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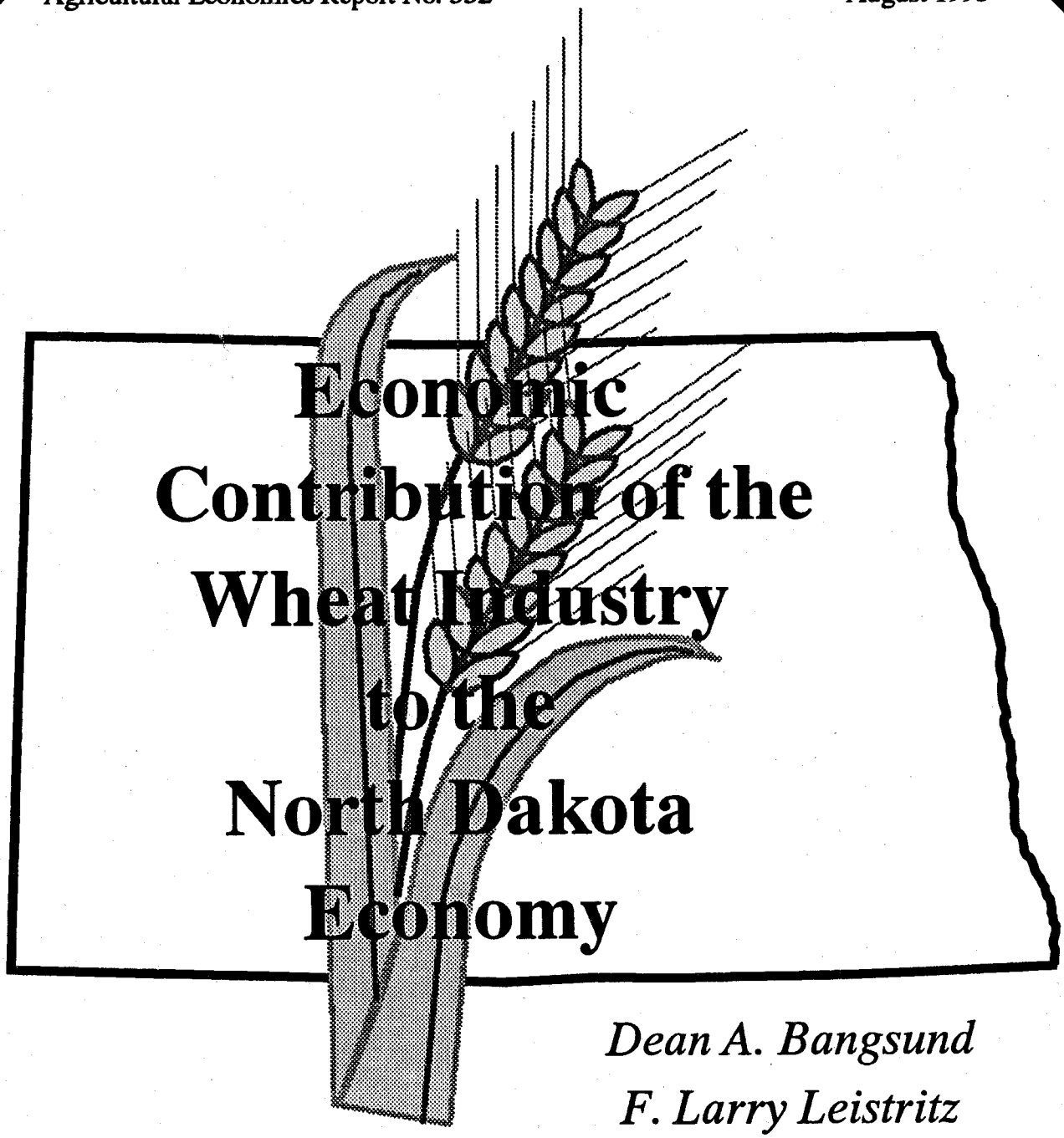

Economic Contribution of the Wheat Industry to the North Dakota Economy

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HIGHLIGHTS

North Dakota has a well-earned reputation as being a major producer of wheat in the United States. Historically, North Dakota has been the nation's number one producer of durum and spring wheat. North Dakota has accounted for over 12 percent of all wheat produced in the U.S. since 1980.

The importance of wheat production to the North Dakota economy may not be clearly understood. Wheat production is likely the single most important agricultural activity in the state, considering (1) agriculture is the largest economic base sector (activities that bring money into the state) in the state, (2) crop revenues account for nearly 70 percent of all farm receipts, and (3) wheat alone accounts for over 40 percent of all farm revenue.

Wheat is produced in all areas of the state; however, production is concentrated in the Red River Valley and in the northern third of the state. Wheat production (spring, durum, and winter wheat) in North Dakota averaged about 11.1 million acres and 368 million bushels annually from 1991 through 1993.

Direct economic impacts from the wheat industry were estimated for crop production, grain handling, transportation, and processing activities. Farmers and producers generate direct impacts to the state's economy through (1) expenditures for production inputs and (2) returns to unpaid labor, management, and equity. Grain handling, transportation, and processing activities similarly impact the economy through (1) expenditures for operating inputs and (2) net returns from operations.

Crop production budgets were used with estimates of wheat acreage and yields to determine the economic impacts from wheat production. Annual direct economic impacts from wheat production were estimated at $1.5 billion or about $135 per acre.

Grain handling impacts were estimated for country elevators using a grain handling budget, typical handling margin, and estimates of the amount of wheat handled. Annual direct economic impacts from grain handling were estimated at $43 million.

The amount of grain shipped from counties to various market destinations by mode of transport was used in conjunction with truck and rail budgets to estimate the direct economic impacts from wheat transportation. Annual direct economic impacts were $34 million and $68 million for truck and rail transportation, respectively. Collectively, of the $260 million spent annually on wheat transportation, only $102 million were retained within the North Dakota economy.

Economic impacts from wheat processing were determined from surveying wheat processors in the state. Total direct economic impacts from wheat processing (milling activities) were $36 million annually.

Total annual direct economic impacts from all wheat activities in North Dakota were estimated at $1.68 billion. An input-output model was used to estimate the secondary economic impacts. The $1.68 billion in direct economic impacts generated another $2.85 billion in secondary economic impacts. Annual economic activity (direct and secondary) was estimated at about $4.5 billion. Each acre of wheat planted was estimated to generate about $408 in economy-wide business activity annually.

Annual tax collections from the wheat industry were about $100 million, which included $71 million in sales and use, $21 million in personal income, and $8 million in corporate income taxes. Approximately 22,900 farms in 1992 raised wheat in North Dakota. Wheat processing activities in the state were directly responsible for about 520 full-time jobs. Secondary employment supported by wheat production, grain handling, transportation, and processing activities was estimated at 50,980 jobs annually.

The importance of wheat to North Dakota is not a recent phenomenon; historical acreage and production suggest this crop has been an extremely important agricultural activity in the state for several decades. Wheat is produced abundantly throughout North Dakota, suggesting the impacts are distributed in all areas of North Dakota. When measured in terms of secondary employment, economy-wide personal income, retail sales, tax revenues, and overall economic activity, the wheat industry in North Dakota is likely one of the most important economic activities in the state, agricultural or otherwise.

Economic Contribution of the Wheat Industry to the North Dakota Economy

Dean A. Bangsund and F. Larry Leistritz*

INTRODUCTION

North Dakota, like other Great Plains states, relies heavily upon agriculture for much of its economic activity. The contribution of agriculture to the state's economy has been repeatedly documented (Coon et al. 1986; Coon and Leistritz 1987; Coon and Leistritz 1989; Leistritz and Coon 1991; Coon et al. 1992; Leistritz et al. 1993; Coon and Leistritz 1994). The importance of agriculture can be measured by examining the amount of money that the activity brings into the state, sometimes called the economic base or basic income. From 1990 through 1992, agriculture accounted for 37 percent of North Dakota's economic base (Coon and Leistritz 1994). Agriculture's importance in the North Dakota economy also can be demonstrated by examining the state's gross state product. Gross state product is the value of all goods and services attributable to labor and property located within the state. From 1985 through 1989, agriculture accounted for over 10 percent of the state's gross state product, making North Dakota the fourth most agriculturally dependent state in the nation.

Agriculture does play a major role in North Dakota's economy and most people familiar with the state realize the importance of agriculture to the state's economy. However, the economic significance of the various activities within the agriculture industry are less understood. North Dakota has been dependent upon cash crop receipts (excluding government program payments) for nearly 60 percent of the state's total farm receipts since 1985. If cash crop receipts and government program payments are included over the same time period, crop activities account for nearly 70 percent of all farm receipts (North Dakota Agricultural Statistics Service 1994). Alternatively, excluding government payments, crop sales have outnumbered livestock sales by a margin of 2.5-to-1.

Considering the importance of crop sales to the North Dakota economy, the leading crops in the state should represent a substantial contribution to the economy. Even more dramatic than the dominance of crop activities to the agriculture industry is the dominance of wheat to North Dakota's crop production. Wheat production (excluding government payments) has accounted for over 52 percent of all crop receipts from 1991 through 1993 (North Dakota Agricultural Statistics Service 1994). Cash wheat sales and government payments for wheat production have accounted for nearly 41 percent of all farm revenue from 1991 through 1993 (North Dakota Agricultural Statistics Service 1994). Since farm receipts are an important measure of farm level impacts on local economies, wheat is the

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single most important enterprise for farmers and agriculturally based rural economies in North Dakota. Wheat activities, measured in terms of cash receipts, clearly overshadow any other agricultural activity in the state.

Information from an economic impact or contribution study can be valuable for industry, educational, and public relations efforts. Determining the economic contribution of a given industry provides information about its importance to local economies. Not only can the impacts to local economies be measured, but the impacts on specific economic sectors and industries also can be identified. Providing economic information on how an industry impacts related industries can be valuable to policymakers and business leaders.

Wheat production affects the entire state; wheat is abundantly produced in all areas of the state and the economic consequences of production are felt throughout the state's economy and in most communities. In the case of the wheat industry in North Dakota, an impact study is especially beneficial, not only for identifying specific economic impacts to various economic sectors and quantifying impacts to local economies, but also because it can demonstrate the susceptibility of the North Dakota economy to fluctuations in wheat sales, demonstrate the economic dependence of the state to wheat production, and indicate the economic impacts that could result from potential changes in policies which affect the wheat industry. North Dakota could benefit in numerous ways from quantifying the economic impacts of the wheat industry; arguably the most important agricultural activity in the state.

OBJECTIVES

The purpose of this report is to estimate the economic contribution (direct and secondary effects) of the wheat industry to the economy of North Dakota. Specific objectives include

1) quantifying wheat acreage and production in North Dakota,

2) estimating the direct and secondary impacts to the North Dakota economy from producing wheat,

3) estimating the direct and secondary impacts to the North Dakota economy from handling North Dakota wheat,

4) estimating the direct and secondary impacts to the North Dakota economy from transporting North Dakota wheat, and

5) estimating the direct and secondary impacts to the North Dakota economy from processing (flour milling) North Dakota wheat.

PROCEDURES

An economic contribution analysis, as defined in this study, represents an estimate of all local expenditures and returns associated with an industry (i.e., economic activity from producing, handling, transporting, and processing wheat). The economic contribution approach to estimating economic activity has been used for several similar studies (Bangsund and Leistritz 1995; Bangsund et al. 1994; Bangsund and Leistritz 1993; Bangsund and Leistritz 1992).

Analysis of the impacts associated with the wheat industry[1] required several steps. Discussion of the procedures used in the study was divided into the following sections: (1) wheat production, (2) grain movement, (3) transportation, (4) processing, and (5) application of input-output analysis to generate secondary impacts.

Wheat Production

North Dakota has a well-earned reputation as being a major producer of wheat in the United States. North Dakota and Kansas have squared off 13 of the last 15 years to determine which state will lead the nation in total wheat production. Since 1980, North Dakota has led the nation in total wheat production 3 times and been second to Kansas 10 times. Wheat production in Kansas is dominated by winter wheat, whereas, in North Dakota, durum and spring wheat dominate production. Historically, North Dakota has been the nation's top producer of durum and spring wheat, averaging 78 and 42 percent of all U.S. production the last 15 years, respectively. Recently, North Dakota has produced over 80 percent of U.S. durum production and half of the country's spring wheat production. North Dakota has accounted for over 12 percent of all wheat produced in the U.S. since 1980.

Wheat is produced in all areas of the state; however, production is concentrated in the Red River Valley and in the northern third of the state (Figure 1). Spring wheat has historically dominated North Dakota wheat production, accounting for about 78 percent of all wheat production (North Dakota Agricultural Statistics Service *various years*). Durum and winter wheat typically have accounted for about 21 and 1 percent of all wheat produced in the state, respectively.

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[1]The wheat industry, as described and analyzed in this report, is limited to activities associated with wheat produced in North Dakota. Wheat from other states generates economic activity within the state through expenditures for transportation and processing, but was not included in this study.

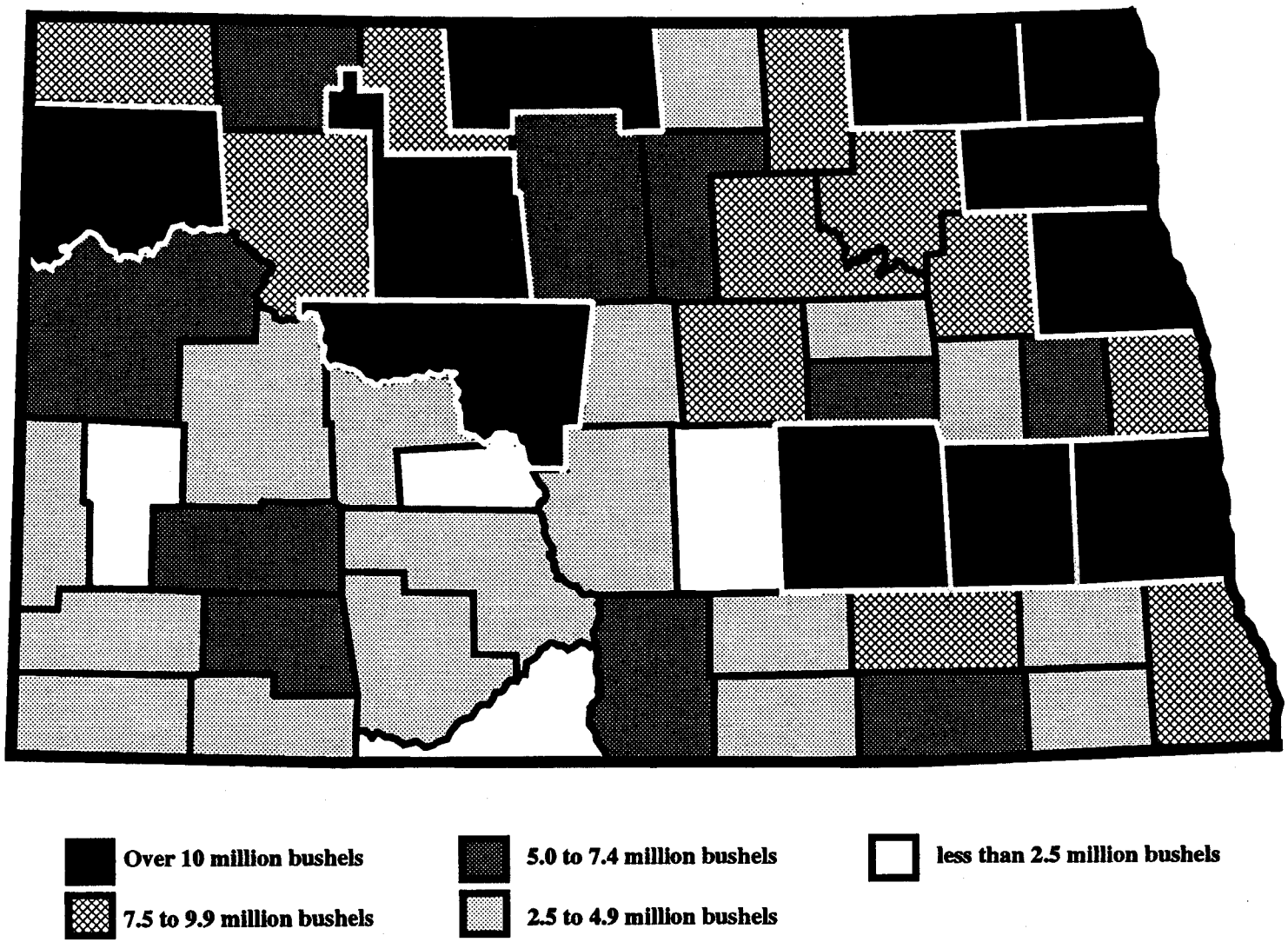

Figure 1. Average Wheat Production in North Dakota, by County, 1991 to 1993

All wheat production in North Dakota averaged about 11.1 million planted acres and 368.3 million bushels from 1991 through 1993 (North Dakota Agricultural Statistics Service 1994) (Appendix A). County wheat yields from 1991 through 1993 varied from 23 to 41 bushels per planted acre, with an overall state average of 33.2 bushels per acre (Figure 2). Wheat yields are generally highest in the Red River Valley and in the northern counties of North Dakota. Considering the effects of adverse weather on the general growing conditions in many parts of the state during recent years, average yields may reflect differences in weather-related yield losses as much as any geographic advantages in wheat production.

Wheat production used in this report was averaged to eliminate fluctuations in yearly production levels, thus providing a better indication of year-to-year impacts generated by the wheat industry. A three-year average (1991-1993) was used as a proxy to estimate the economic impacts.

Production budgets were developed for different production regions in North Dakota (Appendix B). Separate budgets for various regions in the state were developed because of differences in general growing conditions and farming practices throughout the state. Production expenditures and returns were estimated separately for durum, spring, and winter wheat in all farm production regions. Production expenditures were estimated from budgets obtained from the North Dakota State University Extension Service (Swenson and Aakre 1992) and reflect estimated 1993 expenses. Wheat revenue was a combination of yields and prices, wheat deficiency payments, and disaster payments, all averaged from 1991 through 1993 (Appendix B).

Grain Movement

Grain movement was defined as including grain flow (i.e., logistics of grain movement from production to final markets) and grain handling (i.e., cleaning, mixing, storing, loading, and unloading). The following section is divided into 1) grain flow and 2) grain handling.

Grain Flow

Tracking grain flow is usually complex, involving several modes of transportation (e.g., truck, railroad, barge, vessel) and several possible destinations and handlers (Figure 3). For this study, grain movements were limited to shipments from (1) farms to country elevators and (2) country elevators to out-of-state destinations (i.e., river port, terminal elevator, subterminal elevator, another country elevator, processor) and (3) country elevators to instate processors or final destinations (Figure 4).

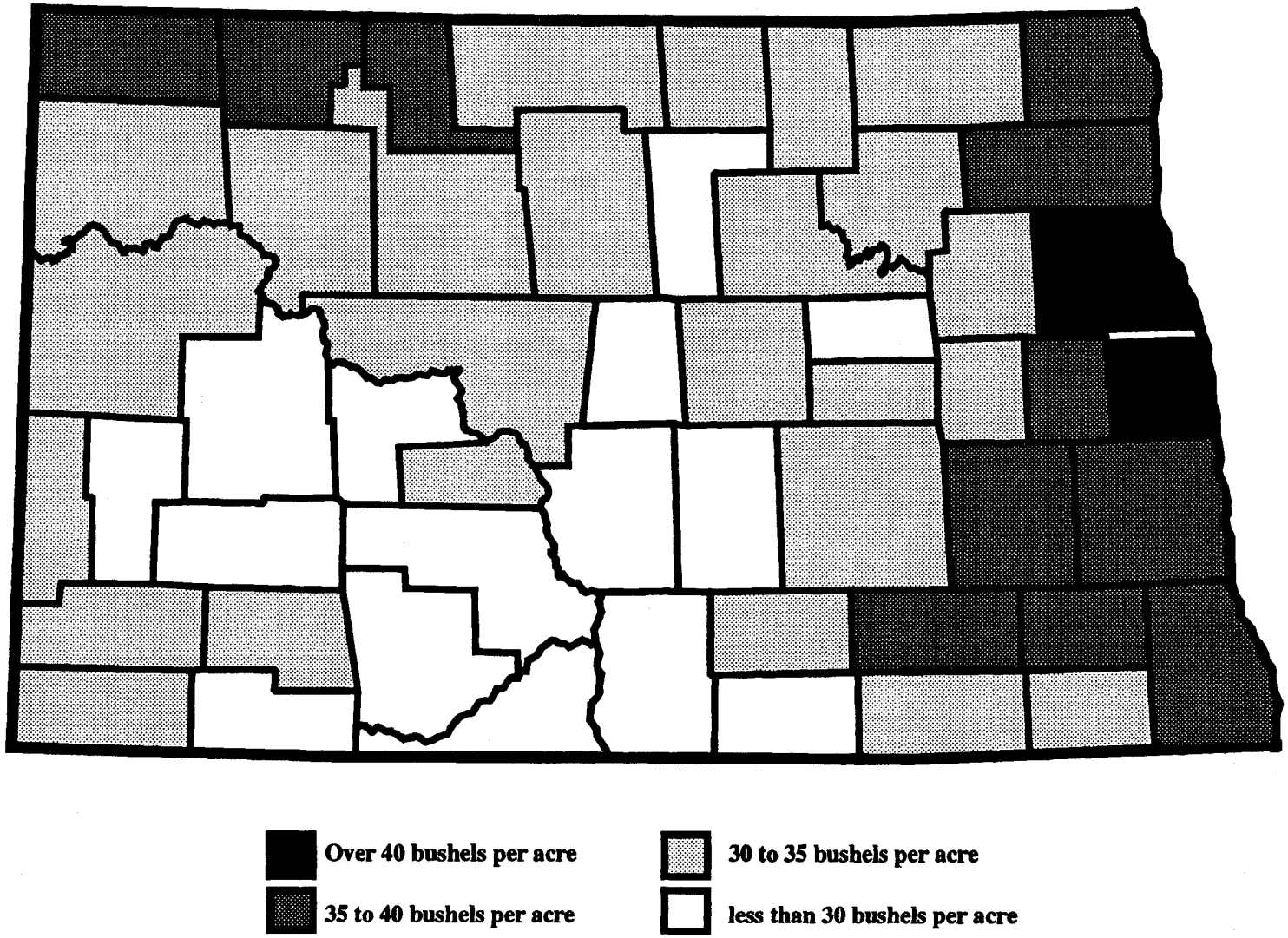

Figure 2. Average Wheat Yields in North Dakota, by County, 1991 to 1993

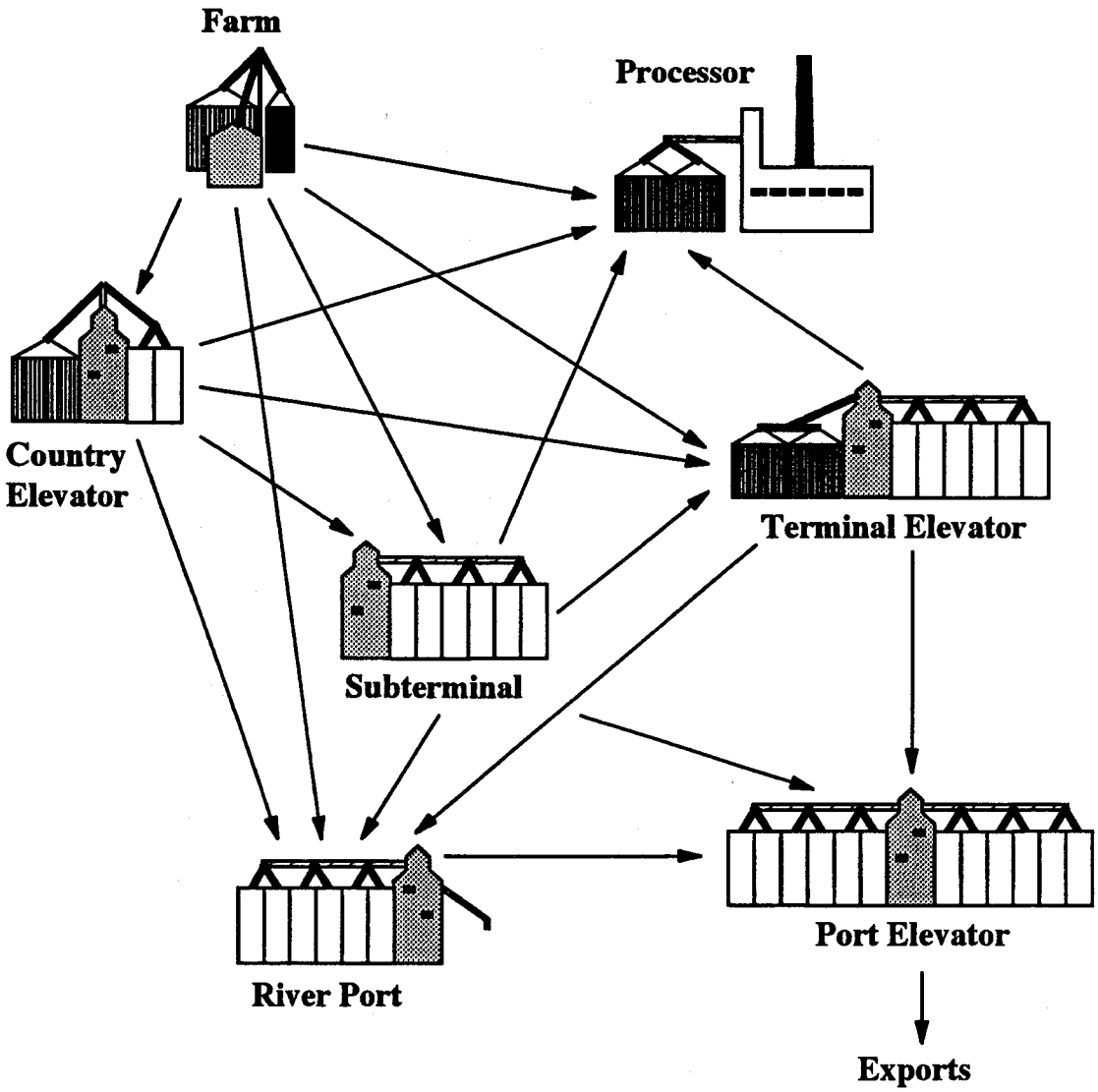

Figure 3. Typical Grain Movements in the United States Grain Marketing System

SOURCE: U.S. Department of Agriculture (1990).

All wheat produced[2] was assumed to be transported by the farmer to a country elevator. Spring and durum wheat shipments from elevators in North Dakota were nearly equal to total production from 1991 through 1993 (Andreson et al. 1994b). Collectively, North Dakota farmers transport only small amounts of wheat to processors and out-of-state

[2]Wheat produced for commercial seed was subtracted from county wheat production when estimating the amount of wheat entering the marketing system (see Appendix A for explanation).

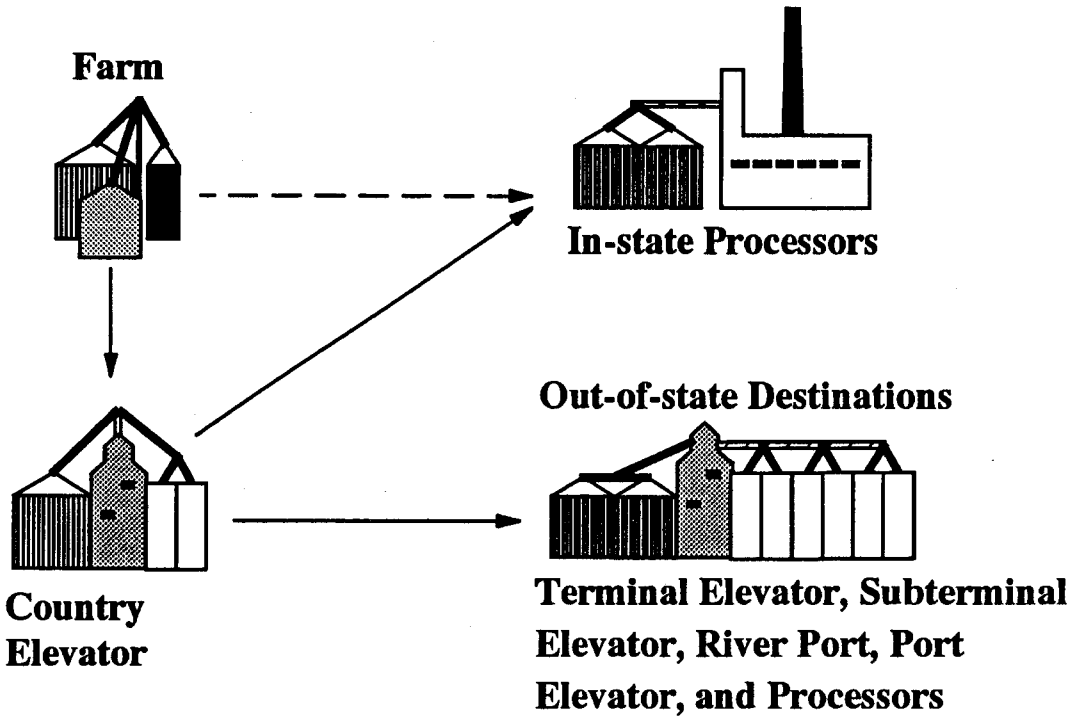

Figure 4. Assumed Wheat Movements for Wheat Produced in North Dakota.

destinations. Also, processors generally do not buy directly from producers because they prefer to buy large quantities of uniform-quality grain, which is difficult to accomplish through buying from a variety of producers.

After delivery to a country elevator, wheat was assumed to be delivered by the country elevator to either in-state processors or out-of-state destinations. Grain flow statistics for spring and durum wheat were used to identify the percentage of wheat shipped to various destinations from crop reporting districts in the state (Andreson et al. 1994b). Estimates of average wheat production were used with the grain flow statistics to identify the volumes of wheat shipped from crop reporting districts to various destinations. The amount of wheat shipped by mode of transportation (i.e., truck and rail), estimated separately for each destination, was obtained from Andreson et al. (1994a). Shipping characteristics (i.e., amount shipped by truck and rail to each destination) for each crop reporting district were applied to county-level durum and spring wheat production to estimate grain flow from each county.

Wheat produced in North Dakota is eventually shipped all over the nation; however, Duluth and Minneapolis/St. Paul destinations collectively received about 50 percent of all North Dakota wheat (Table 1). Substantial amounts of wheat were also shipped to the

Table 1. Wheat Movements From Crop Reporting Regions in North Dakota to Various Destinations, 1991 through 1993

Region	Unit	Market Destinations						Total	Percent of All Wheat
		Duluth	Minn/ St. Paul	Pacific Northwest	Southwest/ Midland	North Dakota	Other		
Central	Bu	5,763,000	16,357,000	4,449,000	4,081,000	86,000	6,361,000	37,097,000	10.1%
	%	15.5%	44.1%	12.0%	11.0%	0.2%	17.1%		
East Central	Bu	8,185,000	12,029,000	11,891,000	2,969,000	10,989,000	994,000	47,057,000	12.8%
	%	17.4%	25.6%	25.3%	6.3%	23.4%	2.1%		
North Central	Bu	4,090,000	13,181,000	8,453,000	3,412,000	2,777,000	6,230,000	38,143,000	10.4%
	%	10.7%	34.6%	22.2%	8.9%	7.3%	16.3%		
Northeast	Bu	19,299,000	22,909,000	7,428,000	11,928,000	10,666,000	4,134,000	76,363,000	20.7%
	%	25.3%	30.0	9.7%	15.6%	14.0%	5.4%		
Northwest	Bu	5,699,000	17,072,000	14,261,000	10,834,000	3,601,000	8,390,000	59,857,000	16.3%
	%	9.5%	28.5%	23.8%	18.1%	6.0%	14.0%		
South Central	Bu	1,546,000	11,208,000	1,134,000	4,363,000	9,000	951,000	19,212,000	5.2%
	%	8.0%	58.3%	5.9%	22.7%	0.0%	5.0%		
Southeast	Bu	3,998,000	22,654,000	762,000	2,299,000	748,000	8,302,000	38,763,000	10.5%
	%	10.3%	58.4%	2.0%	5.9%	1.9%	21.4%		
Southwest	Bu	4,610,000	2,671,000	14,345,000	2,656,000	321,000	1,507,000	26,109,000	7.1%
	%	17.7%	10.2%	54.9%	10.2%	1.2%	5.8%		
West Central	Bu	1,001,000	12,660,000	4,091,000	4,837,000	0	3,100,000	26,688,000	7.0%
	%	3.9%	49.3%	15.9%	18.8%		12.1%		
All Regions	Bu	54,191,000	130,740,000	66,813,000	47,378,000	29,197,000	39,970,000	368,290,000	
	%	14.7%	35.5%	18.1%	12.9%	7.9%	10.9%		

Pacific Northwest and Southwest/Midland destinations. Destinations outside of Minnesota that received the greatest amount of North Dakota durum were Southwest/Midland and miscellaneous markets, while destinations for spring wheat (other than Minnesota) that received the greatest amount were Southwest/Midland and Pacific Northwest (Appendix C).

Grain Handling

Grain handling impacts were estimated by determining (1) a typical handling margin for local elevators in North Dakota and (2) the amount of wheat typically handled by country elevators. A grain handling budget was used to allocate the local elevator returns and expenses for handling wheat (Appendix B). All wheat produced[3] in North Dakota was assumed to be handled through country elevators. Country elevators handled, based on average wheat production, approximately 356 million bushels annually. Wheat handled by elevators and processors at destinations outside of North Dakota was not included.

Transportation

Shipping and hauling costs (i.e., money spent on transporting wheat to market destinations) were included in the study to measure the economic impact transportation of wheat has on the North Dakota economy. To realistically approach the problem of estimating transportation costs for wheat in North Dakota, transportation costs were limited to 1) truck and rail movements from country elevators to in-state and out-of-state destinations and 2) shipments of wheat from farms to in-state destinations. Any other possible combinations of shipments and destinations were not included in the study. The remaining section is divided into transportation by country elevators and brief discussions of truck and railroad transportation.

Transportation from Country Elevators

Transportation costs of shipping wheat from local elevators to market destinations required estimating 1) the amount of wheat transported from counties to market destinations by mode of transport, 2) per unit expense for truck and rail transportation to move wheat to various destinations, and in some cases, (3) the distance from a central location within the county to market destinations. The amount of wheat shipped from each county to market destinations (i.e., Duluth, Minneapolis/St. Paul, in-state processors, etc.) was determined by applying grain flow information to county production (Appendix C).

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[3]Wheat raised for commercial seed was included in grain handling charges with country elevators; however, commercial wheat seed was excluded from grain flow calculations.

The percentages of grain shipments to market destinations by truck and railroad transportation were obtained from Andreson et al. (1994a). The percentages of grain hauled by truck and railroad were applied to county grain movements to estimate the amount of grain shipped by each mode of transportation (Appendix C).

Shipping points (i.e., a central town or location) within each county were selected to calculate transportation costs for the entire county. Shipping points for each county were selected based on location within the county and on whether they contained an elevator with access to a major railroad. Shipping points were used to determine transportation distances to market destinations for both truck (highway miles) and rail (rail line miles). All wheat entering the market system within a county was assumed to be transported from that county's shipping point.

Truck Transportation

Trucking costs for wheat were based on information obtained from the Upper Great Plains Transportation Institute (1995b). The trucking rates obtained varied by destination, origin within the state, and timing of the shipment. Grain flow information was used with various truck rates to estimate an overall average rate (Appendix B). The truck rate was used with a truck operating budget to estimate operation expenses and returns. These expenses and returns were then allocated to various economic sectors (Appendix B). Total trucking costs for each county to each destination were estimated by multiplying mileage by cost per mile by the number of shipments.

Railroad Transportation

Railroad transportation costs required estimating the railroad companies' costs of rail shipments, developing a railroad expense budget to allocate shipment costs to expense categories, and estimating charges levied by the railroad companies on elevators for railcar shipments (shipping tariffs). Railroad companies' expenses incurred in rail transport were estimated using the Uniform Railroad Costing System (URCS), a microcomputer model developed by the Interstate Commerce Commission (1990).

URCS estimates variable and total costs (i.e., expenses incurred by the railroad companies, not to be mistaken for the cost incurred by elevators) of railroad transportation based on a current data base of financial and rail shipment information obtained from major railroad companies. The proportions of wheat shipped by single car, multiple car, and unit train rates in the state were obtained from Andreson et al. (1994b) and were used with URCS and grain flow information to estimate an overall cost structure of rail shipments in North Dakota.

URCS provides an estimate of the total variable costs and total allocated costs for rail shipments; however, the model does not provide an adequate breakdown of the costs. Thus, a railroad budget was developed to allocate the variable and fixed costs obtained from URCS to various expense categories which were subsequently allocated to economic sectors (Appendix B).

After estimating the expenses incurred by the railroad companies, the rates charged elevators for rail shipments were determined. Shipping tariffs are rates charged elevators per rail car to ship grain. Tariffs for rail shipments from North Dakota origins to various destinations were obtained from the Upper Great Plains Transportation Institute (1995a). Total railroad costs were subtracted from shipping tariffs to estimate railroad net returns.

Railroad net returns generated from shipments of wheat were assumed to leave the state and were not considered part of the economic impact. However, not all of the economic activity of rail transportation leaves the state (e.g., fuel, repairs, track maintenance, property tax, some labor, etc.). About 60 percent of the variable and fixed costs was assumed to remain within the state's economy.

Processing

Milling wheat into flour and semolina is the only major wheat processing activity in North Dakota, with no significant amount of wheat used in commercial feed formulations, ethanol production, or other processing activities. Thus, processing impacts were limited to flour milling activities. Any economic activity generated by the flour industry beyond the milling process was not included in this study (e.g., the value of flour to the baking industry, the value of miller's feed grains to the livestock industry). Economic impacts associated with the processing of North Dakota wheat were limited to in-state milling activities.

Economic activity from wheat milling was estimated from a combination of industry information and information obtained from a survey of processors. Only expenditures made to North Dakota entities by in-state processors were obtained from the survey. In addition to wheat milling expenditures and revenues, information on wheat-related employment and bushels of wheat milled was also solicited (Appendix D).

Input-Output Analysis

Economic activity from a project, program, or policy can be categorized into direct and secondary impacts. Direct impacts are those changes in output, employment, or income that represent the initial or direct effects of the project, program, or policy. Secondary impacts (sometimes further categorized into indirect and induced effects) result from

subsequent rounds of spending and respending within the economy. This process of spending and respending is sometimes termed the multiplier process, and the resultant secondary effects are sometimes referred to as multiplier effects (Leistritz and Murdock 1981).

Input-output (I-O) analysis is a mathematical tool that traces linkages among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). The North Dakota I-O Model has 17 economic sectors, is closed with respect to households (households are included in the model), and was developed from primary (survey) data from firms and households in North Dakota. Empirical testing has shown the North Dakota Input-Output Model is sufficiently accurate in estimating gross business volume, personal income, retail activity, and economic activity in other major sectors in North Dakota (Coon and Leistritz 1994).

ECONOMIC IMPACTS

The economic contribution from the wheat industry was estimated from production, grain handling, transportation, and processing activities. Expenditures and returns from these activities represent the direct economic impacts from the wheat industry. Subsequently, the direct impacts were used with an input-output model to estimate the secondary impacts. Secondary impacts result from the turnover or respending of direct impacts within the economy. The following section is divided into five major parts: (1) direct impacts, (2) secondary impacts, (3) employment, (4) tax revenue, and (5) total economic impacts.

Direct Impacts

From an economic perspective, direct impacts are those changes in output, employment, or income that represent the initial or direct effects of a project, program, or activity. The direct impacts from the wheat industry on the economy of North Dakota include (1) expenditures and returns from the production of wheat, (2) expenditures and returns from handling wheat at local elevators, (3) economic activity generated from transportation of wheat from local collection points to in-state and out-of-state markets, and (4) expenses and returns from wheat milling activities. The following sections describe these direct economic impacts.

Wheat Production

Farmers and producers generate direct economic impacts to the area economy through (1) expenditures for production outlays and (2) returns to unpaid labor, management, and

equity. Direct economic impacts from wheat production (i.e., production outlays and producer returns) were estimated by developing crop production budgets. The wheat production budgets contained estimated revenue, variable and fixed costs, and returns to unpaid labor, management, and equity (Appendix B).

Total direct impacts per acre from wheat production should be equal to the gross revenue per acre, providing all economic activity (production expenses and returns) remains in the North Dakota economy. All expenses and returns associated with wheat production were assumed to remain within the state economy (i.e., there were no economic leakages associated with the production of wheat), even though some inputs, such as fertilizer, seed, and machinery, may be purchased in neighboring states.

Wheat production in North Dakota averaged 11.1 million acres from 1991 to 1993. The 11.1 million acres of wheat generated about $845.8 million in production expenditures and $546.1 million in returns to unpaid labor, management, and equity annually from 1991 through 1993. Direct impacts (expenditures and returns) from wheat production averaged $135.2 per acre or $1.5 billion annually (Table 2).

Grain Handling

Country (local) elevators generate direct economic impacts to the area economy through (1) expenditures for grain handling inputs and (2) returns on grain handling. Direct economic impacts from grain handling were estimated by developing a country elevator budget and from information obtained from industry contacts.

Local elevators in North Dakota handled approximately 356 million bushels (97 percent of production) of wheat annually from 1991 through 1993. With a gross margin of about $0.12 per bushel, grain handling at local elevators generated about $43 million in annual direct impacts to the economy of North Dakota (Table 3).

Transportation

Truck and rail transportation generates direct economic impacts to the area economy through (1) expenditures for operating inputs and (2) operating returns. Direct economic impacts from transportation were estimated separately for truck and rail transportation.

Table 2. Average Direct Economic Impacts From Wheat Production in North Dakota, 1991 Through 1993

Expenses/Returns[a]	Direct Impacts From Wheat Production
	-------- $ --------
Gross Revenue	
Grain Sales	1,236,853,000
Government Payments[b]	260,890,000
Total Revenue	1,497,743,000
Expenses	
Fertilizer	77,082,000
Herbicide, Fungicide, etc.	64,196,000
Seed and Seed Treatment	70,267,000
Fuel and Lubrication	78,434,000
Repairs and Maintenance	103,797,000
Crop Insurance[c]	2,377,000
Interest on Variable Costs	15,835,000
Interest on Machinery Debt	63,593,000
Land Interest	148,381,000
Equipment Overhead	188,308,000
Hauling	36,829,000
Miscellaneous[d]	60,896,000
Property Taxes	47,448,000
Total Expenses	957,443,000
Returns to Unpaid Labor, Management, and Equity	540,230,000
Total Direct Impacts	1,497,743,000

[a] Includes summerfallow expenses for wheat raised on fallowed land.

[b] Government payments included $219.5 million in farm commodity program payments and $41.5 million in disaster aid (see Appendix B for explanation).

[c] Represents the net cost of Federal Crop Insurance from 1991 through 1993 (see Appendix B for explanation).

[d] Represents expenditures for general farm insurance, license fees, farm utilities (e.g., electricity, phone), machinery storage, and other general farm expenses (e.g., tax preparations, subscriptions, dues).

Table 3. Average Direct Economic Impacts to the North Dakota Economy From Wheat Handling by Country Elevators, 1991 Through 1993

Categories	Annual Direct Impacts From Grain Handling
	----- $ -----
Labor	11,772,000
Utilities	2,018,000
Interest	3,363,000
Equip. Depr. and Repairs	4,709,000
Taxes and Licenses	1,682,000
Insurance	3,027,000
General Expenses	5,045,000
Services	1,345,000
Net Returns	9,800,000
Total Direct Impacts	42,761,000

Truck Transportation

A trucking rate was used in conjunction with hauling distances and number of loads to develop an estimate of the economic impacts from truck transportation. Economic activity from intrastate (e.g., a local elevator to Grand Forks) and interstate (e.g., a local elevator to Duluth) truck shipments was allocated differently. All trucking costs associated with intrastate shipments were assumed to remain within the state. Fuel is a major portion (over 20 percent) of the expense in trucking, some of which on interstate shipments, would be purchased in other states. Also, some repairs are incurred on out-of-state trips. Furthermore, some trucking is conducted by out-of-state trucking firms, which incur most of their expenses in other states. Thus, about 80 percent of the interstate trucking expenses were assumed to remain in the North Dakota economy.

Country and terminal elevators spent about $41.3 million on truck transportation; however, only 81 percent of that expense was allocated as direct impacts. Total direct economic impacts from truck transportation were about $33.6 million (Table 4). About 21 percent of all North Dakota wheat was shipped by truck to market destinations. Trucking expenditures and returns accounted for about one-third of the direct impacts from wheat transportation.

Table 4. Annual Direct Economic Impacts From Truck Transportation of North Dakota Wheat to Market Destinations, 1991 through 1993

Categories	Annual Direct Impacts From Truck Transportation
	----- $ -----
Fuel and Lubrication	6,730,000
Labor	7,204,000
Tires	1,354,000
Repairs and Maintenance	2,757,000
Equipment	8,250,000
License and Taxes	655,000
Insurance	2,508,000
Mngt., Admin., and Comm.	1,804,000
Building/Storage	158,000
Net Returns	2,202,000
Total Direct Impacts	33,622,000

Railroad Transportation

Railroads and rail transportation have played major roles in the economy of most western states since statehood; North Dakota is no exception. The availability and use of railroads are important to most industries, especially agriculture. Railroads provide timely, economical transportation of production inputs and commodities. Their impacts can be felt by the service they provide (i.e., the complex movement of production inputs and shipment of commodities to and from all areas of the United States) and by the economic activity they incur in operation. The economic impacts of railroad transportation were estimated by determining expenses and returns generated in the transportation process.

Country elevators spent about $220 million on rail transportation to ship North Dakota wheat to market destinations. About 30 percent or $68 million of the total amount spent remained as direct economic impacts (Table 5), the remaining amount was either incurred in other states or removed from the state. About 79 percent of all North Dakota wheat was shipped by rail to market destinations. Expenditures for rail shipments retained within the North Dakota economy accounted for two-thirds of the direct economic impacts from wheat transportation.

Table 5. Annual Direct Economic Impacts From Rail Transportation of North Dakota Wheat to Market Destinations, 1991 through 1993

Categories	Annual Direct Impacts From Rail Transportation
	------ $ ------
Crew and Labor	21,516,000
Locomotive Operation	11,509,000
Car Expenses	10,534,000
Transportation	5,644,000
Maintenance-of-Way	8,664,000
Depr./Car and Locomotive	8,664,000
Central Administration	387,000
Insurance	229,000
Property Tax	1,123,000
Total Direct Impacts	68,270,000

Processing

Agricultural processing is a key component of the farm-to-consumer food chain. Agricultural processing, to some extent, includes almost all agricultural commodities and generates a host of different products. In the case of wheat, the processing chain generally starts with the milling industry[4], which grinds wheat into flour and semolina.

Economic impacts to the North Dakota economy from processing wheat were limited to in-state milling activities. Expenditures, returns, and employment information was obtained through a survey of in-state milling firms. Milling firms in the state processed about 18 million bushels of wheat annually from 1991 through 1993. In-state expenditures and returns from processing wheat were estimated at $36 million annually (Table 6).

Secondary Impacts

Secondary economic impacts result from subsequent rounds of spending and respending within an economy. Input-output (I-O) analysis traces linkages (i.e., the amount

[4]Some wheat in the United States is processed into breakfast foods and miscellaneous feeds; however, in-state processing of North Dakota wheat was limited entirely to flourmilling.

Table 6. Annual Direct Economic Impacts From Wheat Processing Activities in North Dakota, 1991 through 1993

Economic Sectors	Direct Impacts From Wheat Processing
	------- $ -------
Construction	705,000
Transportation	10,906,000
Comm and Public Utilities	1,498,000
Ag Processing and Misc Mfg.	7,241,000
Retail Trade	231,000
Finance, Insurance, and Real Estate	910,000
Business and Personal Service	141,000
Professional and Social Service	64,000
Households	14,732,000
Government	62,000
Total Direct Impacts	104,971,000

of spending and respending) among sectors of an economy and calculates the total business activity resulting from a direct impact in a basic sector (Coon et al. 1985). An economic sector is a group of similar economic units (e.g., communications and public utilities, retail trade, construction).

This process of spending and respending can be explained by using an example. A single dollar from an area wheat producer (**Households** sector) may be spent for a loaf of bread at the local store (**Retail Trade** sector); the store uses part of that dollar to pay for the next shipment of bread (**Transportation** and **Agricultural Processing** sectors) and part to pay the store employee (**Households** sector) who shelved or sold the bread; the bread supplier uses part of that dollar to pay for the grain used to make the bread (**Agriculture-Crops** sector) ... and so on (Hamm et al. 1993).

Secondary economic impacts were estimated separately for wheat production, grain handling, transportation, and processing. The following sections discuss the allocation of direct impacts to various economic sectors of the North Dakota Input-Output Model and the amount of secondary impacts generated in those economic sectors.

Wheat Production

Wheat production expenditures and returns were allocated to various economic sectors of the North Dakota Input-Output Model. Seed, herbicide, fungicide, insecticide, fertilizer, fuel, lubrication, repairs, equipment overhead, half of miscellaneous variable expenses, and 20 percent of miscellaneous overhead costs to the **Retail Trade** sector. Crop insurance, interest on variable costs, interest on machinery and equipment debt, and land interest payments were allocated to the **Finance, Insurance, and Real Estate** (FIRE) sector. Half of miscellaneous variable expenses and 40 percent of miscellaneous overhead costs were allocated to the **Business and Personal Services** sector. The **Communication and Public Utilities** sectors represented 40 percent of miscellaneous overhead expenses. Property taxes were allocated to the **Government** sector. Returns to unpaid labor, management, and equity were allocated to the **Households** sector.

Total direct impacts of $1.498 billion from wheat production in North Dakota generated about $2.514 billion in secondary impacts (Table 7). Secondary impacts were greatest in the **Households** sector ($868 million) and the **Retail Trade** sector ($753 million), followed by the **Finance, Insurance, and Real Estate** ($166 million), **Communication and Public Utilities** ($126 million), and **Government** ($112 million) sectors. Secondary impacts occurred in seven economic sectors that did not have direct impacts. For every dollar in direct economic activity from wheat production, another $1.68 was generated in secondary economic activity. Total economic impacts from wheat production were about $4 billion and included about 43,700 secondary jobs. Secondary jobs represent employment outside of the wheat industry, but employment that is dependent on the existence of the wheat industry.

Grain Handling

Grain handling expenditures and returns were allocated to various economic sectors. Office supplies, equipment depreciation and repairs, supplies and repairs, and general expenses were allocated to the **Retail Trade** sector. Taxes and licenses were allocated to the **Government** sector. Insurance and interest expense were allocated to the **Finance, Insurance, and Real Estate** sector. Utilities and communication expenses were allocated to the **Communications and Public Utilities** sector. Labor expenses was allocated to the **Households** sector.

Total direct impacts of $43 million from handling activities generated about $92 million in secondary impacts (Table 8). Secondary impacts were greatest in the **Households** sector ($28 million) and the **Retail Trade** sector ($23 million). Secondary impacts from wheat handling also affected the **Agriculture-Crops**, **Agriculture-Livestock**, and **Construction** sectors, three sectors that had no direct impacts, but had substantial secondary impacts. For every dollar in direct economic activity from grain handling, another $2.15 was

Table 7. Annual Direct, Secondary, and Total Economic Impacts of Wheat Production in North Dakota, by Economic Sector, 1991 through 1993

Economic Sectors	Economic Impacts From Wheat Production		
	Direct	Secondary	Total
	---------- 000s $ ----------		
Agriculture-Livestock	0	108,658	108,658
Agriculture-Crops	0	43,663	43,663
Nonmetal Mining	0	5,934	5,934
Construction	0	90,615	90,615
Transportation	0	14,960	14,960
Comm and Pub Util	19,749	126,072	145,820
Ag Proc and Misc Mfg.	0	68,587	68,587
Retail Trade	630,865	753,099	1,383,965
Fin, Ins, and Real Estate	233,871	165,522	399,393
Bus and Pers Service	25,511	64,825	90,336
Prof and Soc Service	0	91,860	91,860
Households	540,299	867,987	1,408,287
Government	47,448	112,203	159,651
Total Impacts	1,497,743	2,513,985	4,011,729
Secondary Employment (full-time equivalent jobs)			43,712

generated in secondary economic activity. Total economic impacts from grain handling were about $135 million annually and included about 1,550 secondary jobs.

Transportation

Expenditures and returns associated with wheat transportation were allocated to various economic sectors. Fuel, lubrication, tires, repairs and maintenance, equipment, locomotive operation, rail car expenses, rail car and locomotive depreciation, food, supplies, and other expenses were allocated to the **Retail Trade** sector. Labor and central administration expenses were allocated to the **Households** sector. Property taxes and licenses were allocated to the **Government** sector. Insurance and housing expenses were

Table 8. Annual Direct, Secondary, and Total Economic Impacts of Grain Handling Activities in North Dakota, by Economic Sector, 1991 through 1993

Economic Sector	Economic Impacts From Grain Handling		
	Direct	Secondary	Total
	---------- 000s $ ----------		
Agriculture-Livestock	0	4,056	4,056
Agriculture-Crops	0	7,266	7,266
Nonmetal Mining	0	198	198
Construction	0	2,684	2,684
Transportation	0	456	456
Comm and Public Utilities	2,018	3,704	5,722
Ag Proc and Misc Mfg.	9,799	8,714	18,513
Retail Trade	9,754	23,226	32,980
Fin, Ins, and Real Estate	6,391	5,121	11,512
Business and Pers Service	1,345	2,033	3,378
Prof and Social Service	0	2,639	2,639
Households	11,772	28,387	40,159
Government	1,682	13,426	5,108
Total Impacts	42,761	91,910	134,671
Secondary Employment (full-time equivalent jobs)			1,553

allocated to the **Finance, Insurance, and Real Estate** sector. Communication expenses were allocated to the **Communications and Public Utilities** sector. General transportation expenses, maintenance-of-way costs, and net returns from truck transportation were allocated to the **Transportation** sector.

Total direct impacts of $102 million from wheat transportation generated about $160 million in secondary impacts (Table 9). Secondary impacts were greatest in the **Households** sector ($54 million) and the **Retail Trade** sector ($47 million). Secondary impacts from

Table 9. Annual Direct, Secondary, and Total Economic Impacts of Wheat Transportation in North Dakota, by Economic Sector, 1991 through 1993

Economic Sector	Economic Impacts From Transportation		
	Direct	Secondary	Total
	---------- 000s $ ----------		
Agriculture-Livestock	0	7,427	7,427
Agriculture-Crops	0	2,794	2,794
Nonmetal Mining	0	461	461
Construction	0	5,528	5,528
Transportation	16,509	973	17,482
Comm and Public Utilities	601	7,648	8,249
Ag Proc and Misc Mfg.	0	4,186	4,186
Retail Trade	49,956	47,379	97,335
Fin, Ins, and Real Estate	2,737	10,423	13,160
Business and Pers Service	0	3,794	3,794
Prof and Social Service	0	5,467	5,467
Households	30,310	53,665	83,975
Government	1,778	9,859	11,637
Total Impacts	101,891	159,604	261,495
Secondary Employment (full-time equivalent jobs)			3,745

transportation also affected the **Agriculture-Livestock**, **Construction**, and **Professional and Social Service** sectors, three sectors that had no direct impacts, but had substantial secondary impacts. For every dollar in direct economic activity from transportation activities, another $1.57 was generated in secondary economic activity. Total economic impacts from wheat transportation were about $261 million annually and included about 3,745 secondary jobs.

Processing

Expenditures and returns obtained from a survey of wheat processors in the state were allocated to various economic sectors. Construction was allocated to the **Construction** sector. Transportation expenses were allocated to the **Transportation** sector. Miscellaneous manufacturing and wholesale trade expenses and net returns were allocated to the **Agricultural Processing and Miscellaneous Manufacturing** sector. Half of plant

maintenance and overhaul expenses was allocated to **Business and Personal Services** sector, and the remaining half was allocated to the **Retail Trade** sector. Other items allocated to the **Retail Trade** sector included expenses for petroleum, natural gas, supplies, maintenance, and miscellaneous items. Communication, public utility, and electricity expenses were allocated to the **Communications and Public Utilities** sector. Interest and insurance expenses were allocated to the **Finance, Insurance, and Real Estate** sector. Employee benefits and salary and wages were allocated to the **Households** sector. All taxes were allocated to the **Government** sector.

Total direct impacts of $36 million from wheat processing activities generated about $85 million in secondary impacts (Table 10). Secondary impacts were greatest in the **Households** sector ($25 million) and the **Retail Trade** sector ($23 million). For every dollar in direct economic activity from wheat processing, another $2.32 was generated in secondary economic activity. Total economic impacts from wheat processing were about $121 million and included about 1,970 secondary jobs.

Table 10. Annual Direct, Secondary, and Total Economic Impacts of Wheat Processing Activities in North Dakota, by Economic Sector, 1991 through 1993

Economic Sector	Economic Impacts From Wheat Processing		
	Direct	Secondary	Total
	---------- 000s $ ----------		
Agriculture-Livestock	0	3,040	3,040
Agriculture-Crops	0	5,360	5,360
Nonmetal Mining	0	264	264
Construction	705	2,538	3,243
Transportation	10,906	359	11,265
Comm and Public Utilities	1,498	3,373	4,871
Ag Proc and Misc Mfg.	7,241	6,406	13,647
Retail Trade	231	23,089	23,320
Fin, Ins, and Real Estate	910	5,142	6,052
Business and Pers Service	141	1,923	2,064
Prof and Social Service	64	2,598	2,662
Households	14,732	25,393	40,125
Government	62	5,294	5,356
Total Impacts	36,490	84,779	121,269
Secondary Employment (full-time equivalent jobs)			1,968

Employment

The wheat industry benefits the economy by creating and supporting direct and secondary employment. Direct employment is a measure of the number of full-time jobs within an industry. Secondary jobs are an estimate of employment outside of an industry, but employment that is created from the industry's economic activity.

Direct Employment

Direct employment in the wheat industry is extremely difficult to quantify. Many of the positions (employment) affiliated with the wheat industry (i.e., those outside of production) exist in other industries. Employment at local elevators is part of the grain handling business; and jobs in shipping and hauling wheat are part of the transportation industry. In each case, some jobs might disappear without the wheat industry, while others may not be affected. For example, an elevator that relies on wheat for a major portion of its grain handling activities may reduce its work force if it no longer handled wheat, providing it could not make up for the loss in grain handling with other commodities or agricultural activities.

However, the issue is not that simple. If wheat was no longer produced, some alternative commodity likely would be raised in its place and likely would be marketed and handled by grain elevators. Thus, local elevators would change from handling and shipping wheat to handling and shipping the alternative commodity. The effects on employment are unclear.

Employment-related questions in transportation are similar. For example, independently employed truck drivers who haul farm commodities, in the absence of any wheat to haul, likely would remain employed, but seek alternative hauling opportunities with other commodities. Even in the case where wheat is the only commodity hauled, alternative commodities raised in the place of wheat likely would provide similar shipping opportunities. Thus, most of the jobs outside of wheat production are within industries that are supported only in part by the wheat industry. This makes estimating direct employment extremely difficult. The wheat industry does directly affect jobs in grain handling and transportation; however, actual quantification of those jobs is not clear.

Direct employment (full-time equivalent jobs) in wheat production is also difficult to quantify. Approximately 22,900 farms or 74 percent of all farms raised wheat in North Dakota in 1992, with about 21,300 of those farms having sales over $10,000 (U.S. Department of Commerce 1994). Of all farms in the state having grain sales over $10,000, 96 percent of them raised some wheat in 1992.

The number of full-time equivalent (FTE) positions that could be attributable to wheat production from those 22,900 farms is nearly impossible to estimate, given the scope of this study. Unless those farms raised only wheat each year, the time spent raising wheat usually would be less than a full-time job. The degree of time or fraction of employment for any particular farmer raising wheat varies nearly every year. An estimate of the number of full-time jobs would require knowing the number of people employed by those farms, and the fraction of employment devoted to wheat production for each worker. Also, many farmers, even in the absence of wheat, likely would remain employed raising other crops.

Employment in wheat processing activities was obtained from a survey of processors. Wheat processors were estimated to employ 520 FTE positions in North Dakota.

Secondary Employment

Secondary employment estimates represent the number of full-time jobs generated based on the volume of business activity created by the industry. Productivity ratios[5] were used with estimates of business activity to obtain secondary employment. Wheat production indirectly supported about 43,700 full-time equivalent jobs in North Dakota. Grain handling activities indirectly supported about 1,550 FTE jobs. Transportation of wheat to in-state and out-of-state markets generated about 3,745 FTE jobs. Wheat processing in the state indirectly supported about 1,968 FTE jobs. All wheat activities combined supported about 50,980 FTE jobs in the state.

Tax Revenue

Tax collections are another important measure of the economic impact of an industry on an economy. Tax implications are an increasingly important measure of local and state-level impacts. Some of the interest in estimating tax revenue generated by an industry stems from public awareness of the importance of tax revenue to local and state governments. In an era of reduced federal funding, revenue shortfalls, and growing public demand on governments to balance their budgets while providing constant or increased levels of services and benefits, tax collections are an important factor in assessing economic impacts.

Business activity alone does not directly support local government functions; however, taxes on personal income, retail trade, real estate property, and corporate income are important revenue sources for local and state governments. Total economic impacts in

[5]A measure of the amount of economic activity needed in an economic sector to support one full-time job.

the **Retail Trade** sector were used to estimate revenue from sales and use taxes. Economic activity in the **Households** sector was used to estimate personal income tax collections. Similarly, corporate income tax revenue was estimated from the economic activity in all business sectors (excluding the **Households, Government,** and **Agriculture** sectors).

I-O analysis was used to estimate personal income, retail trade, and other business activity, which was used to estimate tax revenue. Tax revenue generated by the wheat industry in North Dakota included $71.2 million in sales and use taxes, $20.4 million in personal income taxes, and $8 million in corporate income taxes in 1993 (Table 11). Total collections from sales and use, personal income, and corporate income taxes were about $100 million annually. Wheat production also was directly responsible for about $47.4 million in property taxes in 1993. Property taxes were included in the direct impacts.

Table 11. Estimated Tax Collections Generated From Wheat Industry Activities, North Dakota, 1993

Tax	Estimated Tax Collections
	------ million dollars ------
Sales and Use	71.2
Personal Income	20.4
Corporate Income	8.0
Total Taxes	99.8

Total Economic Impacts

Total annual direct impacts from wheat production expenditures and returns in North Dakota were estimated at $1.5 billion. Grain handling, transportation, and processing activities generated an additional $181 million in annual direct impacts. All wheat industry activities generated about $1.68 billion in annual direct impacts from 1991 through 1993. Business activity was greatest in the **Retail Trade** ($691 million), **Households** ($597 million), **Finance, Insurance, and Real Estate** ($244 million), and **Government** ($51 million) sectors (Table 12).

Annual secondary impacts from wheat production in North Dakota were estimated at $2.5 billion. Grain handling, transportation, and processing activities generated an additional $336 million in annual secondary impacts. All wheat industry activities generated about $2.85 billion in annual secondary impacts from 1991 through 1993. The economic areas of

Table 12. Direct Impacts from the Wheat Industry to the North Dakota Economy, by Economic Sector and Industry Activity, 1991 through 1993

Economic Sector	Total Direct Impacts by Industry Activity				
	Wheat Production	Transpor-tation	Grain Handling	Proc-essing	Total Direct
	000s $				
Agriculture-Livestock	0	0	0	0	0
Agriculture-Crops	0	0	0	0	0
Nonmetal Mining	0	0	0	0	0
Construction	0	0	0	705	705
Transportation	0	16,509	0	10,906	27,416
Comm and Pub Util	19,749	601	2,018	1,498	23,865
Ag Proc and Misc Mnfg	0	0	9,799	7,241	17,041
Retail Trade	630,865	49,956	9,754	231	690,807
Fin, Ins, and R Estate	233,871	2,737	6,391	910	243,908
Bus and Pers Service	25,511	0	1,345	141	26,997
Prof and Soc Service	0	0	0	64	64
Households	540,299	30,310	11,772	14,732	597,113
Government	47,448	1,778	1,682	62	50,970
Total Direct Impacts	1,497,743	101,891	42,761	36,490	1,678,886

the state economy with the greatest secondary impacts included the **Households** ($975 million), **Retail Trade** ($847 million), **Finance, Insurance, and Real Estate** ($186 million), **Communication and Public Utilities** ($141 million), and **Government** ($131 million) sectors. Overall, each dollar of direct impacts from the wheat industry generated about $1.70 in secondary impacts.

Secondary employment estimates represent the number of full-time jobs generated based on the volume of business activity created by the industry. Wheat activities in the state indirectly supported about 50,980 FTE jobs. In addition to wheat processing employment and secondary jobs, the wheat industry directly influences employment in grain handling and transportation. Direct employment from wheat processing was estimated at 520 FTE jobs.

Annual economic impacts from wheat production expenditures and returns in North Dakota were estimated at $4 billion. Grain handling, transportation, and processing activities generated an additional $517 million in annual economic impacts. All wheat industry activities generated a total economic impact of $4.5 billion annually in the state from 1991 through 1993 (Table 13).

The economic sectors with the greatest impacts included **Households** ($1.57 billion), **Retail Trade** ($1.54 billion), **Finance, Insurance, and Real Estate** ($430 million), **Government** ($182 million), and **Communication and Public Utilities** ($165 million) (Table 13).

Table 13. Total Impacts from the Wheat Industry to the North Dakota Economy, by Economic Sector and Industry Activity, 1991 through 1993

Economic Sector	Total Economic Impacts by Industry Activity				
	Wheat Production	Transpor-tation	Grain Handling	Proc-essing	Total Impacts
	000s $				
Agriculture-Livestock	108,658	7,427	4,056	3,040	123,181
Agriculture-Crops	43,663	2,794	7,266	5,360	59,083
Nonmetal Mining	5,934	461	198	264	6,857
Construction	90,615	5,528	2,684	3,243	102,070
Transportation	14,960	17,482	456	11,265	44,163
Comm and Pub Util	145,820	8,249	5,722	4,871	164,662
Ag Proc and Misc Mnfg	68,587	4,186	18,513	13,647	104,933
Retail Trade	1,383,965	97,335	32,980	23,320	1,537,600
Fin, Ins, and R Estate	399,393	13,160	11,512	6,052	430,117
Bus and Pers Service	90,336	3,794	3,378	2,064	99,572
Prof and Soc Service	91,860	5,467	2,639	2,662	102,628
Households	1,408,287	83,975	40,159	40,125	1,572,546
Government	159,651	11,637	5,108	5,356	181,752
Total Economic Impacts	4,011,729	261,495	134,671	121,269	4,529,164
Secondary Employment	43,712	3,745	1,553	1,968	50,980

Each acre of wheat planted in North Dakota (1991 through 1993) averaged about $408 in total economic activity (direct and secondary economic impacts) or, expressed alternatively, each bushel of wheat produced resulted in $12.3 in total business activity. For every 217 acres of wheat planted or 7,224 bushels of wheat harvested, one secondary FTE

job in North Dakota was supported. On average, each acre of wheat planted in North Dakota generated about $12.28 in tax revenue ($4.28 in property tax and $9.00 in combined sales and use, personal income, and corporate income taxes).

SUMMARY

North Dakota, like other Great Plains states, relies heavily upon agriculture for much of its economic activity. The contribution/dependence of agriculture to the state's economy has been repeatedly documented; however, the economic significance of the various economic activities within the agriculture sector are less understood. Agriculture in the state is heavily dominated by farm-level production activities. North Dakota's reliance on agriculture is based largely on crop sales, which account for about 70 percent of the total value of all farm receipts.

North Dakota has traditionally been a leading state in the production of several crops in the United States; however, the most important, both in terms of acreage and gross sales, is wheat. Wheat is arguably the single most important agricultural activity in the state, accounting for over 40 percent of all farm receipts (crop and livestock sales) and generating over $1 billion in cash receipts annually. The importance of wheat to the state's economy becomes clear when the magnitude of wheat sales is combined with the state's dependence upon agricultural activities. Thus, an economic impact study of the wheat industry benefits the state by (1) documenting the size of the industry, (2) highlighting the susceptibility of the state's economy to changes in wheat activities, and (3) identifying the economic consequences of policy changes affecting the industry.

An analysis of the economic impacts from the wheat industry was limited to wheat produced in North Dakota and included in-state expenditures and returns from wheat transportation, handling, and processing. Wheat acreage and yields and production expenses and returns were used to estimate the economic activity from wheat production. Commodity flow information was used to determine the amount of wheat shipped to various market destinations. Wheat flow information was combined with truck and rail transportation costs and returns to estimate the economic impacts from wheat shipments. Grain handling costs and returns were estimated to determine the economic activity from wheat handling. Economic impacts from wheat processing were limited to in-state flour milling and were based on a survey of wheat processors in the state.

Wheat production in North Dakota averaged 11.1 million acres and 368 million bushels from 1991 through 1993. Average yield during that time was 33 bushels per planted acre. Wheat industry impacts were estimated based on a three-year average of wheat acreage and production. Total direct impacts (in-state expenditures and returns) from wheat

production were estimated at $1.5 billion or about $135 per acre. The $1.5 billion in direct impacts from wheat production generated another $2.5 billion in secondary economic impacts.

Direct impacts from handling wheat at country (local) elevators in North Dakota were estimated at about $43 million. Secondary impacts resulting from grain handling activities were estimated at $92 million dollars.

In-state expenditures and returns from transporting wheat from country elevators to market destinations were estimated at $102 million. The direct economic impacts from transportation activities generated another $160 million in secondary impacts. Truck and rail shipments of wheat accounted for one-third and two-thirds of all wheat transportation impacts, respectively.

Direct economic impacts generated by wheat milling activities were estimated at about $36 million. Flour milling activity generated another $85 million in secondary impacts.

Annual economic impacts from all wheat activities in North Dakota were estimated at $4.5 billion. Wheat production accounted for 88 percent, grain handling accounted for 6 percent, transportation accounted for about 3 percent, and processing activities accounted for 3 percent of all economic impacts.

The wheat industry, through economic activity created by wheat production, handling, transportation, and processing, indirectly supported about 50,980 full-time equivalent secondary jobs. Secondary jobs represent employment outside the wheat industry, but employment that is dependent on the existence of the wheat industry. Wheat processing activities directly supports about 520 full-time equivalent jobs annually.

In addition to secondary employment, economic activity associated with the wheat industry in North Dakota generated about $71 million, $20 million, and $8 million in sales and use, personal income, and corporate income taxes, respectively. The wheat industry also was estimated to be directly responsible for about $47 million in property taxes. Total taxes generated by the wheat industry in North Dakota, including property taxes, were estimated at $147 million annually.

CONCLUSIONS

Wheat production is undoubtedly the most important agricultural activity in North Dakota. The importance of wheat to North Dakota is not a recent phenomenon; historical

acreage and production would suggest this crop has been the single most important agricultural activity in the state for several decades. The importance of wheat not only comes from the magnitude of the crop's impacts, but from the distribution of those impacts as well. Wheat is produced abundantly throughout North Dakota, which correspondingly implies the impacts are distributed in all areas of North Dakota. Also, much of the impacts from wheat production are generated in local and rural economies through the purchase of production inputs, which are not concentrated in any particular region or city.

The enormous influence of wheat production on North Dakota's economy also makes the economy sensitive to factors affecting overall crop value. Because of the magnitude of wheat production, small changes in wheat acreage, yields, or prices can have dramatic effects on the state's economy. Examples of the effects of these changes have been recently felt with yield reductions from overly wet growing/harvest conditions and the effects of wheat diseases on crop values. The actual effects of recent adverse weather impacts were not evaluated in this study; however, the effect of changes in price or crop production can be demonstrated. For example, a $0.10 to $0.15 per bushel drop in the average yearly market value for wheat, based on production figures from 1991 through 1993, would cost the state $37 to $55 million in lost revenues. Alternatively, if crop prices remain unchanged but yield drops by 10 percent statewide, the state could experience a reduction in farm revenues of nearly $124 million. Decreases in crop quantities also affect transportation and grain handling impacts, further adding to the effect of reduced crop quantities. The potential consequences of policies or actions which could affect crop prices and/or acreage planted should be evaluated carefully since small changes in wheat production or values translate into substantial impacts within the state.

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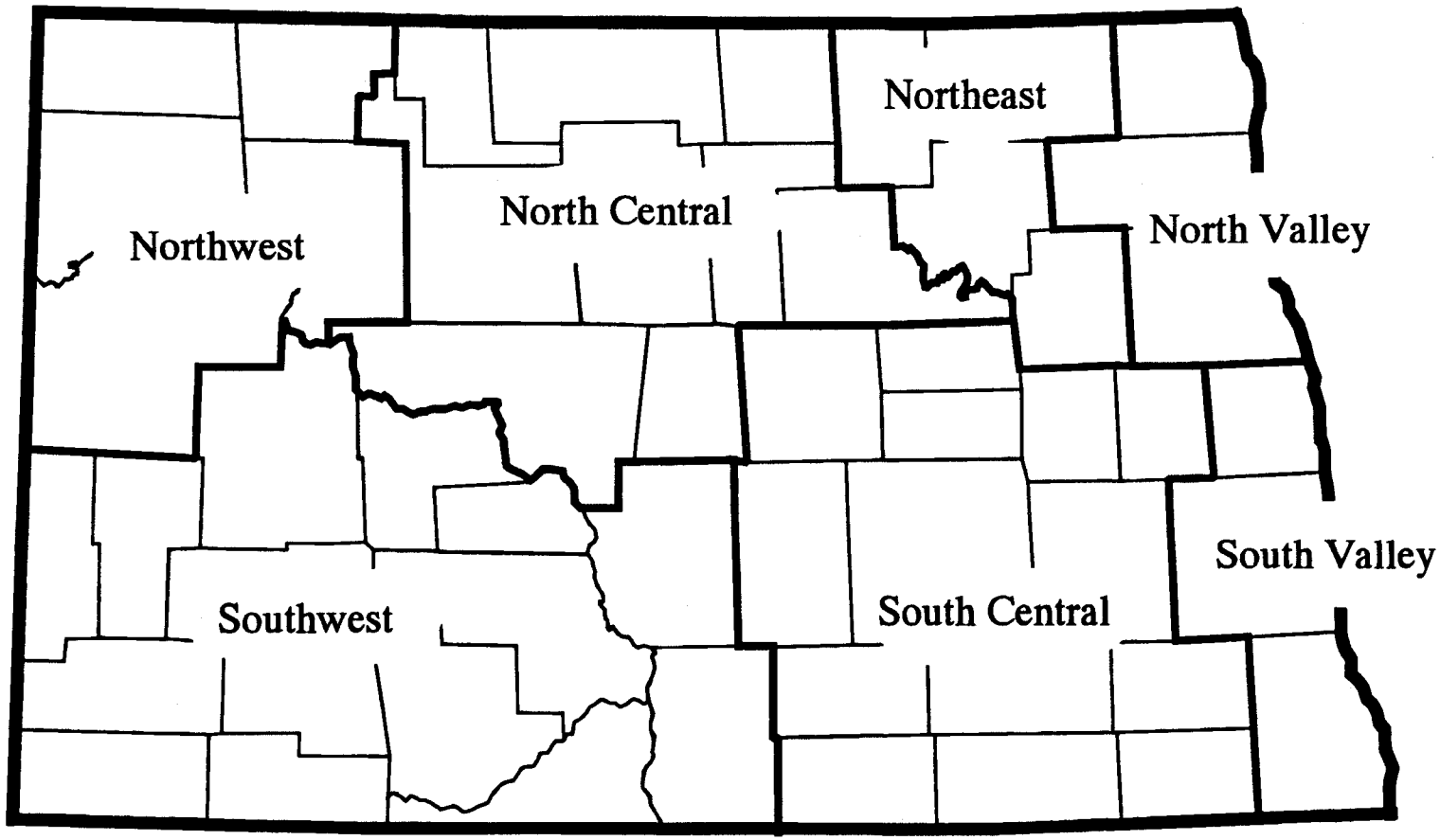
APPENDIX A

Wheat Production, Yield, and Acreage by County, North Dakota, 1991-1993

Certified seed production was obtained from the North Dakota State Seed Department (Kunz 1994). Total seed use was estimated by multiplying planting seed rates and average planted acres. Planting seed rates were obtained from Swenson and Aakre (1992). Wheat entering the marketing system was estimated as total production less total seed use, adjusted for 1 percent shrink. Wheat handled by local elevators was estimated as total wheat production less the difference between total seed use and certified seed production.

Extension Service Crop Production Regions



Appendix Table A1. Spring Wheat, by County and Production Region, North Dakota, Average 1991 Through 1993

County and Production Region	Summer Fallow				Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production	Acres Planted	Acres Harvested	Yield per Pltd Acre	Production
			bu				bu	
Benson	44,200	42,867	36.3	1,605,967	95,033	89,367	30.8	2,927,133
Bottineau	66,767	65,733	37.1	2,475,167	168,233	166,600	34.2	5,756,167
McHenry	67,133	65,967	31.4	2,106,600	115,867	114,700	29.0	3,365,133
McLean	90,200	88,667	34.2	3,082,967	121,600	119,633	31.5	3,829,433
Pierce	35,400	33,667	30.9	1,094,733	81,267	76,167	26.8	2,176,267
Renville	89,733	88,567	39.9	3,580,800	80,267	79,767	35.6	2,856,533
Rolette	10,700	10,533	36.8	393,900	37,600	36,600	31.1	1,168,467
Sheridan	44,867	43,933	29.8	1,336,000	80,133	79,233	25.9	2,071,667
Ward	94,233	93,567	37.5	3,533,233	155,533	153,867	32.8	5,105,633
NORTHCENTRAL	543,233	533,500	35.4	19,209,367	935,533	915,933	31.3	29,256,433
Cavalier	52,100	48,567	39.8	2,072,967	291,233	254,433	31.5	9,187,033
Nelson	29,733	28,533	36.9	1,098,500	158,600	151,133	32.3	5,115,500
Ramsey	38,100	35,100	36.0	1,370,300	150,233	135,900	30.8	4,627,033
Towner	21,533	21,000	38.1	819,467	78,467	74,667	30.1	2,365,200
NORTHEAST	141,467	133,200	37.9	5,361,233	678,533	616,133	31.4	21,294,767
Grand Forks	27,800	27,167	45.3	1,259,467	244,400	237,067	41.0	10,032,567
Pembina	19,300	17,733	39.6	764,367	264,033	233,933	35.0	9,246,300
Walsh	34,167	31,967	39.0	1,334,100	278,967	255,167	39.7	11,064,167
NORTH VALLEY	81,267	76,867	41.3	3,357,933	787,400	726,167	38.5	30,343,033
Burke	73,133	71,900	36.8	2,689,967	45,200	44,267	36.5	1,651,367
Divide	26,633	26,300	37.7	1,004,367	11,667	11,500	37.4	436,167
McKenzie	87,400	83,700	33.1	2,889,200	27,533	26,700	30.2	832,800
Mountrail	21,733	21,567	37.5	816,067	12,600	12,433	36.4	458,933
Williams	164,833	163,633	33.3	5,493,267	33,800	33,433	32.2	1,088,133
NORTHWEST	373,733	367,100	34.5	12,892,867	130,800	128,333	34.2	4,467,400
Barnes	47,367	46,333	41.1	1,947,633	299,100	288,133	36.2	10,815,667
Dickey	14,767	14,133	35.4	522,933	130,100	126,733	35.0	4,559,600
Eddy	18,833	18,267	33.3	626,433	69,167	66,233	28.6	1,980,633
Foster	23,433	23,067	39.5	925,167	124,167	120,733	32.2	4,002,733
Griggs	20,433	19,667	40.7	832,633	118,900	113,500	31.9	3,786,967
Kidder	15,700	15,167	34.1	534,733	58,967	56,667	25.6	1,509,467
LaMoure	50,933	49,600	38.7	1,969,900	162,167	156,833	35.6	5,767,233
Logan	28,933	27,900	34.9	1,009,600	87,633	85,833	30.1	2,639,800
McIntosh	33,767	32,700	34.6	1,169,267	112,900	105,300	24.5	2,762,400
Ransom	9,733	9,700	41.3	402,133	103,233	101,767	37.7	3,888,733
Sargent	9,100	8,933	42.3	384,900	110,867	105,367	34.9	3,870,300
Steele	18,033	17,467	38.0	685,267	150,233	144,467	34.7	5,219,533
Stutsman	81,600	79,333	39.2	3,195,933	284,600	272,567	32.4	9,219,100
Wells	66,900	66,133	37.9	2,534,600	176,433	172,200	32.4	5,720,733
SOUTH CENTRAL	439,533	428,400	38.1	16,741,133	1,988,467	1,916,333	33.1	65,742,900
Cass	27,667	26,500	41.6	1,151,633	341,633	333,467	39.8	13,597,500
Richland	9,533	9,433	40.9	389,767	188,800	186,233	39.5	7,449,900
Traill	11,233	11,133	40.1	450,300	167,100	165,367	41.2	6,888,367
SOUTH VALLEY	48,433	47,067	41.1	1,991,700	697,533	685,067	40.0	27,935,767

- continued -

Appendix Table A1. Continued

County and Production Region	Summer Fallow				Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production	Acres Planted	Acres Harvested	Yield per Pltd Acre	Production
			bu				bu	
Adams	72,133	66,133	27.3	1,971,333	32,867	30,867	24.1	792,333
Billings	22,533	22,033	28.6	644,567	7,467	6,967	22.0	164,100
Bowman	70,233	68,900	31.7	2,227,167	14,767	13,433	25.9	382,833
Burleigh	47,133	45,867	30.9	1,454,767	97,633	94,067	25.3	2,467,633
Dunn	57,900	56,833	32.2	1,866,433	60,433	55,833	23.9	1,444,567
Emmons	39,267	37,333	29.6	1,162,633	168,467	162,733	25.8	4,338,600
Golden Valley	37,967	37,833	36.9	1,402,067	37,033	35,667	30.0	1,109,600
Grant	69,700	68,633	29.4	2,050,800	71,867	69,933	24.6	1,765,567
Hettinger	129,400	124,733	35.0	4,526,500	90,600	85,933	28.0	2,540,833
Mercer	50,633	49,600	31.6	1,601,800	31,933	30,967	25.4	810,767
Morton	71,367	69,700	31.7	2,265,000	86,900	82,233	24.8	2,157,667
Oliver	21,500	21,033	33.7	724,067	35,600	33,733	29.1	1,034,733
Sioux	17,400	16,367	24.7	430,433	19,233	17,467	22.5	432,233
Slope	76,433	75,633	33.5	2,558,967	23,567	23,033	24.4	574,367
Stark	100,733	100,067	31.3	3,151,467	70,933	69,100	26.0	1,841,200
SOUTHWEST	884,333	860,700	31.7	28,038,000	849,300	811,967	25.7	21,857,033
NORTH DAKOTA	2,512,000	2,446,833	34.9	87,592,233	6,067,567	5,799,933	33.1	200,897,333

Source: North Dakota Agricultural Statistics Service.

Appendix Table A2. Durum Wheat, By County and Production Region, North Dakota, Average, 1991 Through 1993

County and Production Region	Summer Fallow				Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production	Acres Planted	Acres Harvested	Yield per Pltd Acre	Production
			bu				bu	
Benson	59,633	58,300	33.1	1,975,033	85,167	81,167	28.5	2,430,500
Bottineau	58,067	57,067	33.7	1,955,933	101,933	99,933	30.3	3,083,733
McHenry	5,267	5,167	33.3	175,167	11,400	10,933	29.1	331,500
McLean	95,167	94,367	32.0	3,044,100	81,500	79,467	30.2	2,460,233
Pierce	25,933	24,833	30.7	797,000	40,733	39,567	27.2	1,106,667
Renville	31,900	31,233	37.3	1,188,967	35,433	34,433	32.2	1,140,700
Rolette	31,167	30,667	33.5	1,044,600	63,833	61,167	30.4	1,939,400
Sheridan	1,367	1,300	26.8	36,600	1,467	1,467	27.3	40,067
Ward	82,867	81,800	36.3	3,008,267	107,133	104,867	31.9	3,416,400
NORTH CENTRAL	391,367	384,733	33.8	13,225,667	528,600	513,000	30.2	15,949,200
Cavalier	27,433	26,333	37.2	1,019,167	105,900	94,333	29.5	3,128,833
Nelson	9,833	9,700	34.0	333,900	36,167	34,767	32.1	1,161,433
Ramsey	26,233	24,867	34.2	897,400	94,767	88,967	29.4	2,781,600
Towner	61,900	59,867	34.1	2,109,033	128,100	122,467	29.7	3,807,633
NORTHEAST	125,400	120,767	34.8	4,359,500	364,933	340,533	29.8	10,879,500
Grand Forks	333	333	38.3	12,767	4,000	3,667	34.1	136,567
Pembina	233	233	39.6	9,233	2,767	2,533	36.9	102,100
Walsh	1,233	1,200	31.4	38,700	7,767	7,067	30.6	237,967
NORTH VALLEY	1,800	1,767	33.7	60,700	14,533	13,267	32.8	476,633
Burke	48,233	45,833	34.4	1,658,800	24,433	24,167	33.4	814,867
Divide	148,433	147,067	36.7	5,440,767	26,200	25,567	32.9	863,100
McKenzie	32,533	32,267	34.2	1,112,467	4,600	4,467	30.3	139,200
Mountrail	164,467	162,267	35.3	5,805,400	73,867	71,733	31.6	2,333,600
Williams	121,500	118,167	32.2	3,911,667	21,100	20,767	28.2	595,633
NORTHWEST	515,167	505,600	34.8	17,929,100	150,200	146,700	31.6	4,746,400
Barnes	767	700	27.8	21,333	5,400	5,267	31.4	169,667
Dickey	1,133	1,100	34.4	38,967	6,200	5,867	27.8	172,367
Eddy	2,700	2,633	30.0	80,867	7,467	6,933	22.7	169,133
Foster	1,033	1,000	35.4	36,567	5,967	5,833	28.1	167,767
Griggs	1,067	1,000	35.6	37,967	4,267	3,833	34.9	149,033
Kidder	1,733	1,667	35.0	60,633	3,600	3,300	24.9	89,700
LaMoure	2,067	2,067	33.4	68,933	8,267	8,133	32.3	266,733
Logan	900	867	26.0	23,433	1,767	1,567	21.5	37,900
McIntosh	967	933	26.4	25,500	2,867	2,700	20.2	57,833
Ransom	233	233	33.9	7,900	2,167	2,100	30.0	65,100
Sargent	633	600	30.3	19,200	11,200	10,267	26.0	291,133
Steele	633	600	36.7	23,267	4,700	4,500	33.3	156,733
Stutsman	8,100	7,833	33.3	270,033	28,567	27,767	29.4	839,633
Wells	12,300	11,933	33.5	411,500	23,033	22,333	29.2	671,500
SOUTHCENTRAL	34,267	33,167	32.9	1,126,100	115,467	110,400	28.6	3,304,233
Cass	867	800	38.1	33,000	13,833	12,833	38.1	526,667
Richland	300	300	32.6	9,767	7,633	7,600	35.1	267,567
Traill	333	333	40.8	13,600	5,167	5,000	37.4	193,400
SOUTHVALLEY	1,500	1,433	37.6	56,367	26,633	25,433	37.1	987,633

- continued -

Appendix Table A2. Continued

County and Production Region	Summer Fallow				Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production	Acres Planted	Acres Harvested	Yield per Pltd Acre	Production
			bu				bu	
Adams	4,900	4,867	31.7	155,267	933	933	23.3	21,733
Billings	500	467	28.5	14,233	133	133	28.2	3,767
Bowman	7,667	7,400	30.1	230,567	1,667	1,667	23.1	38,433
Burleigh	5,633	5,467	32.3	182,233	4,700	4,533	26.1	122,767
Dunn	867	800	32.0	27,700	300	233	21.0	6,300
Emmons	1,100	933	22.7	24,967	2,633	2,200	18.6	49,033
Golden Valley	5,200	5,167	37.6	195,333	1,967	1,967	28.3	55,667
Grant	567	467	22.8	12,933	567	300	13.6	7,733
Hettinger	8,833	8,533	35.0	309,167	1,667	1,567	22.1	36,833
Mercer	5,967	5,800	31.8	189,633	3,867	3,733	29.3	113,367
Morton	633	533	25.1	15,867	433	333	19.5	8,467
Oliver	0	0	0.0	0	0	0	0.0	0
Sioux	767	700	21.8	16,700	1,300	1,033	19.2	24,967
Slope	6,133	6,100	32.1	196,800	1,233	1,233	24.8	30,533
Stark	5,400	5,033	27.5	148,233	2,767	2,600	20.4	56,433
SOUTHWEST	54,167	52,267	31.7	1,719,633	24,167	22,467	23.8	576,033
NORTH DAKOTA	1,123,667	1,099,733	34.2	38,477,067	1,224,533	1,171,800	30.1	36,919,633

Source: North Dakota Agricultural Statistics Service.

Appendix Table A3. Winter Wheat, by County and Production Region, North Dakota, Average 1991 Through 1993

County and Production Region	Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production
			bu	
Benson	1,567	1,333	29.0	45,433
Bottineau	2,767	2,633	35.0	96,900
McHenry	2,100	1,967	32.1	67,400
McLean	5,633	4,467	25.1	141,333
Pierce	567	467	29.3	16,600
Renville	0	0	0.0	0
Rolette	267	233	26.7	7,133
Sheridan	2,067	1,733	24.5	50,733
Ward	2,500	2,367	36.2	90,600
NORTH CENTRAL	17,467	15,200	29.5	516,133
Cavalier	567	500	30.2	17,100
Nelson	1,600	1,267	30.9	49,467
Ramsey	1,100	967	32.0	35,167
Towner	800	733	35.0	28,000
NORTHEAST	4,067	3,467	31.9	129,733
Grand Forks	2,600	2,400	34.8	90,600
Pembina	267	267	30.1	8,033
Walsh	67	67	20.0	1,333
NORTH VALLEY	2,933	2,733	34.1	99,967
Burke	4,000	3,700	30.8	123,067
Divide	9,400	8,667	32.0	300,400
McKenzie	4,833	4,267	33.6	162,233
Mountrail	1,933	1,567	26.8	51,867
Williams	13,667	12,533	29.2	398,833
NORTHWEST	33,833	30,733	30.6	1,036,400

- continued -

Appendix Table A3. Continued

County and Production Region	Continuous Cropping			
	Acres Planted	Acres Harvested	Yield Per Pltd Acre	Production
			bu	
Barnes	1,800	1,700	34.6	62,300
Dickey	6,167	5,267	28.2	174,100
Eddy	1,433	1,033	23.1	33,067
Foster	1,000	733	24.9	24,933
Griggs	2,067	1,933	32.8	67,800
Kidder	1,333	1,133	29.0	38,633
LaMoure	3,700	2,900	22.6	83,767
Logan	967	800	21.9	21,167
McIntosh	1,167	1,067	22.3	26,067
Ransom	4,100	3,733	34.4	140,867
Sargent	3,967	3,733	35.8	142,200
Steele	1,567	1,500	36.4	57,000
Stutsman	10,000	8,200	29.2	292,400
Wells	4,167	3,600	30.3	126,233
SOUTH CENTRAL	43,433	37,333	29.7	1,290,533
Cass	3,600	3,300	32.1	115,633
Richland	1,267	1,133	28.3	35,833
Traill	1,533	1,500	35.5	54,500
SOUTH VALLEY	6,400	5,933	32.2	205,967
Adams	6,333	4,967	26.7	169,167
Billings	1,967	1,167	17.3	33,933
Bowman	3,833	2,867	26.9	103,000
Burleigh	4,167	3,600	21.1	88,000
Dunn	4,167	3,867	29.3	122,100
Emmons	2,100	1,933	28.0	58,867
Golden Valley	6,333	5,567	31.8	201,167
Grant	1,167	967	27.5	32,067
Hettinger	2,000	1,567	21.7	43,433
Mercer	1,833	1,467	23.0	42,200
Morton	1,367	967	19.8	27,000
Oliver	533	333	18.8	10,000
Sioux	700	567	22.1	15,467
Slope	2,500	2,167	34.6	86,533
Stark	2,867	2,600	32.0	91,667
SOUTHWEST	41,867	34,600	26.9	1,124,600
NORTH DAKOTA	150,000	130,000	29.4	4,403,333

Source: North Dakota Agricultural Statistics Service.

Appendix Table A4. All Durum, Spring, and Winter Wheat Production, by Production Region and County, North Dakota, Average 1991 Through 1993

County and Production Region	Durum (continuous and summerfallow)				Spring Wheat (continuous and summerfallow)				Winter Wheat			
	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production
			bu				bu				bu	
Benson	144,800	139,467	30.4	4,405,533	139,233	132,233	32.6	4,533,100	1,567	1,333	29.0	45,433
Bottineau	160,000	157,000	31.5	5,039,667	235,000	232,333	35.0	8,231,333	2,767	2,633	35.0	96,900
McHenry	16,667	16,100	30.4	506,667	183,000	180,667	29.9	5,471,733	2,100	1,967	32.1	67,400
McLean	176,667	173,833	31.2	5,504,333	211,800	208,300	32.6	6,912,400	5,633	4,467	25.1	141,333
Pierce	66,667	64,400	28.6	1,903,667	116,667	109,833	28.0	3,271,000	567	467	29.3	16,600
Renville	67,333	65,667	34.6	2,329,667	170,000	168,333	37.9	6,437,333	0	0	0.0	0
Rolette	95,000	91,833	31.4	2,984,000	48,300	47,133	32.3	1,562,367	267	233	26.7	7,133
Sheridan	2,833	2,767	27.1	76,667	125,000	123,167	27.3	3,407,667	2,067	1,733	24.5	50,733
Ward	190,000	186,667	33.8	6,424,667	249,767	247,433	34.6	8,638,867	2,500	2,367	36.2	90,600
NORTH CENTRAL	919,967	897,733	31.7	29,174,867	1,478,767	1,449,433	32.8	48,465,800	17,467	15,200	29.5	516,133
Cavalier	133,333	120,667	31.1	4,148,000	343,333	303,000	32.8	11,260,000	567	500	30.2	17,100
Nelson	46,000	44,467	32.5	1,495,333	188,333	179,667	33.0	6,214,000	1,600	1,267	30.9	49,467
Ramsey	121,000	113,833	30.4	3,679,000	188,333	171,000	31.8	5,997,333	1,100	967	32.0	35,167
Towner	190,000	182,333	31.1	5,916,667	100,000	95,667	31.8	3,184,667	800	733	35.0	28,000
NORTHEAST	490,333	461,300	31.1	15,239,000	820,000	749,333	32.5	26,656,000	4,067	3,467	31.9	129,733
Grand Forks	4,333	4,000	34.5	149,333	272,200	264,233	41.5	11,292,033	2,600	2,400	34.8	90,600
Pembina	3,000	2,767	37.1	111,333	283,333	251,667	35.3	10,010,667	267	267	30.1	8,033
Walsh	9,000	8,267	30.7	276,667	313,133	287,133	39.6	12,398,267	67	67	20.0	1,333
NORTH VALLEY	16,333	15,033	32.9	537,333	868,667	803,033	38.8	33,700,967	2,933	2,733	34.1	99,967
Burke	72,667	70,000	34.0	2,473,667	118,333	116,167	36.7	4,341,333	4,000	3,700	30.8	123,067
Divide	174,633	172,633	36.1	6,303,867	38,300	37,800	37.6	1,440,533	9,400	8,667	32.0	300,400
McKenzie	37,133	36,733	33.7	1,251,667	114,933	110,400	32.4	3,722,000	4,833	4,267	33.6	162,233
Mountrail	238,333	234,000	34.1	8,139,000	34,333	34,000	37.1	1,275,000	1,933	1,567	26.8	51,867
Williams	142,600	138,933	31.6	4,507,300	198,633	197,067	33.1	6,581,400	13,667	12,533	29.2	398,833
NORTHWEST	665,367	652,300	34.1	22,675,500	504,533	495,433	34.4	17,360,267	33,833	30,733	30.6	1,036,400

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Appendix Table A4. Continued

County and Production Region	Durum (continuous and summerfallow)				Spring Wheat (continuous and summerfallow)				Winter Wheat			
	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production
			bu				bu				bu	
Barnes	6,167	5,967	31.0	191,000	346,467	334,467	36.8	12,763,300	1,800	1,700	34.6	62,300
Dickey	7,333	6,967	28.8	211,333	144,867	140,867	35.1	5,082,533	6,167	5,267	28.2	174,100
Eddy	10,167	9,567	24.6	250,000	88,000	84,500	29.6	2,607,067	1,433	1,033	23.1	33,067
Foster	7,000	6,833	29.2	204,333	147,600	143,800	33.4	4,927,900	1,000	733	24.9	24,933
Griggs	5,333	4,833	35.1	187,000	139,333	133,167	33.2	4,619,600	2,067	1,933	32.8	67,800
Kidder	5,333	4,967	28.2	150,333	74,667	71,833	27.4	2,044,200	1,333	1,133	29.0	38,633
LaMoure	10,333	10,200	32.5	335,667	213,100	206,433	36.3	7,737,133	3,700	2,900	22.6	83,767
Logan	2,667	2,433	23.0	61,333	116,567	113,733	31.3	3,649,400	967	800	21.9	21,167
McIntosh	3,833	3,633	21.7	83,333	146,667	138,000	26.8	3,931,667	1,167	1,067	22.3	26,067
Ransom	2,400	2,333	30.4	73,000	112,967	111,467	38.0	4,290,867	4,100	3,733	34.4	140,867
Sargent	11,833	10,867	26.2	310,333	119,967	114,300	35.5	4,255,200	3,967	3,733	35.8	142,200
Steele	5,333	5,100	33.8	180,000	168,267	161,933	35.1	5,904,800	1,567	1,500	36.4	57,000
Stutsman	36,667	35,600	30.3	1,109,667	366,200	351,900	33.9	12,415,033	10,000	8,200	29.2	292,400
Wells	35,333	34,267	30.7	1,063,000	243,333	238,333	33.9	8,255,333	4,167	3,600	30.3	126,233
SOUTH CENTRAL	149,733	143,567	29.6	4,430,333	2,428,000	2,344,733	34.0	82,484,033	43,433	37,333	29.7	1,290,533
Cass	14,700	13,633	38.1	559,667	369,300	359,967	39.9	14,749,133	3,600	3,300	32.1	115,633
Richland	7,933	7,900	35.0	277,333	198,333	195,667	39.5	7,839,667	1,267	1,133	28.3	35,833
Traill	5,500	5,333	37.6	207,000	178,333	176,500	41.2	7,338,667	1,533	1,500	35.5	54,500
SOUTH VALLEY	28,133	26,867	37.1	1,044,000	745,967	732,133	40.1	29,927,467	6,400	5,933	32.2	205,967
Adams	5,833	5,800	30.3	177,000	105,000	97,000	26.3	2,763,667	6,333	4,967	26.7	169,167
Billings	633	600	28.4	18,000	30,000	29,000	27.0	808,667	1,967	1,167	17.3	33,933
Bowman	9,333	9,067	28.8	269,000	85,000	82,333	30.7	2,610,000	3,833	2,867	26.9	103,000
Burleigh	10,333	10,000	29.5	305,000	144,767	139,933	27.1	3,922,400	4,167	3,600	21.1	88,000
Dunn	1,167	1,033	29.1	34,000	118,333	112,667	28.0	3,311,000	4,167	3,867	29.3	122,100
Emmons	3,733	3,133	19.8	74,000	207,733	200,067	26.5	5,501,233	2,100	1,933	28.0	58,867
Golden Valley	7,167	7,133	35.0	251,000	75,000	73,500	33.5	2,511,667	6,333	5,567	31.8	201,167
Grant	1,133	767	18.2	20,667	141,567	138,567	27.0	3,816,367	1,167	967	27.5	32,067
Hettinger	10,500	10,100	33.0	346,000	220,000	210,667	32.1	7,067,333	2,000	1,567	21.7	43,433
Mercer	9,833	9,533	30.8	303,000	82,567	80,567	29.2	2,412,567	1,833	1,467	23.0	42,200
Morton	1,067	867	22.8	24,333	158,267	151,933	27.9	4,422,667	1,367	967	19.8	27,000
Oliver	0	0	0.0	0	57,100	54,767	30.8	1,758,800	533	333	18.8	10,000
Sioux	2,067	1,733	20.2	41,667	36,633	33,833	23.5	862,667	700	567	22.1	15,467
Slope	7,367	7,333	30.9	227,333	100,000	98,667	31.3	3,133,333	2,500	2,167	34.6	86,533
Stark	8,167	7,633	25.1	204,667	171,667	169,167	29.1	4,992,667	2,867	2,600	32.0	91,667
SOUTHWEST	78,333	74,733	29.3	2,295,667	1,733,633	1,672,667	28.8	49,895,033	41,867	34,600	26.9	1,124,600
NORTH DAKOTA	2,348,200	2,271,533	32.1	75,396,700	8,579,567	8,246,767	33.6	288,489,567	150,000	130,000	29.4	4,403,333

Source: North Dakota Agricultural Statistics Service.

Appendix Table A5. All Wheat, by County and Production Region, North Dakota, Average 1991 Through 1993

County and Production Region	All Wheat			
	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production
			bu	
Benson	285,600	273,033	31.5	8,984,067
Bottineau	397,767	391,967	33.6	13,367,900
McHenry	201,767	198,733	30.0	6,045,800
McLean	394,100	386,600	31.9	12,558,067
Pierce	183,900	174,700	28.2	5,191,267
Renville	237,333	234,000	36.9	8,767,000
Rolette	143,567	139,200	31.7	4,553,500
Sheridan	129,900	127,667	27.2	3,535,067
Ward	442,267	436,467	34.3	15,154,133
NORTH CENTRAL	2,416,200	2,362,367	32.3	78,156,800
Cavalier	477,233	424,167	32.3	15,425,100
Nelson	235,933	225,400	32.9	7,758,800
Ramsey	310,433	285,800	31.3	9,711,500
Towner	290,800	278,733	31.4	9,129,333
NORTHEAST	1,314,400	1,214,100	32.0	42,024,733
Grand Forks	279,133	270,633	41.3	11,531,967
Pembina	286,600	254,700	35.3	10,130,033
Walsh	322,200	295,467	39.3	12,676,267
NORTH VALLEY	887,933	820,800	38.7	34,338,267
Burke	195,000	189,867	35.6	6,938,067
Divide	222,333	219,100	36.2	8,044,800
McKenzie	156,900	151,400	32.7	5,135,900
Mountrail	274,600	269,567	34.5	9,465,867
Williams	354,900	348,533	32.4	11,487,533
NORTHWEST	1,203,733	1,178,467	34.1	41,072,167

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Appendix Table A5. Continued

County and Production Region	All Wheat			
	Acres Planted	Acres Harvested	Yield per Pltd Ac	Production
			bu	
Barnes	354,433	342,133	36.7	13,016,600
Dickey	158,367	153,100	34.5	5,467,967
Eddy	99,600	95,100	29.0	2,890,133
Foster	155,600	151,367	33.1	5,157,167
Griggs	146,733	139,933	33.2	4,874,400
Kidder	81,333	77,933	27.5	2,233,167
LaMoure	227,133	219,533	35.9	8,156,567
Logan	120,200	116,967	31.0	3,731,900
McIntosh	151,667	142,700	26.6	4,041,067
Ransom	119,467	117,533	37.7	4,504,733
Sargent	135,767	128,900	34.7	4,707,733
Steele	175,167	168,533	35.1	6,141,800
Stutsman	412,867	395,700	33.5	13,817,100
Wells	282,833	276,200	33.5	9,464,567
SOUTH CENTRAL	2,621,167	2,525,633	33.7	88,204,900
Cass	387,600	376,900	39.8	15,424,433
Richland	207,533	204,700	39.3	8,152,833
Traill	185,367	183,333	41.0	7,600,167
SOUTH VALLEY	780,500	764,933	39.9	31,177,433
Adams	117,167	107,767	26.5	3,109,833
Billings	32,600	30,767	26.4	860,600
Bowman	98,167	94,267	30.4	2,982,000
Burleigh	159,267	153,533	27.1	4,315,400
Dunn	123,667	117,567	28.0	3,467,100
Emmons	213,567	205,133	26.4	5,634,100
Golden Valley	88,500	86,200	33.5	2,963,833
Grant	143,867	140,300	26.9	3,869,100
Hettinger	232,500	222,333	32.1	7,456,767
Mercer	94,233	91,567	29.3	2,757,767
Morton	160,700	153,767	27.8	4,474,000
Oliver	57,633	55,100	30.7	1,768,800
Sioux	39,400	36,133	23.3	919,800
Slope	109,867	108,167	31.4	3,447,200
Stark	182,700	179,400	28.9	5,289,000
SOUTHWEST	1,853,833	1,782,000	28.8	53,315,300
NORTH DAKOTA	11,077,767	10,648,300	33.2	368,289,600

Source: North Dakota Agricultural Statistics Service.

Appendix Table A6. Spring Seed Wheat Adjustments

County	Crop Rprt Dist.	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Certified Seed Production	Wheat Entering the Mktng System	Wheat Handled by Local Elevators
Eddy	c	88,000	2,607,067	1.25	110,000	39,304	2,472,096	2,536,371
Foster	c	147,600	4,927,900	1.25	184,500	65,924	4,695,966	4,809,324
Kidder	c	74,667	2,044,200	1.25	93,333	33,349	1,931,358	1,984,216
Sheridan	c	125,000	3,407,667	1.25	156,250	55,830	3,218,903	3,307,247
Stutsman	c	366,200	12,415,033	1.25	457,750	163,559	11,837,711	12,120,843
Wells	c	243,333	8,255,333	1.25	304,167	108,682	7,871,655	8,059,849
Barnes	ec	346,467	12,763,300	1.75	606,317	154,746	12,035,414	12,311,729
Cass	ec	369,300	14,749,133	1.75	646,275	164,944	13,961,830	14,267,802
Griggs	ec	139,333	4,619,600	1.75	243,833	62,232	4,332,009	4,437,998
Steele	ec	168,267	5,904,800	1.75	294,467	75,155	5,554,230	5,685,488
Traill	ec	178,333	7,338,667	1.75	312,083	79,651	6,956,318	7,106,234
Benson	nc	139,233	4,533,100	1.25	174,042	na	4,315,468	4,359,058
Bottineau	nc	235,000	8,231,333	1.25	293,750	na	7,858,208	7,937,583
McHenry	nc	183,000	5,471,733	1.25	228,750	na	5,190,554	5,242,983
Pierce	nc	116,667	3,271,000	1.25	145,833	na	3,093,915	3,125,167
Rolette	nc	48,300	1,562,367	1.25	60,375	na	1,486,972	1,501,992
Cavalier	ne	343,333	11,260,000	1.5	515,000	153,346	10,637,550	10,898,346
Grand F.	ne	272,200	11,292,033	1.5	408,300	121,575	10,774,896	11,005,309
Nelson	ne	188,333	6,214,000	1.5	282,500	84,117	5,872,185	6,015,617
Pembina	ne	283,333	10,010,667	1.5	425,000	126,548	9,489,810	9,712,215
Ramsey	ne	188,333	5,997,333	1.5	282,500	84,117	5,657,685	5,798,950
Towner	ne	100,000	3,184,667	1.5	150,000	44,664	3,004,320	3,079,331
Walsh	ne	313,133	12,398,267	1.5	469,700	139,858	11,809,281	12,068,424
Burke	nw	118,333	4,341,333	1	118,333	na	4,180,770	4,223,000
Divide	nw	38,300	1,440,533	1	38,300	na	1,388,211	1,402,233
Mountrail	nw	34,333	1,275,000	1	34,333	na	1,228,260	1,240,667
Renville	nw	170,000	6,437,333	1	170,000	na	6,204,660	6,267,333
Ward	nw	249,767	8,638,867	1	249,767	na	8,305,209	8,389,100
Williams	nw	198,633	6,581,400	1	198,633	na	6,318,939	6,382,767
Burleigh	sc	144,767	3,922,400	1	144,767	na	3,739,857	3,777,633
Emmons	sc	207,733	5,501,233	1	207,733	na	5,240,565	5,293,500
Grant	sc	141,567	3,816,367	1	141,567	na	3,638,052	3,674,800
Morton	sc	158,267	4,422,667	1	158,267	na	4,221,756	4,264,400
Sioux	sc	36,633	862,667	1	36,633	na	817,773	826,033
Dickey	se	144,867	5,082,533	1.5	217,300	64,703	4,816,581	4,929,936
LaMoure	se	213,100	7,737,133	1.5	319,650	95,179	7,343,309	7,512,662
Logan	se	116,567	3,649,400	1.5	174,850	52,063	3,439,805	3,526,613
McIntosh	se	146,667	3,931,667	1.5	220,000	65,507	3,674,550	3,777,174
Ransom	se	112,967	4,290,867	1.5	169,450	50,455	4,080,203	4,171,872
Richland	se	198,333	7,839,667	1.5	297,500	88,583	7,466,745	7,630,750
Sargent	se	119,967	4,255,200	1.5	179,950	53,582	4,034,498	4,128,832
Adams	sw	105,000	2,763,667	1	105,000	na	2,632,080	2,658,667
Billings	sw	30,000	808,667	1	30,000	na	770,880	778,667

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Appendix Table A6. Continued

County	Crop Rprt Dist.	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Certified Seed Production	Wheat Entering the Mktng System	Wheat Handled by Local Elevators
Bowman	sw	85,000	2,610,000	1	85,000	na	2,499,750	2,525,000
Golden V.	sw	75,000	2,511,667	1	75,000	na	2,412,300	2,436,667
Hettinger	sw	220,000	7,067,333	1	220,000	na	6,778,860	6,847,333
Slope	sw	100,000	3,133,333	1	100,000	na	3,003,000	3,033,333
Stark	sw	171,667	4,992,667	1	171,667	na	4,772,790	4,821,000
Dunn	wc	118,333	3,311,000	1	118,333	na	3,160,740	3,192,667
McKenzie	wc	114,933	3,722,000	1	114,933	na	3,570,996	3,607,067
McLean	wc	211,800	6,912,400	1	211,800	na	6,633,594	6,700,600
Mercer	wc	82,567	2,412,567	1	82,567	na	2,306,700	2,330,000
Oliver	wc	57,100	1,758,800	1	57,100	na	1,684,683	1,701,700
State		8,579,567	288,489,567		11,293,158	2,227,674	274,424,444	279,424,082

Appendix Table A7. Durum Seed Wheat Adjustments

County	Crop Rprt Dist.	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Certified Seed Production	Wheat Entering the Mktng System	Wheat Handled by local Elevators
Eddy	c	10,167	250,000	1.25	12,708	668	234,919	237,960
Foster	c	7,000	204,333	1.25	8,750	460	193,627	196,043
Kidder	c	5,333	150,333	1.25	6,667	350	142,230	144,017
Sheridan	c	2,833	76,667	1.25	3,542	186	72,394	73,311
Stutsman	c	36,667	1,109,667	1.25	45,833	2,409	1,053,195	1,066,242
Wells	c	35,333	1,083,000	1.25	44,167	2,321	1,028,445	1,041,154
Barnes	ec	6,167	191,000	1.5	9,250	na	179,933	181,750
Cass	ec	14,700	559,667	1.5	22,050	na	532,241	537,617
Griggs	ec	5,333	187,000	1.5	8,000	na	177,210	179,000
Steele	ec	5,333	180,000	1.5	8,000	na	170,280	172,000
Traill	ec	5,500	207,000	1.5	8,250	na	196,763	198,750
Benson	nc	144,800	4,405,533	1.25	181,000	9,512	4,182,288	4,234,045
Bottineau	nc	160,000	5,039,667	1.25	200,000	10,511	4,791,270	4,850,177
McHenry	nc	16,667	506,667	1.25	20,833	1,095	480,975	486,928
Pierce	nc	66,667	1,903,667	1.25	83,333	4,379	1,802,130	1,824,713
Rolette	nc	95,000	2,984,000	1.25	118,750	6,241	2,836,598	2,871,491
Cavalier	ne	133,333	4,148,000	1.5	200,000	8,759	3,908,520	3,956,759
Grand Forks	ne	4,333	149,333	1.5	6,500	285	141,405	143,118
Nelson	ne	46,000	1,495,333	1.5	69,000	3,022	1,412,070	1,429,355
Pembina	ne	3,000	111,333	1.5	4,500	197	105,765	107,030
Ramsey	ne	121,000	3,679,000	1.5	181,500	7,949	3,462,525	3,505,449
Towner	ne	190,000	5,916,667	1.5	285,000	12,481	5,575,350	5,644,148
Walsh	ne	9,000	276,667	1.5	13,500	591	260,535	263,758
Burke	nw	72,667	2,473,667	1	72,667	4,774	2,376,990	2,405,774
Divide	nw	174,633	6,303,867	1	174,633	11,472	6,067,941	6,140,705
Mountrail	nw	238,333	8,139,000	1	238,333	15,656	7,821,660	7,916,323
Renville	nw	67,333	2,329,667	1	67,333	4,423	2,239,710	2,266,757
Ward	nw	190,000	6,424,667	1	190,000	12,481	6,172,320	6,247,148
Williams	nw	142,600	4,507,300	1	142,600	9,368	4,321,053	4,374,068
Burleigh	sc	10,333	305,000	1	10,333	na	291,720	294,667
Emmons	sc	3,733	74,000	1	3,733	na	69,564	70,267
Grant	sc	1,133	20,667	1	1,133	na	19,338	19,533
Morton	sc	1,067	24,333	1	1,067	na	23,034	23,267
Sioux	sc	2,067	41,667	1	2,067	na	39,204	39,600
Dickey	se	7,333	211,333	1.5	11,000	na	198,330	200,333
LaMoure	se	10,333	335,667	1.5	15,500	na	316,965	320,167
Logan	se	2,667	61,333	1.5	4,000	na	56,760	57,333
McIntosh	se	3,833	83,333	1.5	5,750	na	76,808	77,583

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Appendix Table A7. Continued

County	Crop Rprt Dist.	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Certified Seed Production	Wheat Entering the Mktng System	Wheat Handled by local Elevators
Ransom	se	2,400	73,000	1.5	3,600	na	68,706	69,400
Richland	se	7,933	277,333	1.5	11,900	na	262,779	265,433
Sargent	se	11,833	310,333	1.5	17,750	na	289,658	292,583
Adams	sw	5,833	177,000	1	5,833	na	169,455	171,167
Billings	sw	633	18,000	1	633	na	17,193	17,367
Bowman	sw	9,333	269,000	1	9,333	na	257,070	259,667
Golden V.	sw	7,167	251,000	1	7,167	na	241,395	243,833
Hettinger	sw	10,500	346,000	1	10,500	na	332,145	335,500
Slope	sw	7,367	227,333	1	7,367	na	217,767	219,967
Stark	sw	8,167	204,667	1	8,167	na	194,535	196,500
Dunn	wc	1,167	34,000	1	1,167	na	32,505	32,833
McKenzie	wc	37,133	1,251,667	1	37,133	na	1,202,388	1,214,533
McLean	wc	176,667	5,504,333	1	176,667	na	5,274,390	5,327,667
Mercer	wc	9,833	303,000	1	9,833	na	290,235	293,167
Oliver	wc	0	0	1	0	na	0	0
State			75,396,700		2,788,333	129,589	71,882,283	72,737,956

Appendix Table A8. Winter Seed Wheat Adjustments

County	Crop Rprt Dist	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Wheat Entering Marketing System & Wheat Handled by Elevators
Eddy	c	1,433	33,067	1.25	1,792	30,962
Foster	c	1,000	24,933	1.25	1,250	23,447
Kidder	c	1,333	38,633	1.25	1,667	36,597
Sheridan	c	2,067	50,733	1.25	2,583	47,669
Stutsman	c	10,000	292,400	1.25	12,500	277,101
Wells	c	4,167	126,233	1.25	5,208	119,815
Barnes	ec	1,800	62,300	1.75	3,150	58,559
Cass	ec	3,600	115,633	1.75	6,300	108,240
Griggs	ec	2,067	67,800	1.75	3,617	63,542
Steele	ec	1,567	57,000	1.75	2,742	53,716
Traill	ec	1,533	54,500	1.75	2,683	51,299
Benson	nc	1,567	45,433	1.25	1,958	43,040
Bottineau	nc	2,767	96,900	1.25	3,458	92,507
McHenry	nc	2,100	67,400	1.25	2,625	64,127
Pierce	nc	567	16,600	1.25	708	15,733
Rolette	nc	267	7,133	1.25	333	6,732
Cavalier	ne	567	17,100	1.5	850	16,088
Grand Forks	ne	2,600	90,600	1.5	3,900	85,833
Nelson	ne	1,600	49,467	1.5	2,400	46,596
Pembina	ne	267	8,033	1.5	400	7,557
Ramsey	ne	1,100	35,167	1.5	1,650	33,182
Towner	ne	800	28,000	1.5	1,200	26,532
Walsh	ne	67	1,333	1.5	100	1,221
Burke	nw	4,000	123,067	1	4,000	117,876
Divide	nw	9,400	300,400	1	9,400	288,090
Mountrail	nw	1,933	51,867	1	1,933	49,434
Renville	nw	0	0	1	0	0
Ward	nw	2,500	90,600	1	2,500	87,219
Williams	nw	13,667	398,833	1	13,667	381,315
Burleigh	sc	4,167	88,000	1	4,167	82,995
Emmons	sc	2,100	58,867	1	2,100	56,199
Grant	sc	1,167	32,067	1	1,167	30,591
Morton	sc	1,367	27,000	1	1,367	25,377
Sioux	sc	700	15,467	1	700	14,619
Dickey	se	6,167	174,100	1.5	9,250	163,202
LaMoure	se	3,700	83,767	1.5	5,550	77,435
Logan	se	967	21,167	1.5	1,450	19,520
McIntosh	se	1,167	26,067	1.5	1,750	24,074

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Appendix Table A8. Continued

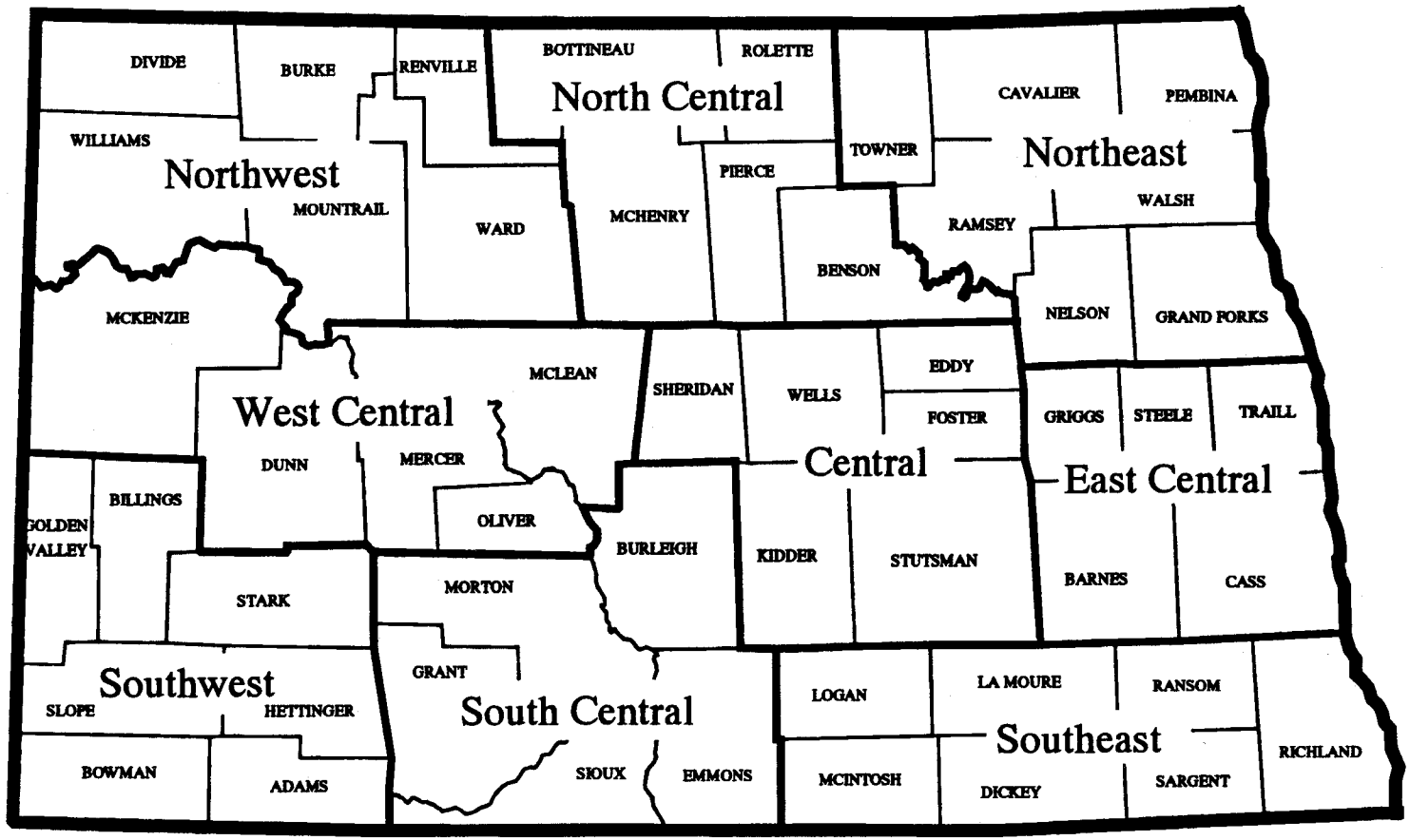
County	Crop Rprt Dist	Acres Planted	Bushels Production	Planting Rate bu/ac	Total Seed Used	Wheat Entering Marketing System & Wheat Handled by Elevators
Ransom	se	4,100	140,867	1.5	6,150	133,370
Richland	se	1,267	35,833	1.5	1,900	33,594
Sargent	se	3,967	142,200	1.5	5,950	134,888
Adams	sw	6,333	169,167	1	6,333	161,205
Billings	sw	1,967	33,933	1	1,967	31,647
Bowman	sw	3,833	103,000	1	3,833	98,175
Golden Valle	sw	6,333	201,167	1	6,333	192,885
Hettinger	sw	2,000	43,433	1	2,000	41,019
Slope	sw	2,500	86,533	1	2,500	83,193
Stark	sw	2,867	91,667	1	2,867	87,912
Dunn	wc	4,167	122,100	1	4,167	116,754
McKenzie	wc	4,833	162,233	1	4,833	155,826
McLean	wc	5,633	141,333	1	5,633	134,343
Mercer	wc	1,833	42,200	1	1,833	39,963
Oliver	wc	533	10,000	1	533	9,372
State		150,000	4,403,333		178,908	4,182,181

APPENDIX B

Crop Production, Truck and Railroad, and County Elevator Budgets

Acreage and yields were averaged from 1991 through 1993 (North Dakota Agricultural Statistics Service 1994). Farm program payments and disaster payments were obtained from U.S. Department of Agriculture (1994). Farm program payments were first averaged by county for 1991 through 1993 and then divided by total wheat acreage in each county. Average market prices were obtained from the North Dakota Agricultural Statistics Service (1994) and weighted by production each year from 1991 through 1993. Crop insurance enrollment and indemnities were obtained from Harrison (1993) and averaged from 1991 through 1993. Crop expenses were obtained from Swenson and Aakre (1992).

North Dakota Agricultural Statistics Districts



Appendix Table B1. Spring (Summmerfallow) Budgets for Various Regions, North Dakota, 1993

	Crop Production Regions							Weighted
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Average
Total Acres	543,233	141,467	81,267	373,733	439,533	48,433	884,333	2,512,000
Revenue per Acre								
Yield	35.4	37.9	41.3	34.5	38.1	41.1	31.7	34.9
Price	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37
Farm Program Pmts	$18.93	$21.74	$26.94	$18.11	$19.48	$24.30	$15.90	$18.36
Disaster Payments	$0.93	$6.78	$9.68	$0.41	$4.13	$10.82	$0.99	$2.24
Total Revenue	$139.04	$156.25	$175.88	$134.79	$151.98	$173.72	$123.75	$138.12
Variable Expenses per Acre								
Seed	6.25	7.50	8.75	5.00	6.25	8.75	5.00	5.82
Herbicide	5.41	5.41	5.41	1.25	5.41	5.41	1.25	3.33
Fungicide	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	2.52	5.67	6.60	3.73	2.02	5.43	2.91	3.12
Crop Insurance	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Fuel & Lubrication	5.84	6.03	6.88	4.59	5.86	6.86	4.66	5.31
Repairs	8.51	8.58	9.03	6.98	8.51	9.02	7.01	7.78
Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	3.54	3.79	4.13	3.45	3.81	4.11	3.17	3.49
Miscellaneous	1.05	1.05	1.05	1.00	1.05	1.05	1.00	1.02
Operating Interest	1.23	1.41	1.54	0.98	1.22	1.50	0.94	1.12
Total Variable	35.81	40.90	44.86	28.44	35.60	43.60	27.41	32.45
Fixed Expenses per Acre								
Misc. Overhead	3.83	3.91	4.04	3.36	3.84	4.03	3.39	3.62
Machinery Depreciation	15.55	15.79	16.30	12.87	15.58	16.27	12.96	14.30
Mach Int Payment	5.39	5.39	5.22	5.39	5.39	5.29	5.39	5.38
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	2.80
Land Interest Payment	10.30	9.08	16.92	9.06	9.19	18.30	7.36	9.19
Total Fixed Costs	37.96	38.09	48.54	32.70	37.29	50.20	31.26	35.29
Summerfallow Expenses	30.99	30.80	40.78	27.71	30.28	42.41	26.15	29.20
Returns to Unpaid Labor, Management, and Equity	34.27	46.45	41.70	45.94	48.81	37.51	38.93	41.18

Appendix Table B2. Spring (Continuous) Budgets for Various Regions, North Dakota, 1993

	Crop Production Regions							Weighted
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Average
Total Acres	935,533	678,533	787,400	130,800	1,988,467	697,533	849,300	6,067,567
Revenue per Acre								
Yield	31.3	31.4	38.5	34.2	33.1	40.0	25.7	33.1
Price	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37	$3.37
Farm Program Pmts	$18.93	$21.74	$26.94	$18.11	$19.48	$24.30	$15.90	$20.64
Disaster Payments	$0.93	6.78	9.68	0.41	4.13	10.82	0.99	$4.90
Total Revenue	$125.26	$134.29	$166.50	$133.63	$135.04	$170.10	$103.63	$137.13
Variable Expenses per Acre								
Seed	6.25	7.50	8.75	5.00	6.25	8.75	5.00	6.80
Herbicide	5.41	5.41	5.41	1.25	5.41	5.41	5.41	5.32
Fungicide	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	7.70	11.56	12.39	4.00	8.14	11.37	4.05	8.72
Crop Insurance	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Fuel & Lubrication	5.84	6.03	6.88	4.59	5.86	6.86	5.02	5.98
Repairs	8.51	8.58	9.03	6.98	8.51	9.02	7.50	8.47
Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	3.13	3.14	3.85	3.42	3.31	4.00	2.57	3.31
Miscellaneous	1.05	1.05	1.05	1.00	1.05	1.05	1.05	1.05
Operating Interest	1.40	1.59	1.74	0.99	1.42	1.71	1.14	1.46
Total Variable	40.75	46.33	50.57	28.69	41.42	49.64	33.21	42.57
Fixed Expenses per Acre								
Misc. Overhead	3.83	3.91	4.04	3.36	3.84	4.03	3.48	3.83
Machinery Depreciation	15.55	15.79	16.30	12.87	15.58	16.27	13.61	15.44
Mach Int Payment	5.39	5.39	5.22	5.39	5.39	5.39	5.39	5.37
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	3.82
Land Interest Payment	10.30	9.08	16.92	9.06	9.19	18.30	7.36	11.14
Total Fixed Costs	37.96	38.09	48.54	32.70	37.29	50.30	32.00	39.60
Returns to Unpaid Labor, Management, and Equity	46.55	49.88	67.39	72.25	56.34	70.16	38.42	54.96

Appendix Table B3. Durum (Summerfallow) Budgets for Various Regions, North Dakota, 1993

	Crop Production Regions							Weighted
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Average
Total Acres	391,367	125,400	1,800	515,167	34,267	1,500	54,167	1,123,667
Revenue per Acre								
Yield	33.8	34.8	33.7	34.8	32.9	37.6	31.7	34.2
Price	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31
Farm Program Pmts	$18.93	$21.74	$26.94	$18.11	$19.48	$24.30	$15.90	$18.76
Disaster Payments	$0.93	$6.78	$9.68	$0.41	$4.13	$10.82	$0.99	$1.47
Total Revenue	$131.77	$143.64	$148.29	$133.77	$132.43	$159.56	$122.02	$133.62
Variable Expenses per Acre								
Seed	5.94	7.13	7.13	4.75	5.94	7.13	4.75	5.47
Herbicide	5.41	5.41	5.41	1.25	5.41	5.41	1.25	3.30
Fungicide	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	2.72	3.26	6.20	5.20	8.14	11.37	4.11	4.17
Crop Insurance	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Fuel & Lubrication	5.89	5.93	6.71	4.66	5.86	6.86	4.73	5.28
Repairs	8.52	8.54	8.97	7.01	8.51	9.02	7.04	7.76
Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	3.38	3.48	3.37	3.48	3.29	3.76	3.17	3.42
Miscellaneous	1.05	1.05	1.05	1.00	1.05	1.05	1.00	1.02
Operating Interest	1.22	1.29	1.44	1.03	1.41	1.64	0.98	1.14
Total Variable	35.60	37.55	41.74	29.84	41.07	47.70	28.50	33.03
Fixed Expenses per Acre								
Misc. Overhead	3.85	3.87	3.97	3.39	3.84	4.03	3.42	3.62
Machinery Depreciation	15.61	15.67	16.09	12.96	15.58	16.27	13.05	14.28
Mach Int Payment	5.39	5.39	5.22	5.39	5.39	5.29	5.39	5.39
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	2.59
Land Interest Payment	10.30	9.08	16.92	9.06	7.16	18.30	7.36	9.38
Total Fixed Costs	38.04	37.93	48.26	32.82	35.26	50.20	31.38	35.26
Summerfallow Expenses	30.99	30.80	40.78	27.71	30.28	42.41	26.15	29.24
Returns to Unpaid Labor, Management, and Equity	27.13	37.36	17.50	43.40	25.82	19.24	35.99	36.09

Appendix Table B4. Durum (Continuous) Budgets for Various Regions, North Dakota, 1993

	Crop Production Regions							Weighted
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Average
Total Acres	528,600	364,933	14,533	150,200	115,467	26,633	24,167	1,224,533
Revenue per Acre								
Yield	30.2	29.8	32.8	31.6	28.6	37.1	23.8	30.1
Price	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31	$3.31
Farm Program Pmts	$18.93	$21.74	$26.94	$18.11	$19.48	$24.30	$15.90	$19.87
Disaster Payments	$0.93	$6.78	$9.68	$0.41	$4.13	$10.82	$0.99	$3.23
Total Revenue	$119.77	$127.24	$145.22	$123.16	$118.37	$157.92	$95.82	$122.94
Variable Expenses per Acre								
Seed	5.94	7.13	7.13	4.75	5.94	7.13	4.75	6.17
Herbicide	5.41	5.41	5.41	1.25	5.41	5.41	5.41	4.90
Fungicide	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	8.58	9.68	9.31	6.14	8.14	11.37	4.05	8.55
Crop Insurance	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Fuel & Lubrication	5.89	5.93	6.71	4.66	5.86	6.86	5.02	5.76
Repairs	8.52	8.54	8.97	7.01	8.51	9.02	7.50	8.34
Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	3.02	2.98	3.28	3.16	2.86	3.71	2.38	3.01
Miscellaneous	1.05	1.05	1.05	1.00	1.05	1.05	1.05	1.04
Operating Interest	1.42	1.50	1.54	1.05	1.40	1.64	1.13	1.40
Total Variable	41.29	43.69	44.87	30.48	40.63	47.65	32.75	40.63
Fixed Expenses per Acre								
Misc. Overhead	3.85	3.87	3.97	3.39	3.84	4.03	3.48	3.80
Machinery Depreciation	15.61	15.67	16.09	12.96	15.58	16.27	13.61	15.28
Mach Int Payment	5.39	5.39	5.22	5.39	5.39	4.99	5.22	5.38
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	3.23
Land Interest Payment	10.30	9.08	16.92	9.06	9.19	18.30	7.36	9.87
Total Fixed Costs	38.04	37.93	48.26	32.82	37.29	49.90	31.83	37.55
Returns to Unpaid Labor, Management, and Equity	40.44	45.62	52.09	59.86	40.45	60.37	31.24	44.76

Appendix Table B5. Winter Wheat Budgets for Various Regions, North Dakota, 1993

	Crop Production Regions							Weighted
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Average
Total Acres	17,467	4,067	2,933	33,833	43,433	6,400	41,867	150,000
Revenue per Acre								
Yield	29.5	31.9	34.1	30.6	29.7	32.2	26.9	29.4
Price	$3.38	$3.38	$3.38	$3.38	$3.38	$3.38	$3.38	$3.38
Farm Program Pmts	$18.93	$21.74	$26.94	$18.11	$19.48	$24.30	$15.90	$18.52
Disaster Payments	$0.93	$6.78	$9.68	$0.41	$4.13	$10.82	$0.99	$2.51
Total Revenue	$119.64	$136.25	$151.70	$121.96	$123.95	$143.80	$107.60	$120.16
Variable Expenses per Acre								
Seed	4.50	4.50	4.50	4.50	4.50	5.40	4.50	4.54
Herbicide	1.25	1.25	1.25	1.25	1.25	1.25	1.25	1.25
Fungicide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Insecticide	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fertilizer	8.58	8.58	10.10	7.27	9.90	10.10	6.45	8.17
Crop Insurance	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Fuel & Lubrication	5.38	5.38	5.38	4.59	5.45	6.28	4.66	5.06
Repairs	7.98	7.98	7.98	6.98	8.01	8.45	7.01	7.51
Drying	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	2.95	3.19	3.41	3.06	2.97	3.22	2.69	2.94
Miscellaneous	1.05	1.05	1.05	1.05	1.05	1.05	1.05	1.05
Operating Interest	1.14	1.15	1.21	1.03	1.19	1.28	0.99	1.09
Total Variable	33.05	33.29	35.09	29.95	34.53	37.24	28.81	31.82
Fixed Expenses per Acre								
Misc. Overhead	3.69	3.91	4.04	3.36	3.72	3.84	3.39	3.56
Machinery Depreciation	14.78	15.79	16.30	12.87	14.87	15.35	12.96	13.95
Mach Int Payment	5.39	5.39	5.22	5.39	5.39	5.29	5.39	5.38
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	2.84
Land Interest Payment	10.30	9.08	16.92	9.06	9.19	18.30	7.36	9.32
Total Fixed Costs	37.05	38.09	48.54	32.70	36.46	49.09	31.26	35.05
Returns to Unpaid Labor, Management, and Equity	49.55	64.87	68.07	59.31	52.95	57.46	47.53	53.29

Appendix Table B6. Summerfallow Budgets for Various Regions, North Dakota, 1993

Acres of Summerfallow	Crop Production Regions							Weighted Average		
	North Central	Northeast	North Valley	Northwest	South Central	South Valley	Southwest	Durum	Spring	Overall
Durum Wheat	391,367	125,400	1,800	515,167	34,267	1,500	54,167	1,123,667		
Spring Wheat	543,233	141,467	81,267	373,733	439,533	48,433	884,333		2,512,000	
										3,635,667
Total Revenue	0	0	0	0	0	0	0	0	0	0
Variable Expenses per Acre										
Seed	0	0	0	0	0	0	0	0	0	0
Herbicide	0	0	0	0	0	0	0	0	0	0
Fungicide	0	0	0	0	0	0	0	0	0	0
Insecticide	0	0	0	0	0	0	0	0	0	0
Fertilizer	0	0	0	0	0	0	0	0	0	0
Crop Insurance	0	0	0	0	0	0	0	0	0	0
Fuel & Lubrication	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15	4.15
Repairs	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52	3.52
Drying	0	0	0	0	0	0	0	0	0	0
Hauling	0	0	0	0	0	0	0	0	0	0
Miscellaneous	0	0	0	0	0	0	0	0	0	0
Operating Interest	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27
Total Variable	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94	7.94
Fixed Expenses per Acre										
Misc. Overhead	2.22	2.22	2.22	2.05	2.22	2.22	2.05	2.13	2.13	2.13
Machinery Depreciation	6.43	6.43	6.43	5.61	6.43	6.43	5.61	6.01	6.02	6.02
Mach Int Payment	1.21	1.21	1.21	1.02	1.21	1.21	1.02	1.11	1.12	1.12
Land Taxes	2.89	3.92	6.06	2.02	3.29	6.31	2.16	2.59	2.80	2.74
Land Interest Payment	10.30	9.08	16.92	9.06	9.19	18.30	7.36	9.44	9.19	9.26
Total Fixed Costs	23.05	22.86	32.84	19.76	22.34	34.47	18.20	21.30	21.26	21.27
Total Costs per Acre	30.99	30.80	40.78	27.71	30.28	42.41	26.15	29.24	29.20	29.21

Acreage and yields were averaged from 1991 through 1993 (North Dakota Agricultural Statistics Service 1994). Farm program payments and disaster payments were obtained from U.S. Department of Agriculture (1994). Farm program payments were first averaged by county for 1991 through 1993 and then divided by total wheat acreage in each county. Average market prices were obtained from the North Dakota Agricultural Statistics Service (1994) and weighted by production each year from 1991 through 1993. Crop insurance enrollment and indemnities were obtained from Harrison (1993) and averaged from 1991 through 1993. Crop expenses were obtained from Swenson and Aakre (1992).

TRUCK TRANSPORTATION BUDGET

	$/mile[a]
Gross Revenue[b]	1.15
Variable Costs[c]	
Tires	0.0463
Labor	0.2464
Maintenance and Repairs	0.0643
Fuel	0.2302
Total Variable Costs	0.6172
Fixed Costs[c]	
Equipment Costs/Tractor	0.2822
License and Taxes/Tractor	0.0224
Insurance	0.0858
Management and Admn Overhead	0.0617
Housing Costs	0.0054
Total Fixed Costs	0.4575
Total Costs	1.0747
Net Returns	0.0753

[a] Adapted from Dooley et al. (1988) and Bangsund et al. (1994).
[b] Calculated from information obtained from the Upper Great Plains Transportation Institute (1995b).
[c] Based on 900 bushels per trailer.

Total trucking revenues (i.e., expenses incurred by county elevators) were estimated by multiplying mileage by trucking rate per mile by the number of shipments. Because some trucking expenses are incurred in other states on interstate shipments and because some wheat is shipped by out-of-state trucking firms (which incur most of their operating expenses in other states), only 80 percent of the economic activity generated from interstate shipments of North Dakota wheat were allocated as direct impacts to the North Dakota economy. All economic activity from truck shipments of wheat to in-state destinations was included as direct impacts. Transportation expenses retained within the North Dakota economy were subsequently allocated to various economic sectors.

RAILROAD COST BREAKDOWN

Variable Expenses	Percent of Variable Costs
Train Crew[a]	43.73
Locomotive[b]	23.39
Railroad Car[c]	21.41
Transportation Charge[d]	11.47
Total Variable	100.00

Fixed Expenses	Percent of Fixed Costs
Maintenance-of-Way	45.44
Net Liquidation Value	45.44
Central Administration	2.03
Insurance and Other	1.20
Property Tax	5.89
Total Fixed	100.00

[a] Includes wages, fringe benefits, and crew overnight costs.
[b] Includes locomotive repairs, depreciation/rentals/leases, return on investment, servicing, fuel, overhead and machinery.
[c] Includes car-day and car-mile costs.
[d] Includes train inspection/lubrication, dispatching, crossing protection and signal/interlockers costs.

Source: Tolliver et al. (1987).

The amount of variable and fixed costs for rail shipments of wheat leaving North Dakota was determined using the Uniform Railroad Costing Model (URCS), a rail costing model. Grain flow statistics (i.e., amounts of wheat shipped to various destinations from various points in the state) were used in conjunction with URCS to generate an estimate of overall railroad expenses. The railroad operating budget above was used to divide costs obtained from URCS into expense categories and subsequently allocated to various economic sectors. The cost structure of wheat shipments was subtracted from shipping tariffs to determine railroad net returns. Railroad net returns were not allocated as direct impacts, since they were assumed to leave the North Dakota economy. It was assumed that 60 percent of all variable and fixed costs remained within the North Dakota economy and resulted in direct impacts. The other 40 percent was assumed to be generated in other states.

APPENDIX C

Grain Flow Statistics

Appendix Table C1. Spring and Winter Wheat Movements from Crop Reporting Regions in North Dakota to Various Destinations, 1991 Through 1993

Region	Market Destinations						Totals	Percent of All Spring
	Duluth	Minneapolis St. Paul	Midland/ Southwest	Pacific Northwest	ND	Other		
	thousand bushels							
Central	5,210	13,677	3,582	4,233	0	5,861	32,563	11.7%
	16.0%	42.0%	11.0%	13.0%	0.0%	18.0%		
East Central	7,340	10,794	2,591	11,226	10,282	944	43,175	15.5%
	17.0%	25.0%	6.0%	26.0%	23.8%	2.2%		
North Central	1,773	7,315	1,552	7,759	658	3,110	22,167	8.0%
	8.0%	33.0%	7.0%	35.0%	3.0%	14.0%		
Northeast	13,216	17,239	8,619	6,896	8,587	2,906	57,463	20.6%
	23.0%	30.0%	15.0%	12.0%	14.9%	5.1%		
Northwest	1,998	7,423	1,713	12,847	1,105	3,463	28,550	10.2%
	7.0%	26.0%	6.0%	45.0%	3.9%	12.1%		
South Central	1,429	10,363	4,110	1,072	0	893	17,868	6.4%
	8.0%	58.0%	23.0%	6.0%	0.0%	5.0%		
Southeast	3,544	20,911	2,127	709	697	7,454	35,442	12.7%
	10.0%	59.0%	6.0%	2.0%	2.0%	21.0%		
Soutwest	4,242	1,885	2,357	13,432	229	1,421	23,566	8.5%
	18.0%	8.0%	10.0%	57.0%	1.0%	6.0%		
West Central	891	7,303	3,206	3,919	0	2,494	17,813	6.4%
	3.6%	29.7%	13.0%	15.9%	0.0%	10.1%		
All Regions	39,644	96,910	29,856	62,093	21,558	28,547	278,607	
	14.2%	34.8%	10.7%	22.3%	7.7%	10.2%		

Appendix Table C2. Durum Movements from Crop Reporting Regions in North Dakota to Various Destinations, 1991 Through 1993

Region	Market Destinations						Totals	Percent of All Durum
	Duluth	Minneapolis St. Paul	Midland/ Southwest	Pacific Northwest	ND	Other		
	thousand bushels							
Central	272	1,880	300	0	82	191	2,725	3.8%
	10.0%	69.0%	11.0%	0.0%	3.0%	7.0%		
East Central	389	565	214	0	13	75	1,256	1.7%
	31.0%	45.0%	17.0%	0.0%	1.0%	6.0%		
North Central	2,114	5,215	1,691	282	1,973	2,819	14,093	19.6%
	15.0%	37.0%	12.0%	2.0%	14.0%	20.0%		
Northeast	5,054	4,460	2,676	149	1,487	1,041	14,866	20.7%
	34.0%	30.0%	18.0%	1.0%	10.0%	7.0%		
Northwest	3,480	8,990	8,700	870	2,320	4,640	29,000	40.3%
	12.0%	31.0%	30.0%	3.0%	8.0%	16.0%		
South Central	44	319	49	9	9	13	443	0.6%
	10.0%	72.0%	11.0%	2.0%	2.0%	3.0%		
Southeast	241	546	51	13	0	419	1,270	1.8%
	19.0%	43.0%	4.0%	1.0%	0.0%	33.0%		
Soutwest	172	672	186	300	71	29	1,430	2.0%
	12.0%	47.0%	13.0%	21.0%	5.0%	2.0%		
West Central	68	4,828	1,428	0	0	476	6,800	9.5%
	1.0%	71.0%	21.0%	0.0%	0.0%	7.0%		
All Regions	11,836	27,474	15,294	1,622	5,954	9,702	71,882	
	16.5%	38.2%	21.3%	2.3%	8.3%	13.5%		

Appendix Table C3. Mode of Transportation for Durum and Spring Wheat Shipments, North Dakota, 1991 Through 1993

Market Destination	Mode of Transportation		Ratio of Mode	
	Truck	Rail	Truck	Rail
	---------- bu ----------			
Durum				
Duluth	3,196,000	8,640,000	27.0%	73.0%
Minneapolis/St. Paul	6,594,000	20,880,000	24.0%	76.0%
Midland/Southwest	1,988,000	13,305,000	13.0%	87.0%
Pacific Northwest	0	1,622,000	0.0%	100.0%
North Dakota	4,478,000	1,476,000	75.2%	24.8%
Other	1,649,000	8,053,000	17.0%	83.0%
All Durum	17,905,000	53,976,000	24.9%	75.1%
Spring & Winter Wheat				
Duluth	8,325,000	31,319,000	21.0%	79.0%
Minneapolis/St. Paul	19,382,000	77,528,000	20.0%	80.0%
Midland/Southwest	3,881,000	25,974,000	13.0%	87.0%
Pacific Northwest	1,863,000	60,230,000	3.0%	97.0%
North Dakota	16,170,000	5,387,000	75.0%	25.0%
Other	4,853,000	23,694,000	17.0%	83.0%
All Spring and Winter	54,474,000	224,132,000	19.6%	80.4%

Appendix Table C4. Mode of Transportation for All Wheat Shipments, North Dakota, 1991 Through 1993

Market Destination	Mode of Transportation		Ratio of Mode	
	Truck	Rail	Truck	Rail
	---------- bu ----------			
Duluth	11,521,000	39,959,000	22.4%	77.6%
Minneapolis/St. Paul	25,976,000	98,408,000	20.9%	79.1%
Midland/Southwest	5,869,000	39,280,000	13.0%	87.0%
Pacific Northwest	1,863,000	61,852,000	2.9%	97.1%
North Dakota	20,648,000	6,864,000	75.1%	24.9%
Other	6,502,000	31,747,000	17.0%	83.0%
All Destinations	72,379,000	278,110,000	20.7%	79.3%

APPENDIX D

Wheat Processors Expenditure Survey

INSTRUCTIONS

Data provided from this survey will be used to help estimate the economic contribution of the wheat industry to the North Dakota economy. All the information you provide will be kept strictly confidential. The following general instructions are suggested in completing the questionnaire.

1. Use your records from the most recently completed fiscal year.

2. Information should be recorded in dollar terms (figures can be rounded to the nearest thousand dollars).

3. If you cannot identify whether expenditures were made to North Dakota entities, please indicate this on the form.

4. When exact information is not available, please estimate.

5. Definitions for selected expenditure items and their corresponding Standard Industrial Classification (SIC) code listing are included to help in determining allocation of expenditures.

6. If you have questions, please contact:

Dean Bangsund (701-231-7471)
Department of Agricultural Economics
North Dakota State University
Fargo, ND 58105-5636

DEFINITIONS FOR EXPENDITURE ITEMS

(According to the Standard Industrial Classification Manual)

Construction: Includes building construction--general contractors engaged in construction of residential, farm, industrial, public, and other buildings. (Major Groups 15, 16, and 17)

Transportation: Includes railroad, motor freight, water transportation, air transportation, pipeline transportation of petroleum, and other transportation to include packing and crating services, and rental of transportation equipment. (Major Groups 40, 41, 42, 43, 44, 45, 46, and 47)

Communications: Includes establishments engaged in telephone, telegraph, radio, television, and other communication services. (Major Group 48)

Public Utilities: Includes natural gas companies engaged in the transmission, storage, or distribution of natural gas. Also, water supply and sanitary services are included. (Major Group 49 except Group 491)

Wholesale Trade: Includes establishments primarily engaged in selling merchandise to retailers; to industrial, commercial, institutional, or professional users; or to other wholesalers, or acting as agents in buying merchandise for or selling merchandise to such persons or companies. (Major Groups 50 and 51)

Retail Trade: Includes establishments engaged in selling merchandise for personal, household, or farm consumption, and rendering services incidental to the sale of goods. (Major Groups 52, 53, 54, 55, 56, 57, 58, and 59)

Finance, Insurance, and Real Estate: Includes institutions engaged in banking or other financial institutions, insurance, and real estate. (Major Groups 60, 61, 62, 63, 64, 65, 66, and 67)

Business and Personal Services: Includes firms operating lodging services, repair, laundry, entertainment, other personal services predominantly to private individuals, credit collectional, janitorial, and stenographic services. (Major Groups 70, 72, 73, 75, 76, 78 and 79)

Professional and Social Services: Includes establishments engaged in furnishing health, medical, legal, educational, research and development, and other professional services. (Major Groups 80, 81, 82, 83, 84, 86, 88, and 89)

WHEAT INDUSTRY EXPENDITURES SURVEY

Firm: _____

Contact Person: _____

I. Expenditures (_____ year).

Items For Which Expenditures Are Made	Estimated Annual Expenditure In North Dakota
	dollars
Purchases of wheat	
Contract construction	
Plant maintenance and overhaul	
Transportation	
Communications	
Public utilities	
Miscellaneous manufacturing	
Wholesale trade	
Retail trade	
Finance, insurance, and real estate	
Business and personal services	
Professional and social services	
Coal	
Electricity	
Petroleum/natural gas	
Wages and salaries	
Employee benefits	
Government (paid in ND only)	
Property	
Sales and use	
Workman's compensation	
Unemployment	
Other taxes (please specify)	
Other (please specify)	

II. Total annual expenditures outside of North Dakota: $_____.

III. Total expenditures (made to all states): $_____.

IV. Total annual revenue: $_____.

V. Number of workers in full-time equivalents: _____ workers.

VI. Wheat processed: _____ bushels/yr from North Dakota.

VII. Wheat processed: _____ bushels/yr from all states.