 | 3.50 | 3.59 | 5.92 | 4.94 | 5.19 | 0.01 |
| Chemicals | 14.15 | 14.05 | 16.29 | 13.15 | 27.62 | 25.63 | 23.59 | 0.95 |
| Fuel & oil | 13.62 | 11.71 | 13.63 | 14.21 | 15.49 | 18.58 | 19.51 | 0.14 |
| Repairs | 11.90 | 14.56 | 14.04 | 15.89 | 18.35 | 21.10 | 24.26 | 0.54 |
| Land Rent | 61.24 | 63.46 | 66.77 | 67.96 | 75.39 | 82.93 | 91.22 | 0.23 |
| Insurance | 17.33 | 16.20 | 16.59 | 18.51 | 22.26 | 26.72 | 29.39 | 0.28 |
| Interest | 5.85 | 7.01 | 9.39 | 9.45 | 10.32 | 11.25 | 12.26 | 0.76 |
| Labor | 8.27 | 11.34 | 10.31 | 11.03 | 11.53 | 12.06 | 12.61 | 0.39 |
| Mach depr | 12.01 | 11.41 | 11.37 | 12.85 | 13.49 | 14.17 | 14.88 | 0.12 |
| Other | 9.13 | 8.94 | 11.01 | 9.99 | 10.53 | 11.09 | 11.69 | 0.15 |
| Total | 179.93 | 197.47 | 208.06 | 215.38 | 269.03 | 283.52 | 301.31 | 0.50 |
| Corn | | | | | | | | |
| Seed | 40.65 | 42.12 | 45.79 | 52.18 | 78.27 | 77.53 | 76.20 | 0.93 |
| Fertilizer | 47.75 | 55.56 | 61.71 | 68.34 | 109.34 | 101.59 | 98.53 | 1.29 |
| Chemicals | 20.33 | 19.61 | 16.74 | 17.49 | 36.73 | 34.56 | 32.35 | 0.81 |
| Fuel & oil | 27.92 | 28.45 | 28.76 | 30.06 | 33.22 | 39.43 | 41.40 | 0.19 |
| Repairs | 21.21 | 22.27 | 23.25 | 25.84 | 29.84 | 34.31 | 39.46 | 0.41 |
| Land Rent | 62.97 | 66.56 | 71.31 | 72.70 | 80.65 | 88.71 | 97.59 | 0.28 |
| Insurance | 18.43 | 15.09 | 18.95 | 28.74 | 34.57 | 41.48 | 45.63 | 0.88 |
| Interest | 9.34 | 9.73 | 14.62 | 15.59 | 17.02 | 18.55 | 20.22 | 0.82 |
| Labor | 15.21 | 18.52 | 14.59 | 16.34 | 17.07 | 17.83 | 18.72 | 0.12 |
| Mach depr | 17.14 | 14.63 | 15.20 | 20.20 | 21.21 | 22.27 | 23.38 | 0.24 |
| Other | 12.30 | 13.83 | 22.28 | 14.42 | 15.20 | 16.02 | 16.71 | 0.24 |
| Total | 293.25 | 306.37 | 333.20 | 361.90 | 473.12 | 492.29 | 510.20 | 0.61 |

Table 2. Production Costs for the North Central Region, 2004-2007 Historical and 2008-2010 Projected

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2004-2008 |
|---|---|---|---|---|---|---|---|---|
| Wheat | ----------dollars/acre---------- | | | | | | | % |
| Seed | 8.89 | 9.30 | 9.21 | 11.29 | 18.63 | 16.97 | 17.81 | 1.10 |
| Fertilizer | 21.36 | 24.02 | 25.56 | 27.97 | 44.75 | 40.48 | 38.25 | 1.10 |
| Chemicals | 16.22 | 18.84 | 16.07 | 22.83 | 27.89 | 34.03 | 37.43 | 0.72 |
| Fuel & oil | 8.61 | 9.91 | 11.63 | 11.92 | 12.99 | 15.59 | 16.37 | 0.51 |
| Repairs | 12.25 | 10.32 | 10.72 | 13.06 | 15.08 | 17.34 | 19.94 | 0.23 |
| Land Rent | 31.24 | 31.28 | 32.57 | 33.28 | 36.92 | 40.61 | 44.67 | 0.18 |
| Insurance | 9.64 | 10.37 | 11.69 | 13.36 | 16.07 | 19.28 | 21.21 | 0.67 |
| Interest | 4.15 | 5.71 | 7.11 | 7.46 | 8.15 | 8.88 | 9.68 | 0.96 |
| Labor | 4.95 | 6.15 | 4.55 | 5.70 | 6.16 | 6.47 | 6.79 | 0.24 |
| Mach depr | 8.99 | 7.43 | 8.48 | 8.21 | 8.62 | 9.05 | 9.50 | -0.04 |
| Other | 4.98 | 5.01 | 5.83 | 6.16 | 6.75 | 7.02 | 7.30 | 0.36 |
| Total | 131.28 | 138.34 | 143.42 | 161.24 | 202.01 | 215.71 | 228.96 | 0.54 |
| Soybeans | | | | | | | | |
| Seed | 29.29 | 35.52 | 38.15 | 41.60 | 62.40 | 59.43 | 58.64 | 1.13 |
| Fertilizer | 8.91 | 6.57 | 5.02 | 2.94 | 4.70 | 4.58 | 4.69 | -0.47 |
| Chemicals | 11.52 | 10.00 | 9.61 | 12.94 | 27.17 | 25.43 | 23.24 | 1.36 |
| Fuel & oil | 10.09 | 11.79 | 13.56 | 14.13 | 15.40 | 18.48 | 19.41 | 0.53 |
| Repairs | 13.37 | 12.39 | 12.32 | 15.92 | 18.39 | 21.15 | 24.32 | 0.38 |
| Land Rent | 30.12 | 29.79 | 32.63 | 32.08 | 35.58 | 39.13 | 43.05 | 0.18 |
| Insurance | 11.45 | 10.03 | 10.28 | 13.11 | 15.77 | 18.93 | 20.05 | 0.38 |
| Interest | 5.91 | 6.35 | 8.43 | 7.70 | 8.41 | 9.17 | 9.99 | 0.42 |
| Labor | 5.49 | 4.54 | 6.24 | 4.00 | 4.20 | 4.41 | 4.63 | -0.23 |
| Mach depr | 13.06 | 9.78 | 10.11 | 11.98 | 12.58 | 13.21 | 13.87 | -0.04 |
| Other | 5.07 | 6.42 | 5.81 | 5.38 | 6.04 | 6.28 | 6.52 | 0.19 |
| Total | 144.28 | 143.18 | 152.16 | 161.78 | 210.64 | 220.19 | 229.17 | 0.46 |
| Corn | | | | | | | | |
| Seed | 33.31 | 32.97 | 36.83 | 41.11 | 61.67 | 60.21 | 59.52 | 0.85 |
| Fertilizer | 29.68 | 30.28 | 34.90 | 33.37 | 53.39 | 50.61 | 49.16 | 0.80 |
| Chemicals | 8.56 | 9.94 | 9.48 | 12.28 | 25.79 | 24.82 | 23.93 | 2.01 |
| Fuel & oil | 10.08 | 19.84 | 14.74 | 17.10 | 18.60 | 22.25 | 23.34 | 0.85 |
| Repairs | 13.81 | 16.74 | 12.75 | 17.84 | 20.61 | 23.70 | 27.25 | 0.49 |
| Land Rent | 32.60 | 32.74 | 31.15 | 31.57 | 35.01 | 38.51 | 42.36 | 0.07 |
| Insurance | 10.88 | 10.73 | 12.37 | 23.84 | 28.68 | 34.42 | 37.86 | 1.64 |
| Interest | 5.27 | 8.42 | 9.03 | 10.30 | 11.25 | 16.36 | 25.63 | 1.13 |
| Labor | 10.53 | 7.45 | 12.65 | 11.64 | 12.67 | 13.31 | 13.97 | 0.20 |
| Mach depr | 12.86 | 11.39 | 7.73 | 8.77 | 9.21 | 9.67 | 10.15 | -0.28 |
| Other | 5.18 | 3.57 | 7.01 | 6.91 | 7.30 | 7.62 | 7.96 | 0.41 |
| Total | 172.76 | 184.07 | 188.64 | 214.73 | 284.18 | 301.48 | 321.14 | 0.64 |

Table 3. Production Costs for the South Central Region, 2004-2007 Historical and 2008-2010 Projected

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2004-2008 |
|---|---|---|---|---|---|---|---|---|
| Wheat | ----------dollars/acre---------- | | | | | | | % |
| Seed | 10.24 | 10.70 | 10.65 | 11.39 | 18.79 | 16.98 | 17.23 | 0.88 |
| Fertilizer | 25.15 | 27.61 | 32.20 | 33.86 | 54.18 | 50.67 | 48.89 | 1.15 |
| Chemicals | 21.09 | 21.34 | 20.07 | 26.84 | 32.80 | 40.01 | 44.02 | 0.56 |
| Fuel & oil | 8.10 | 9.80 | 10.58 | 12.01 | 13.09 | 15.71 | 16.49 | 0.62 |
| Repairs | 8.55 | 9.01 | 9.90 | 11.09 | 12.81 | 14.73 | 16.94 | 0.50 |
| Land Rent | 31.05 | 32.31 | 34.04 | 35.53 | 39.40 | 43.34 | 47.68 | 0.27 |
| Insurance | 9.46 | 10.57 | 10.36 | 14.11 | 16.97 | 20.37 | 22.41 | 0.79 |
| Interest | 4.41 | 4.28 | 6.42 | 8.00 | 8.74 | 9.52 | 10.38 | 0.98 |
| Labor | 8.10 | 9.07 | 6.87 | 8.38 | 8.80 | 9.24 | 9.70 | 0.09 |
| Mach depr | 12.00 | 13.05 | 12.51 | 13.24 | 13.90 | 14.60 | 15.33 | 0.16 |
| Other | 6.32 | 8.36 | 7.06 | 9.34 | 9.80 | 10.15 | 10.53 | 0.55 |
| Total | 144.47 | 156.10 | 160.66 | 183.79 | 229.28 | 245.33 | 259.59 | 0.59 |
| Soybeans | | | | | | | | |
| Seed | 27.89 | 33.12 | 36.27 | 36.84 | 55.26 | 54.21 | 53.10 | 0.98 |
| Fertilizer | 9.14 | 9.08 | 8.34 | 5.14 | 8.22 | 8.02 | 7.95 | -0.10 |
| Chemicals | 14.07 | 12.83 | 13.88 | 13.21 | 27.74 | 25.82 | 23.10 | 0.97 |
| Fuel & oil | 7.57 | 10.46 | 11.13 | 13.46 | 14.67 | 17.61 | 18.49 | 0.94 |
| Repairs | 9.40 | 10.69 | 11.50 | 14.07 | 16.25 | 18.69 | 21.49 | 0.73 |
| Land Rent | 34.23 | 35.67 | 38.48 | 39.50 | 43.81 | 48.19 | 53.00 | 0.28 |
| Insurance | 11.45 | 12.09 | 13.06 | 16.68 | 20.07 | 23.31 | 25.29 | 0.75 |
| Interest | 4.85 | 5.05 | 6.91 | 22.26 | 24.31 | 26.50 | 28.88 | 4.01 |
| Labor | 9.49 | 8.83 | 10.74 | 9.44 | 10.76 | 11.29 | 11.86 | 0.13 |
| Mach depr | 13.61 | 14.28 | 12.06 | 14.77 | 15.51 | 16.28 | 17.10 | 0.14 |
| Other | 6.82 | 8.62 | 7.07 | 13.57 | 14.13 | 14.71 | 15.30 | 1.07 |
| Total | 148.52 | 160.72 | 169.44 | 198.94 | 250.72 | 264.62 | 275.57 | 0.69 |
| Corn | | | | | | | | |
| Seed | 38.48 | 41.13 | 41.43 | 47.08 | 70.65 | 68.95 | 67.21 | 0.84 |
| Fertilizer | 39.74 | 43.24 | 39.54 | 47.48 | 75.97 | 72.82 | 69.42 | 0.91 |
| Chemicals | 19.81 | 18.06 | 15.19 | 15.60 | 32.76 | 30.72 | 29.81 | 0.65 |
| Fuel & oil | 11.83 | 20.61 | 16.64 | 21.13 | 23.37 | 28.05 | 29.45 | 0.98 |
| Repairs | 12.30 | 16.44 | 15.28 | 19.41 | 22.42 | 25.78 | 29.65 | 0.82 |
| Land Rent | 35.67 | 37.35 | 38.95 | 38.07 | 42.22 | 46.44 | 51.09 | 0.18 |
| Insurance | 13.08 | 13.63 | 14.80 | 21.37 | 25.71 | 30.85 | 33.93 | 0.97 |
| Interest | 7.11 | 8.61 | 9.69 | 12.43 | 13.57 | 14.80 | 16.13 | 0.91 |
| Labor | 10.03 | 11.36 | 13.50 | 13.18 | 13.59 | 14.27 | 14.98 | 0.36 |
| Mach depr | 17.22 | 20.63 | 15.92 | 17.89 | 18.78 | 19.72 | 20.71 | 0.09 |
| Other | 6.57 | 10.20 | 10.33 | 11.55 | 12.82 | 13.36 | 13.93 | 0.95 |
| Total | 211.84 | 241.26 | 231.27 | 265.19 | 351.85 | 365.77 | 376.31 | 0.66 |

Table 4. Production Costs for the West Region, 2004-2007 Historical and 2008-2010 Projected

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2004-2008 |
|---|---|---|---|---|---|---|---|---|
| Wheat | ----------dollars/acre---------- | | | | | | | % |
| Seed | 7.94 | 8.86 | 8.90 | 9.46 | 15.61 | 14.10 | 14.32 | 0.97 |
| Fertilizer | 19.22 | 21.55 | 27.34 | 27.91 | 44.66 | 39.92 | 37.42 | 1.32 |
| Chemicals | 12.95 | 16.27 | 15.69 | 21.50 | 26.27 | 32.05 | 35.26 | 1.03 |
| Fuel & oil | 6.39 | 7.82 | 7.62 | 18.57 | 11.43 | 12.62 | 12.99 | 0.79 |
| Repairs | 8.32 | 9.94 | 7.67 | 4.88 | 5.64 | 6.48 | 7.45 | -0.32 |
| Land Rent | 23.69 | 24.60 | 26.06 | 25.54 | 28.32 | 31.16 | 34.27 | 0.20 |
| Insurance | 7.20 | 9.27 | 7.41 | 10.55 | 12.69 | 15.23 | 16.75 | 0.76 |
| Interest | 5.42 | 7.25 | 8.60 | 7.68 | 8.39 | 8.81 | 9.27 | 0.55 |
| Labor | 5.97 | 9.56 | 4.78 | 2.96 | 3.11 | 3.26 | 3.43 | -0.48 |
| Mach depr | 7.37 | 7.76 | 7.63 | 7.40 | 7.77 | 8.16 | 8.57 | 0.05 |
| Other | 4.36 | 4.97 | 3.84 | 4.24 | 4.50 | 4.65 | 4.80 | 0.03 |
| Total | 108.84 | 127.85 | 125.54 | 140.69 | 176.40 | 185.35 | 193.70 | 0.62 |
| Corn | | | | | | | | |
| Seed | NA | 27.55 | 29.86 | 32.85 | 48.21 | 47.03 | 45.82 | 0.75 |
| Fertilizer | NA | 17.07 | 24.08 | 28.04 | 44.86 | 42.43 | 40.86 | 1.63 |
| Chemicals | NA | 16.44 | 7.24 | 14.83 | 31.14 | 29.86 | 27.53 | 0.89 |
| Fuel & oil | NA | 10.13 | 8.11 | 11.19 | 12.20 | 14.64 | 15.37 | 0.20 |
| Repairs | NA | 10.78 | 7.57 | 15.13 | 17.48 | 20.10 | 23.11 | 0.62 |
| Land Rent | NA | 23.05 | 24.05 | 26.59 | 29.49 | 32.44 | 35.68 | 0.28 |
| Insurance | NA | 6.63 | 12.38 | 10.52 | 12.66 | 15.19 | 16.71 | 0.91 |
| Interest | NA | 6.56 | 9.75 | 11.48 | 12.54 | 13.66 | 14.89 | 0.91 |
| Labor | NA | 12.76 | 10.83 | 9.10 | 9.56 | 10.03 | 10.53 | -0.25 |
| Mach depr | NA | 7.59 | 6.55 | 10.89 | 11.43 | 12.01 | 12.61 | 0.51 |
| Other | NA | 3.78 | 8.13 | 6.91 | 7.18 | 7.44 | 7.72 | 0.90 |
| Total | NA | 142.34 | 148.55 | 177.53 | 236.73 | 244.82 | 250.83 | 0.66 |
| Cow-calf | | | | | | | | |
| Hay | 113.94 | 109.92 | 123.25 | 129.75 | 136.24 | 143.05 | 150.20 | 0.24 |
| Silage | 6.28 | 10.34 | 9.55 | 7.02 | 7.72 | 8.49 | 8.92 | -0.25 |
| Pasture | 98.71 | 105.35 | 106.55 | 121.12 | 134.32 | 147.75 | 155.14 | 0.28 |
| Supp & Vet | 45.39 | 48.60 | 56.25 | 47.41 | 51.13 | 55.17 | 58.29 | 0.05 |
| Fuel & Oil | 15.13 | 19.65 | 24.28 | 26.32 | 28.69 | 34.43 | 36.15 | 0.46 |
| Repairs | 28.69 | 32.61 | 30.33 | 32.70 | 36.71 | 41.52 | 47.01 | 0.13 |
| Interest | 8.17 | 4.56 | 7.75 | 4.86 | 5.10 | 5.36 | 5.63 | 0.12 |
| Labor | 14.04 | 15.36 | 31.94 | 26.38 | 28.81 | 31.40 | 34.23 | 0.88 |
| Other | 43.93 | 48.00 | 55.01 | 49.60 | 52.78 | 56.24 | 59.17 | 0.10 |
| Total | 374.28 | 394.39 | 444.91 | 445.16 | 481.50 | 523.41 | 554.73 | 0.29 |

Total costs in the Red River Valley (RRV) are expected to increase through 2010 (Figure 1). Total production costs in 2010 could be 12%, 12%, and 8% greater than 2008, for wheat, soybeans and corn, respectively, in the region. In 2010 the breakeven price for the commodities, assuming average yields, is $6.13 for wheat, $8.45 for soybeans and $3.57 for corn in the RRV.

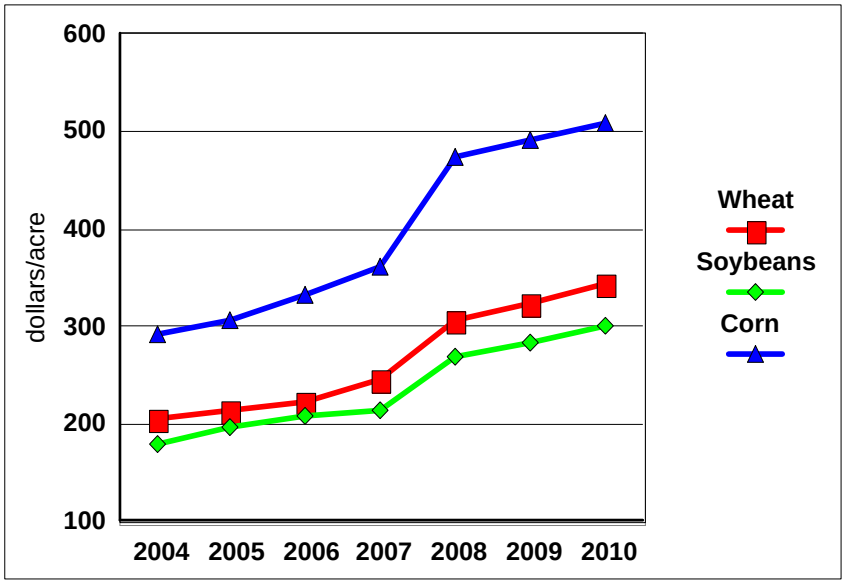


Figure 1. Actual and Projected Per Acre Production Costs for the Red River Valley Region of North Dakota

Total production costs for the NC region have increased 54%, from $131 per acre in 2004 to $202 per acre in 2008, for wheat (Figure 2). The cost has increased 46% for soybeans and 64% for corn for the 2004-2008 period. Fertilizer costs have increased 110% for wheat and 80% for corn during that time period. Fuel costs have increased 51% for wheat, 53% for soybeans and 85% for corn. A large portion of the increased fuel cost is due to drying costs in 2006 and 2007, which are projected into 2008. Other costs, such as chemicals, seed, repairs, and insurance have increased substantially since 2004. Production costs are expected to increase through 2010, an additional 13% for wheat, 9% for soybeans and 13% for corn. The breakeven price for wheat in 2010 will be $5.74 per bushel compared to $3.04 per bushel in 2004 and $4.76 per bushel in 2008. The breakeven price for soybeans will be $7.33 per bushel in 2010 compared to $6.38 per bushel in 2008 and those for corn will be $3.45 per bushel in 2010 compared to $2.86 per bushel in 2008.

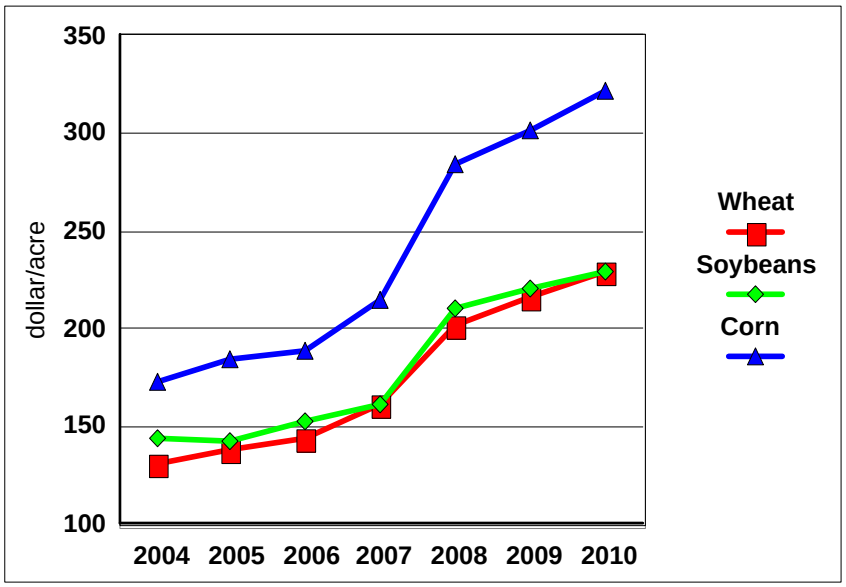


Figure 2. Actual and Projected Per Acre Production Costs for the North Central Region of North Dakota

Total production cost for wheat in the SC region has increased 59% from $144 per acre in 2004 to $229 per acre in 2008 (Table 3). Soybean and corn production costs have increased 69% and 66%, respectively, during the same time period. Fertilizer costs increased 115% for wheat, 91% for corn, between 2004 and 2008, while fuel and oil costs increased 62%, 94%, and 98% for wheat, soybeans, and corn, respectively. Most other costs have increased between 25% and 80% for that same time period. Production costs are expected to increase through 2010 (Figure 3). Production costs for wheat could be 13% higher in 2010 than in 2008, while soybeans and corn production costs could be 10% and 7% greater, respectively. The breakeven price for wheat was $2.81 per bushel in 2004, $4.49 per bushel in 2008 and near $5.30 per bushel in 2010. The breakeven price for soybeans was $6.47 per bushel in 2004, increasing to $7.18 per bushel in 2008 and $8.47 per bushel in 2010. The breakeven price for corn was $3.33 per bushel in 2004. The SC region had a poor corn crop in 2004 which increased the breakeven price. In 2008 the breakeven price for corn will be $2.83 per bushel and $3.38 per bushel in 2010.

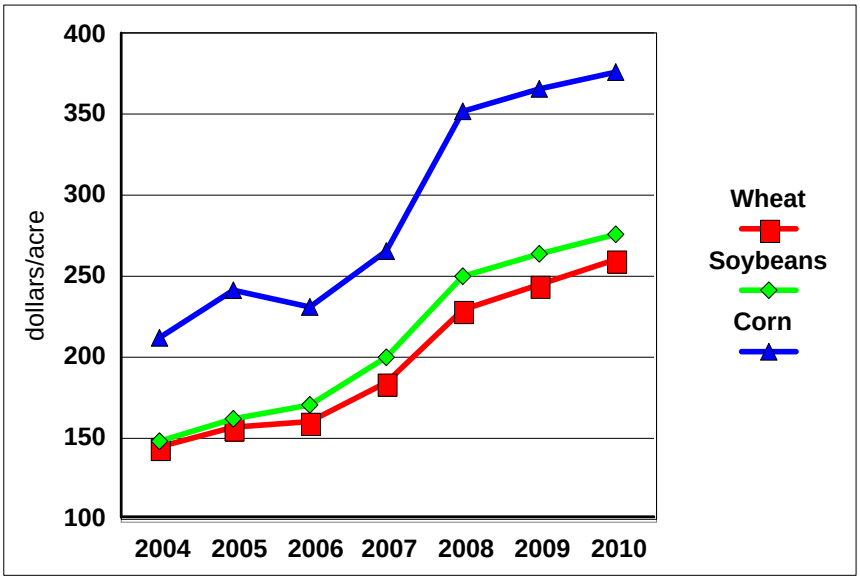


Figure 3. Actual and Projected Per Acre Production Costs for the South Central Region of North Dakota

Total production costs have increased 62% for wheat between 2004 and 2008 in the West region (Table 4). Production costs increased 66% for corn for the 2005-2008 period. The West region did not report corn and soybean production in 2004. The major livestock enterprise is cow-calf production. Production cost has increased 29% between 2004 and 2008. Fertilizer costs have increased 132% for wheat and 163% for corn between 2004 and 2008, while fuel costs have increased 79% for wheat and 20% for corn. Most other costs have increased between 25% and 60% during the same time period. Total costs are expected to increase through 2010 (Figure 4). Production costs for wheat and corn are projected to be 10% higher in 2010 than in 2008. Breakeven price for wheat was $4.17 per bushel in 2004, $5.89 per bushel in 2008 and $7.20 per bushel in 2010. The breakeven price for corn was $2.03 per bushel in 2004, $3.06 per bushel in 2008, and $3.58 per bushel in 2010. Production costs for the cow-calf enterprise increased 29% for the 2004-2008 period. Production costs for fuel, pasture, and hay increased 46%, 28%, and 24%, respectively, for the 2004-2008 period. Production costs are expected to increase, 15%, through 2010 (Figure 5). The breakeven price for cow-calf production was $70 per cwt in 2004, increasing to $86 per cwt in 2008 and $99 per cwt in 2010.

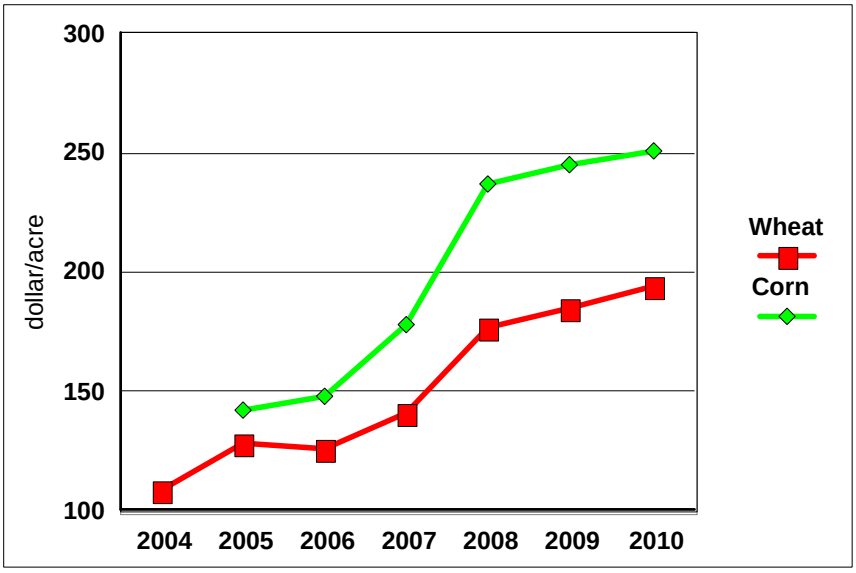


Figure 4. Actual and Projected Per Acre Production Costs for the West Region of North Dakota

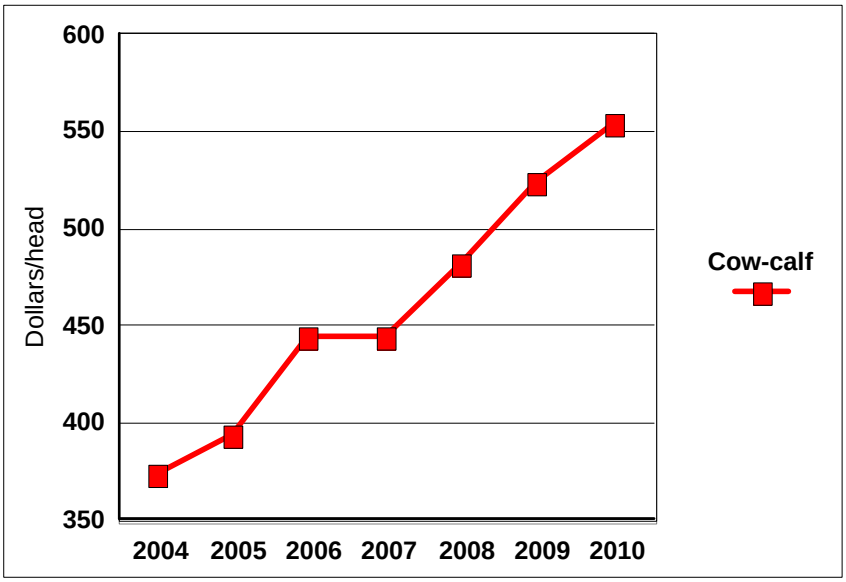


Figure 5. Actual and Projected Per Head Cow-calf Production Costs for the West Region of North Dakota

## Gross Returns

Increasing production costs are tolerable if gross returns are increasing fast enough to cover the additional costs. Difficulties arise if the growth in gross returns slows down or stops while costs continue to increase. Table 5 shows the gross returns for wheat between 2004 and 2010. Data for 2004-2007 are historical and data for 2008-2010 are projections. Gross wheat returns increased 79% for the RRV for the 2004-2008 period. They also increased 100%, 93%, and 91% for the NC, SC, and West regions of the state. All other gross returns increased substantially

except for cow-calf (Tables 6 and 7). Gross returns for years 2009 and 2010 are expected to be only slightly higher than in 2008. The growth in gross returns for wheat and soybeans are expected to be about 5% in any region while expected gross returns for corn will be less than 20%. Gross returns for a cow-calf enterprise in 2010 are expected to be 10% less than in 2008.

**Table 5. Gross Returns for Wheat in the Four Regions, 2004-2010**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| **RRV** | | | | | | | |
| Yield (bushels/acre | 63.70 | 41.43 | 52.93 | 48.23 | 53.13 | 54.61 | 56.07 |
| Price (dollars/ bushel) | 3.47 | 3.41 | 3.96 | 5.10 | 7.45 | 7.26 | 7.34 |
| Total (dollars) | 221.04 | 141.28 | 209.60 | 245.97 | 395.82 | 396.47 | 411.55 |
| **NC** | | | | | | | |
| Yield (bushels/acre) | 43.14 | 35.17 | 34.98 | 37.11 | 38.76 | 39.51 | 40.25 |
| Price (dollars/bushel) | 3.34 | 3.14 | 3.93 | 5.28 | 7.45 | 7.26 | 7.34 |
| Total (dollars) | 144.09 | 110.43 | 137.47 | 195.94 | 288.76 | 286.84 | 295.44 |
| **SC** | | | | | | | |
| Yield (bushels/acre) | 51.35 | 43.79 | 39.49 | 43.82 | 46.18 | 47.25 | 48.31 |
| Price (dollars/bushel) | 3.48 | 3.34 | 3.89 | 5.05 | 7.45 | 7.26 | 7.34 |
| Total (dollars) | 178.70 | 146.26 | 153.62 | 221.29 | 344.04 | 343.04 | 354.60 |
| **West** | | | | | | | |
| Yield (bushels/acre) | 26.44 | 29.11 | 16.51 | 27.76 | 26.83 | 26.85 | 26.88 |
| Price (dollars/bushel) | 3.95 | 4.08 | 4.05 | 5.62 | 7.45 | 7.26 | 7.34 |
| Total (dollars) | 104.44 | 118.77 | 66.87 | 156.01 | 199.88 | 194.93 | 197.30 |

**Table 6. Gross Returns for Soybeans and Cow-calf in the Four Regions, 2004-2010**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| **Soybeans** | | | | | | | |
| **RRV** | | | | | | | |
| Yield (Bushels/acre) | 22.38 | 38.88 | 38.10 | 36.30 | 34.66 | 34.99 | 35.31 |
| Price (dollars/acre | 6.69 | 5.76 | 5.48 | 6.78 | 12.36 | 11.93 | 12.32 |
| Total (dollars) | 149.72 | 223.95 | 208.79 | 246.11 | 428.40 | 417.43 | 435.02 |
| **NC** | | | | | | | |
| Yield (bushels/acre) | 13.63 | 31.49 | 22.85 | 30.72 | 28.35 | 29.00 | 30.00 |
| Price (dollars/acre) | 5.97 | 5.30 | 5.32 | 6.97 | 12.36 | 11.93 | 12.32 |
| Total (dollars) | 81.37 | 166.90 | 121.56 | 214.12 | 350.41 | 345.97 | 369.60 |
| **SC** | | | | | | | |
| Yield (bushels/acre) | 22.94 | 35.56 | 26.27 | 38.05 | 30.49 | 31.68 | 31.88 |
| Price (dollars/bushel) | 5.84 | 5.56 | 5.45 | 7.06 | 12.36 | 11.93 | 12.32 |
| Total (dollars) | 133.97 | 197.71 | 143.17 | 268.63 | 376.86 | 377.94 | 392.76 |
| **Cow-calf** | | | | | | | |
| **West** | | | | | | | |
| Yield (pounds/head) | 559 | 575 | 542 | 562 | 559.5 | 559.5 | 559.5 |
| Price (dollars/pound) | 1.18 | 1.20 | 1.19 | 1.14 | 1.09 | 1.02 | 0.98 |
| Total (dollars) | 661.24 | 692.70 | 642.38 | 642.14 | 608.68 | 571.64 | 549.60 |

**Table 7. Gross Returns for Corn in the Four Regions, 2004-2010**

| | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|
| **RRV** | | | | | | | |
| Yield (bushels/acre) | 114.50 | 143.12 | 138.11 | 130.29 | 137.58 | 140.07 | 142.50 |
| Price (dollars/bushel) | 2.41 | 1.84 | 2.07 | 3.08 | 4.77 | 5.11 | 5.39 |
| Total (dollars) | 275.95 | 263.34 | 285.89 | 401.29 | 656.26 | 715.76 | 768.08 |
| **NC** | | | | | | | |
| Yield (bushels/acre) | 11.68 | 97.35 | 72.99 | 84.25 | 84.86 | 86.00 | 90.00 |
| Price (dollars/bushel) | 2.11 | 1.48 | 1.98 | 2.94 | 4.77 | 5.11 | 5.39 |
| Total (dollars) | 24.64 | 144.08 | 144.52 | 247.70 | 404.78 | 439.46 | 485.10 |
| **SC** | | | | | | | |
| Yield (bushels/acre) | 63.61 | 128.82 | 89.27 | 119.22 | 105.94 | 107.94 | 108.92 |
| Price (dollars/bushels) | 2.18 | 1.70 | 2.09 | 3.13 | 4.77 | 5.11 | 5.39 |
| Total (dollars) | 138.67 | 218.99 | 186.57 | 373.16 | 505.33 | 551.57 | 587.08 |
| **West** | | | | | | | |
| Yield (bushels/acre) | 25.58 | 70.23 | 37.20 | 51.26 | 65.00 | 65.00 | 68.00 |
| Price (dollars/bushels) | 2.28 | 1.98 | 2.19 | 3.59 | 4.77 | 5.11 | 5.39 |
| Total (dollars) | 58.32 | 139.06 | 81.47 | 184.02 | 310.05 | 332.15 | 366.52 |

## Net Returns

Figures 6-9 show the dramatic increase in expected net returns in all regions for the 2004-2010 period. The income levels increase in 2008 and then, in most cases, level off. Table 8 shows the net returns for wheat, soybeans, corn, and cow-calf in the 4 regions for the 2004 -2010 period. In many cases, net returns were negative in 2004, 2005, and 2006. The average net returns for wheat were -$16.90 per acre in the RRV, $3.41 per acre in the NC region, $13.70 per acre in the SC region and -$14.20 per acre in the West for the 2004-2007 period. However, net returns for wheat in the RRV are expected to be over $89 per acre in 2008, and then fall to $68.50 in 2010 which are substantially higher than the long term average net returns.

In 2008, the net returns are expected to be $87 per acre in the NC region, $115 per acre in the SC region and $23 per acre in the West. While the net returns are lower in 2010 than in 2008 in the regions, they are well above the long term average. The average net returns for soybeans were $4.71 per acre for the 2004-2007 period in the RRV, -$4.38 in the NC region, and $52.10 per acre in the SC region. However, the net returns are expected to be $159 per acre, $140 per acre, and $126 per acre in the RRV, NC, and SC region, respectively, in 2008. Average net returns for corn were negative in all 4 regions, -$16, -$50, -$8, and -$1 in the RRV, NC, SC, and West regions, respectively, for the 2004-2007 period. The net returns for corn, however, are expected to be over $183 per acre in the RRV, $126 in the SC region, $121 per acre in the NC regions, and over $73 per acre in the West region, for the 2008-2010 period. The net returns for the cow-calf enterprise will decrease during 2008-2010 because of lower prices due to the cattle cycle.

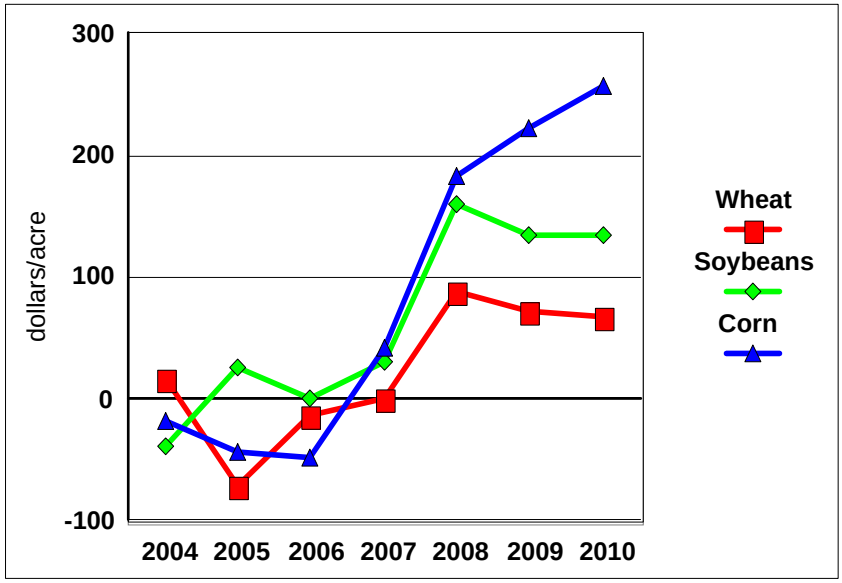


Figure 6. Actual and Projected Per Acre Net Returns for the Red River Valley Region of North Dakota

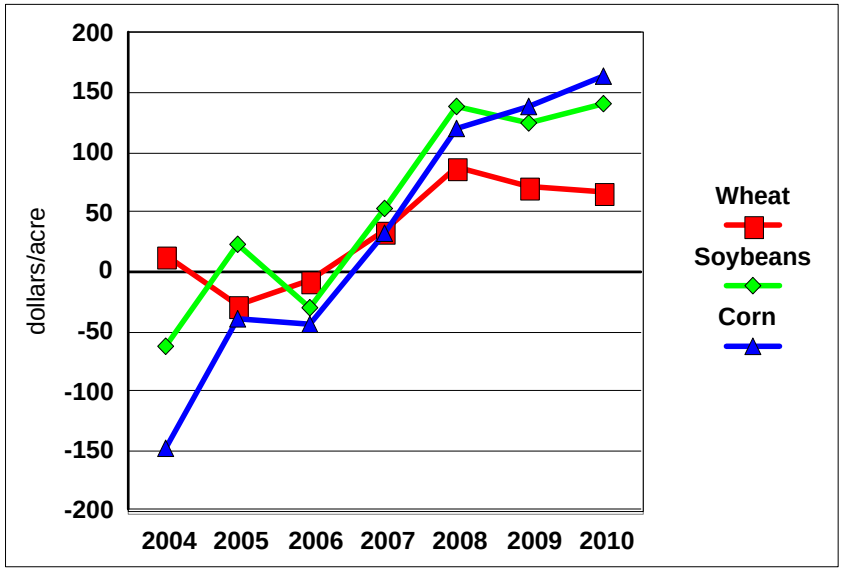


Figure 7. Actual and Projected Per Acre Net Returns for the North Central Region of North Dakota

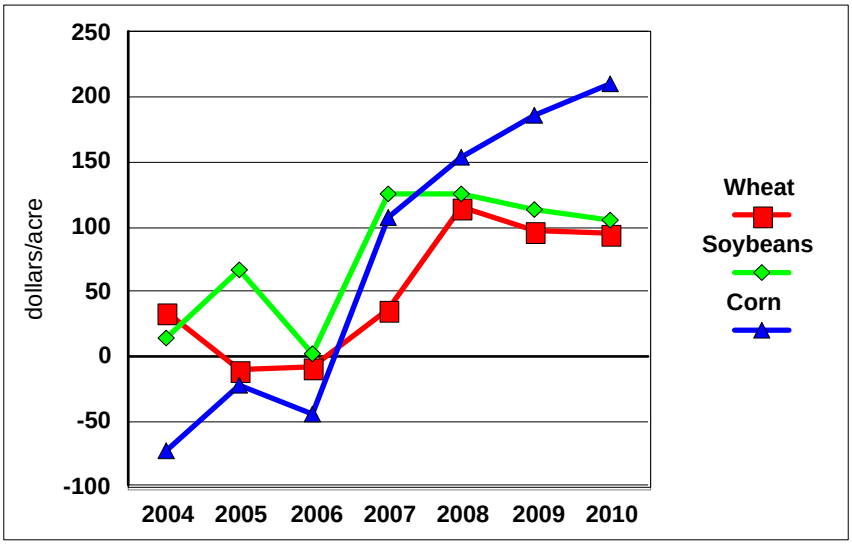


Figure 8. Actual and Projected Per Acre Net Returns for the South Central Region of North Dakota

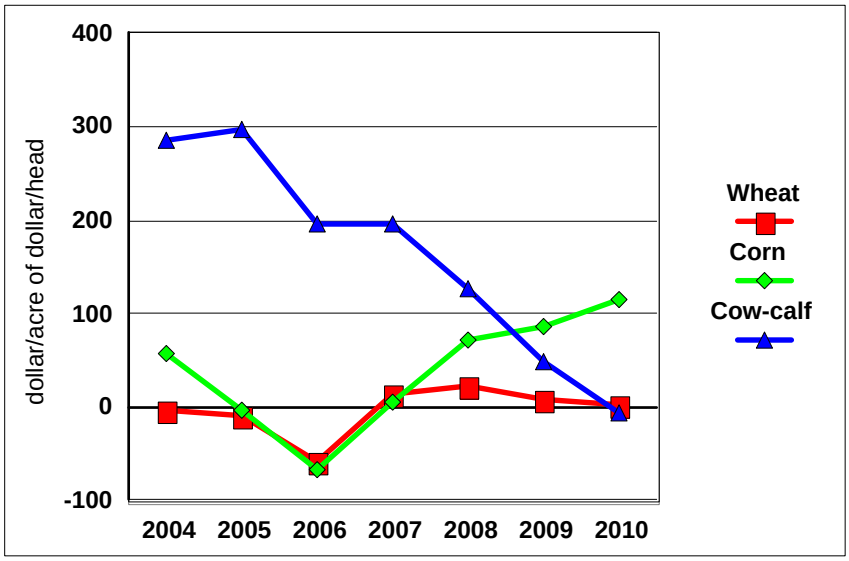


Figure 9. Actual and Projected Per Acre or Per Head Net Returns For the West Region of North Dakota

**Table 8. Net Returns for Wheat, Soybeans, Corn and Cow-calf, 2004-2010**

| | | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|---|---|---|
| **RRV** | | | | | | | | |
| Wheat | $/acre | 16.51 | -71.74 | -13.21 | 0.82 | 89.07 | 72.80 | 98.50 |
| Soybeans | $/acre | -39.11 | 26.50 | 0.71 | 30.73 | 159.37 | 133.91 | 133.71 |
| Corn | $/acre | -17.32 | -42.39 | -47.31 | 41.81 | 183.14 | 223.47 | 257.88 |
| **NC** | | | | | | | | |
| Wheat | $/acre | 12.81 | -27.91 | -5.94 | 34.68 | 86.75 | 71.13 | 66.48 |
| Soybeans | $/acre | -62.94 | 23.72 | -30.61 | 52.33 | 139.77 | 125.78 | 140.43 |
| Corn | $/acre | -148.14 | -40.02 | -44.15 | 32.96 | 120.60 | 137.98 | 163.96 |
| **SC** | | | | | | | | |
| Wheat | $/acre | 34.22 | -9.86 | -7.02 | 37.47 | 114.76 | 97.71 | 95.00 |
| Soybeans | $/acre | 14.27 | 67.23 | 2.11 | 124.77 | 126.13 | 113.32 | 104.88 |
| Corn | $/acre | -73.16 | -22.27 | -44.69 | 107.96 | 153.49 | 185.81 | 210.77 |
| **West** | | | | | | | | |
| Wheat | $/acre | -4.38 | -9.07 | -58.67 | 15.31 | 23.49 | 9.58 | 3.60 |
| Soybeans | $/acre | 58.32 | -3.28 | -66.08 | 6.48 | 73.32 | 87.33 | 115.69 |
| Corn | $/acre | 286.93 | 298.33 | 197.47 | 196.96 | 127.18 | 48.23 | -5.14 |

## Summary

Production costs have increased over 60% for most crops in most regions of the state since 2004. It is expected that production costs will continue to increase for the foreseeable future as the higher returns are capitalized into production costs.

The higher production costs require commodity prices to be substantially higher than the long term average. Whether those levels can be maintained is unknown. Costs will continue to increase well into the future as producers bid up input prices in response to the recent increases in demand. Producers in the United States and other countries will respond to the high commodity prices by increasing supply, which will put pressure on prices.

Gradual decreases in agricultural prices along with increases in production cost could result in gradual decreases in net returns in North Dakota. Net farm income could be substantially lower in 2010, compared to 2008.

## References

*FAPRI Baseline Projections*. January 2008. Food and Agricultural Policy Research Institute, Columbia, MO.

*North Dakota Agricultural Statistics*. Various issues. North Dakota Agricultural Statistics Service, Fargo, ND.

*North Dakota Farm and Ranch Business Management Annual Reports 2004, 2005, 2006 and 2007*. North Dakota State Board for Vocational Education, Bismarck, ND.

Taylor, Richard D. and Won W. Koo. *2008 North Dakota Agricultural Outlook: Representative Farms, 2008-2017*. Agribusiness & Applied Economics Report No. 634, Center for Agricultural Policy and Trade Studies, North Dakota State University, Fargo, ND.

Taylor, Richard D. And Won W. Koo. *How Long Will the Agricultural Boom Last*. Agricultural Policy Brief, Number 19, Center for Agricultural Policy and Trade Studies. North Dakota State University, Fargo, ND.

*USDA Agricultural Projections to 2017*. Long-term Projection Report OCE-2008-1. February 2008. United States Department of Agriculture. Office of the Chief Economist. Washington DC.