Agricultural Economics Miscellaneous Report No. 98 September 1986

Trade and Marketing Patterns of North Dakota Farm and Ranch Operators

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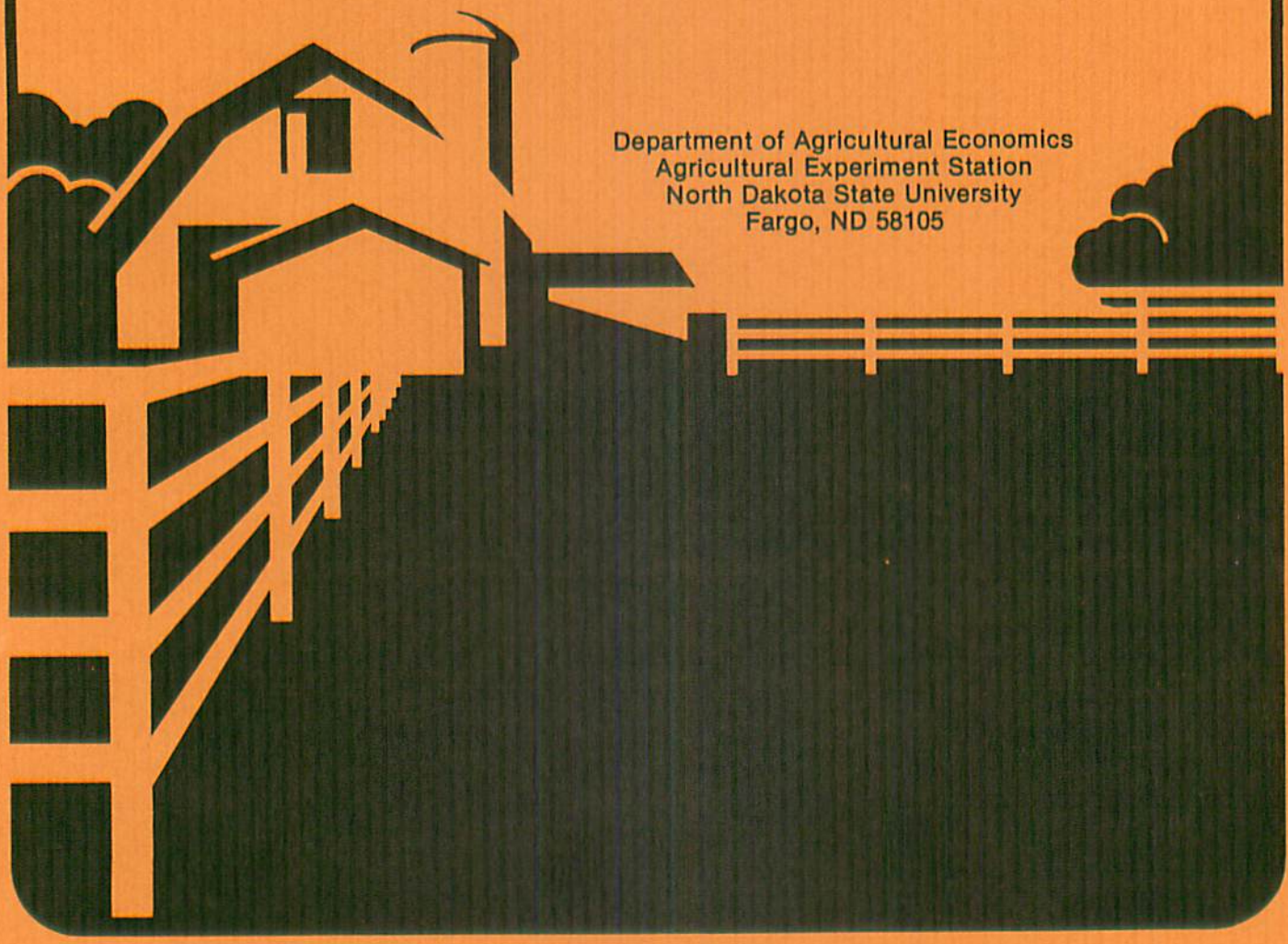

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Preface

This report is the third in a series of publications based on a survey of North Dakota farm and ranch operators conducted in the spring of 1985. Earlier reports in this series are Agricultural Economics Report No. 199 and Agricultural Economics Miscellaneous Report No. 88.

Amassing the vast amount of data that this report represents can only be accomplished with the support of dedicated people. Our appreciation is expressed first to our colleagues, Arlen Leholm, Brenda Ekstrom, and Harvey Vreugdenhil, who were in large measure responsible for designing and conducting the survey as well as for performing much previous analysis of the data. We also take this opportunity to thank Steve Murdock, Don Albrecht, and Rita Hamm of Texas A & M University for their help in designing the survey questionnaire and developing study procedures. A special thanks is due Dr. Myron Johnsrud, director of the Agricultural Extension Service at North Dakota State University, who supported this effort and provided financing for data collection. We also thank the Agricultural and Rural Economics Division (Economic Research Service, USDA) and the Office of Rural Development Policy (USDA) for providing partial support for data analysis; in particular, we thank Fred Hines and Sara Mazie of those offices, respectively, for their encouragement throughout the course of the study.

A special thanks goes to over 900 North Dakota farm operators whose cooperation made our task easier and who provided us with information to help us all better understand the current financial situation in farming.

Our appreciation is next extended to the North Dakota Agricultural Experiment Station and to the numerous support people who rose to the challenge of meeting seemingly impossible deadlines. First, we acknowledge our faithful crew of telephone surveyors who gave up most of their nights and weekends for this project. They are listed below in order of most total time committed:

Delores Zieman, Denise Lura, Sue Bartuska, Mary Moen, Marcia Engel, Cindy Steuve, Jana Mjor, Holly Bartuska, Lori Lymburner, Cathy Selberg, Lori Ust, Theresa Dreher, Cynthia Vanderwerff, Kathy Berry-Koppang, Pat Anderson, Nancy Olson, Lorrie Giese, Patty Jostad, Charmaine Nelson, and Julie Bergman.

Next, we thank our data input personnel, Sharon Vreugdenhil, Jana Mjor, and Lori Cullen, and our typists, Jody Peper and Darla Christensen. Finally, we thank our colleagues in the Department of Agricultural Economics for their helpful review comments.

As always, our gratefulness to these individuals and entities does not implicate them for any remaining errors or omissions.

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Highlights

The purpose of this report was to examine the trade and marketing patterns of North Dakota farm and ranch operators. Specific objectives were to determine the number of miles driven to purchase goods and services and to market agricultural products and to determine the sizes of the communities where these activities occur. Characteristics of the farm and ranch operations, such as gross farm income, total farm assets, net family income, acres of wheat harvested, head of beef cattle raised, and operator's age, were considered to evaluate their relationship to trade and marketing patterns.

Information contained in this report was obtained from a survey of 933 North Dakota farm and ranch operators conducted in March and April 1985. In the survey, operators were asked the community in which they obtained food, hardware, banking services, furniture, automobiles, and farm machinery, and the number of miles they traveled to do so. They were asked to list their primary crop and livestock enterprises as well as how many miles they traveled to market these products and the name of the community where they marketed them. Following are highlights of the results.

- *Operators traveled fewer miles to obtain banking services than to purchase or obtain any other item. Slightly greater distances were traveled to purchase hardware and food, and substantially longer distances were traveled to purchase farm machinery and automobiles while the greatest distance was traveled to purchase furniture. Although there were differences among the regions of the state in number of miles traveled to purchase or obtain goods and services, the purchase pattern order for goods and services remained the same.*

- *Operators often obtained banking services in communities smaller than those where they purchased hardware or food. They purchased automobiles in communities with a median population over three times that of the places where food and hardware were purchased. Furniture was obtained in communities that were generally larger than places where any other item was obtained. Although there were variations between the regions in the state, operators tended to purchase or obtain banking services, food, hardware, and farm machinery in smaller communities, while automobiles and furniture were purchased in larger communities.*

- *Wheat and beef cattle were the primary crop and livestock enterprises reported most frequently by North Dakota farm and ranch operators. On the average, operators traveled over five times as far to market cattle as they did to market wheat. The average number of miles traveled to market wheat was smaller in the Red River Valley region of the state than in the Western region. However, the average number of miles traveled to market cattle was least in the Western region of the state.*

- *The median community size where North Dakota farm and ranch operators marketed beef cattle was nearly 20 times as large as the median size of the communities where they marketed wheat. The median community size where either product was marketed was largest in the Western region and smallest in the Red River Valley region of the state.*

Contrary to findings reported in some other parts of the country, there was little indication that either purchasing or marketing patterns differ by size of agricultural operation.

This report underscores the growing need for an agricultural state such as North Dakota to recognize patterns of trade and marketing in rural areas. As the structure of agriculture undergoes change, so too will these trade and marketing patterns.

TRADE AND MARKETING PATTERNS OF NORTH DAKOTA FARM AND RANCH OPERATORS

Gary A. Goreham, F. Larry Leistritz, and Richard W. Rathge*

In North Dakota as in many other agriculturally dependent areas of the country, changes in the structure of agriculture have helped to precipitate substantial restructuring in the trade and service sectors of rural communities. Changes in agricultural technology have led to farm consolidation and a declining rural farm population. A steady exodus from most of the state's rural counties has been occurring since the 1940s, and this outmigration has, in turn, required consolidation of both private and public services in many rural communities. Even the migration turnaround experienced in many rural areas during the 1970s had little influence in North Dakota. Of the state's 53 counties, 36 experienced population declines during the 1970s, and 35 of these 36 had also lost population during the 1960s.

The current economic situation in agriculture appears likely to lead to additional decreases in farm numbers and to even greater pressures for restructuring the trade and service sectors of nonmetropolitan communities. Recent surveys indicate that nearly 40 percent of North Dakota farm and ranch operators have debt-to-asset ratios in the range likely to cause severe financial stress and that at least one-third of these farm families had insufficient cash income from all sources to cover current farm expenses, interest payments, and family living costs (Leholm et al. 1985; Leistritz et al. 1986). The economic stress affecting agriculture is also having a substantial impact on businesses in rural communities. For example, total taxable sales (adjusted for inflation) registered a 20 percent decline statewide from 1979 to 1984, and sales in towns with populations less than 10,000 fell 31 percent during the same period. These recent developments stimulate increased interest in the effect of changes in farm structure on local businesses and service establishments.

Numerous past studies have examined the relationship between the farm population and community vitality (Korsching 1984; Hass 1983; Voelker et al. 1978; Swanson 1980; Heady and Sonka 1975). These researchers indicate several important relationships between changes in farm size, farm population decline, and the viability of local businesses. First, farm consolidation generally means a declining population base to support local retail and service establishments, although the remaining producers probably will have higher per capita income and purchasing power. Central place theory indicates that a certain minimum population level, known as the threshold, is needed to allow a particular type of business to operate at a profitable level (Voelker et al. 1978; Borchert and Adams 1963). Population thresholds differ for different types of businesses; grocery and hardware stores have much lower thresholds than furniture stores, for example. Declining farm numbers may have the effect of reducing the number of customers for a specific type of business below its threshold, thus leading to business failure.

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Some researchers have also reported a second effect associated with increasing farm size. This is the tendency for operators of larger farms to purchase a smaller proportion of their needs in local trade centers and to patronize, instead, establishments in larger towns. For example, Marousek (1979) reports that small-farm operators in Idaho had a higher propensity than large-farm operators to purchase both farm inputs and consumption goods locally. Similarly, studies conducted in the 1940s of Arvin and Dinuba in California by Goldschmidt (1978) indicated that the community surrounded by small farms (Dinuba) had experienced a higher level of retail trade and a greater growth rate in both retail trade and population than the community surrounded by large farms (Arvin). The small-farm community also had about 2.5 times the number of independent business outlets found in the large-farm community. These findings are challenged, however, by Hayes and Olmstead (1984) who contend that factors in addition to differences in farm size contributed to Arvin's slower community development. Recent work by Korsching (1984) used survey data from Iowa to test the "Goldschmidt thesis." He found that, contrary to what Goldschmidt had suggested, the location of purchase for goods and services was not affected by farm size or tenure status. Thus, the influence of farm size on trade patterns has not been clearly proven (or disproven).

This paper examines the purchasing and marketing behavior of North Dakota farm operators and attempts to determine the influence of farm size on trade patterns. Specifically, the purpose of the analysis is to determine whether operators of larger farms and ranches display a significant pattern of bypassing local retail establishments and marketing outlets in order to patronize those located in larger and more distant places. The findings of this analysis should contribute to a better understanding of the effects of changes in agricultural structure on rural communities.

Study Procedures

Information concerning trade patterns of North Dakota farm and ranch operators was obtained from a telephone survey of a random sample of farm and ranch operators conducted in March and April, 1985. Initial screening questions ensured that all respondents (1) were less than 65 years old, (2) considered farming to be their primary occupation, and (3) sold at least $2,500 of farm products in 1984. Of 1,206 operators contacted who met these criteria, 933 completed the survey for a response rate of 77 percent.

Farm and ranch operators were asked questions regarding the distance they usually traveled to purchase various goods and services and to market their agricultural products. The categories of goods and services included food, hardware, banking services, furniture, automobiles, and farm machinery. The two major agricultural products considered were cattle and wheat because of the predominant and important role they play in the state's agricultural economy.

Operators were also asked to name the communities in which their business transactions were usually conducted. The 1980 census population of these communities was used in this analysis. For the purposes of this report, the term "community" refers to the town or city in which business transactions took place and does not include the surrounding farmsteads.

Included on the survey were several items pertaining to the operator's demographic and economic backgrounds. These responses were used to account for differences in trade patterns among the farmers and ranchers. Demographic and economic questions pertained to the operator's age, gross farm income, net family income, total farm assets, number of beef cattle marketed, and acres of wheat harvested. The desire to test the "Goldschmidt thesis" led to a need to choose an appropriate measure of farm size. The statewide nature of the sample made this task complex because farms and ranches in different areas of the state differ with respect to such factors as land productivity and enterprise mix. Gross income and total farm assets were selected as two measures of size that would be applicable across a wide range of farming situations. In addition, head of cattle marketed and acres of wheat harvested were identified as variables that might be particularly relevant in explaining differences in marketing patterns.

Findings

Major findings of the analysis fall into four categories: (1) distance traveled to purchase goods and services, (2) population of communities where goods and services were purchased, (3) distance traveled to market agricultural products, and (4) population of communities where products were marketed. These findings are reported in the sections which follow.

Distance Farm and Ranch Operators Traveled to Purchase Goods and Services

The operators were asked how many miles they usually traveled to purchase or obtain food, hardware, banking services, furniture, automobiles, and farm machinery. Table 1 lists the mean and median number of miles the operators reported traveling for these purchases. The mean is an arithmetic average whereas the median is the number above which and below which an equal number of observations fall. The standard deviation is a measure which standardizes how widely a set of scores will vary from their mean. About 68 percent of all scores will normally fall within one standard deviation; 96 percent will fall within two standard deviations.

TABLE 1. AVERAGE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985, NORTH DAKOTA

Goods and Services	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
		-miles-				
Food	933	18.2	14	16.2	0	99
Hardware	933	18.1	13	16.8	0	120
Banking services	933	16.7	13	16.1	0	160
Furniture	928	36.5	30	34.6	0	400
Automobiles	929	32.6	25	34.0	0	380
Farm machinery	924	21.1	17	18.1	0	135

Farm and ranch operators traveled fewer miles to obtain banking services (16.7 miles) than to purchase or obtain any of the other goods or services. Following banking services, the average distance traveled to purchase hardware and food was the next smallest with averages of 18.1 miles and 18.2 miles, respectively. The items operators traveled the farthest to obtain were farm machinery, automobiles, and furniture. They traveled an average of 21.1 miles, 32.6 miles, and 36.5 miles, respectively, for these items.

For the purpose of analysis, the state was divided into three regions as depicted in Figure 1. The Western region consists of the counties in the western and south-central portions of the state. This region contains much of the state's grazing land and most of its energy development counties. The Central region, made up of counties in the central and north-central part of the state, contains much of the wheat-growing land. The Red River Valley region consists of the state's easternmost counties.

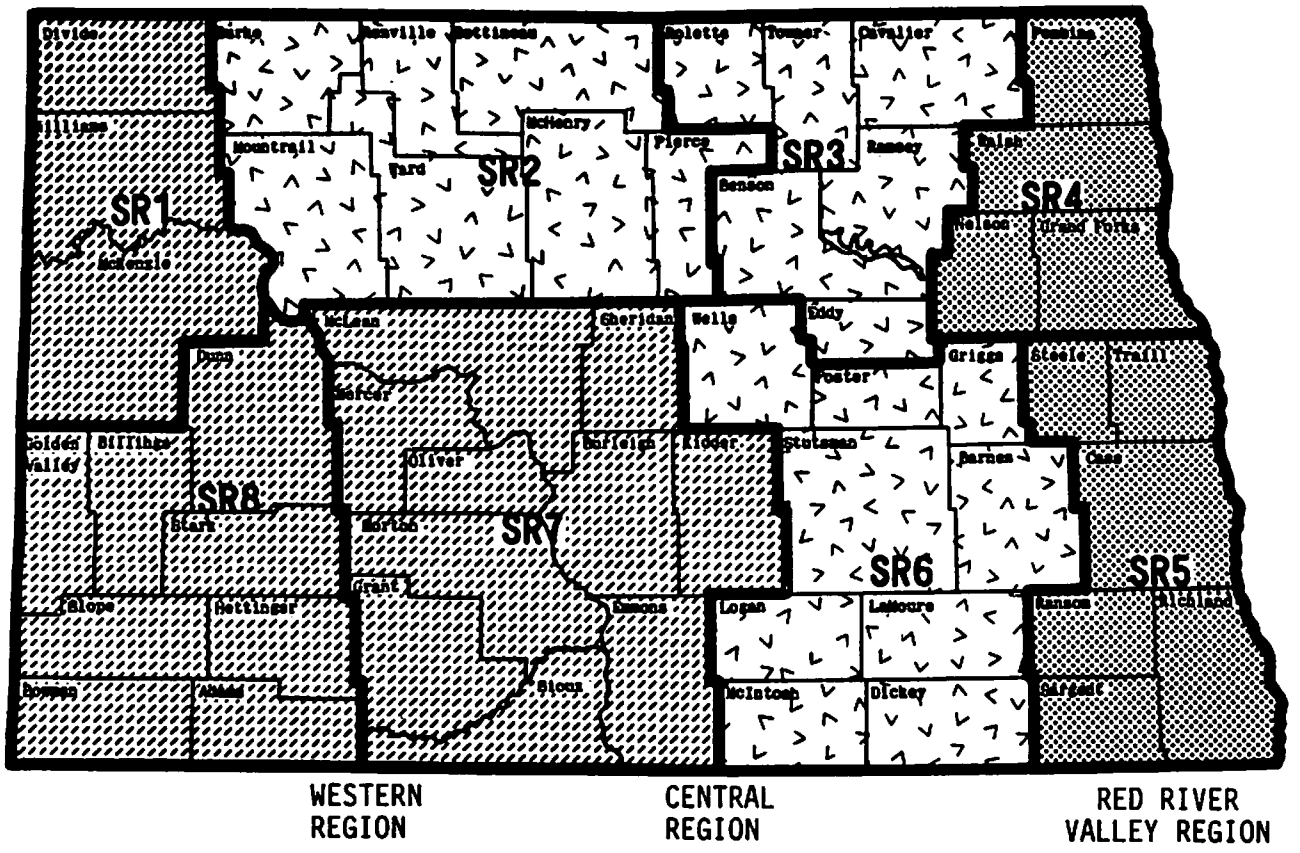

Figure 1. Regions in North Dakota

The average number of miles driven by farm and ranch operators to purchase goods and services varied across the three regions of the state (Appendix Table 1). Operators in the Red River Valley region traveled the least distances to obtain goods or services compared with those in either the

Central or Western regions. The average number of miles driven by operators to make their purchases ranged from 11.2 miles for banking services to 29.0 miles for furniture in the Red River Valley region. This compared with a range of 16.7 miles for food to 35.7 miles for furniture in the Central region and 19.8 miles for banking to 42.9 miles for furniture in the Western region.

With one exception, the average distances driven for various goods and services in the Central region were lower than in the Western region of the state. The exception was the average number of miles driven to purchase farm machinery. Operators in the Central region drove an average of 0.8 miles farther than their Western region counterparts. However, the median distance was shorter in the Central region (17 miles) than in the Western region (18 miles).

Even within each of the three regions, substantial variations were found in the average number of miles driven to purchase the different goods and services (note the standard deviations listed in Table 1). To account for this variation, a number of comparisons were made using demographic and economic variables. These explanatory variables included gross farm income, net family income, total farm assets, operator's age, type of farm organization, community population, number of cattle raised, and acres of wheat harvested. These variables were selected on the basis of results from research conducted in other states as noted in the literature previously reviewed.

The relationships between the number of miles driven to purchase each good or service and selected demographic and economic variables believed to account for differences in the distance traveled are summarized in Table 2. The top numbers in each row in Table 2 are Pearson correlation coefficients which can range from +1.00 (indicating a high positive linear relationship) to -1.00 (indicating a high inverse linear relationship). Values near 0.00 suggest that little or no linear relationship exists between the two variables. The bottom number is the total number of operators whose responses are being correlated.

It was hypothesized that the variables associated with the size of the farm or ranch operation (i.e., gross farm income, total farm assets, acres of wheat) would be positively correlated with the distance an operator would travel to purchase goods and services. However, the data offered no support for this hyopothesis. The only variable which was useful in accounting for the number of miles driven was the size of the community where purchases were usually made. Thus, it would appear that operators of larger farms do not travel greater distances for their purchases than do their smaller farm counterparts. These results were consistent across the three regions of the state (Appendix Tables 2, 3, and 4).

Appendix Tables 5 through 10 provide further detail on the relationship between (1) the demographic and economic variables investigated and (2) the average number of miles driven by farm and ranch operators to purchase goods or obtain services.

Thirty-five percent of the operators surveyed traveled less than 10 miles to purchase food. About 29 percent drove between 10 and 19 miles to purchase food, while the remaining 36 percent went 20 miles or more to make

TABLE 2. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operations Size Variables						
Gross farm income	-.031 884	-.065* 884	-.003 884	.024 880	.047 880	-.074* 875
Total farm assets	.006 890	-.018 890	.030 890	-.000 886	.010 886	-.030 881
Acres of wheat harvested	-.022 702	-.070 702	-.016 701	.021 697	-.003 700	-.056 695
Head of cattle raised	.136* 431	.077 431	.051 431	.050 428	.036 428	.018 426
Other Indicators						
Net family income	-.068* 910	-.058 910	-.036 910	.018 906	-.043 906	-.048 901
Operators's age	-.074* 931	-.008 931	.024 931	-.069* 926	-.076* 927	-.055 922
Size of community where goods or services are obtained	.535* 926	.508* 925	.352* 930	.462* 913	.454* 918	.308* 904

Note: Top number in each row is the Pearson correlation coefficient and bottom number is the number of respondents. The * indicates $p \leq .05$.

food purchases. None of the variables used to measure size of operation were significantly related to the number of miles driven to make food purchases (Appendix Table 5). However, the relationship between population of the community where food was usually purchased and the number of miles driven for such purchases was statistically significant.

A comparison of the number of miles driven by farm and ranch operators to purchase hardware with various indicators of the farming operation is reported in Appendix Table 6. Thirty-four percent of the operators drove less than 10 miles to purchase hardware, while 32 percent drove between 10 and 19 miles to make such purchases. The remaining 34 percent drove 20 miles or more to make their hardware purchases. Net family income was significantly related to the number of miles driven to purchase hardware. Operators with net family incomes less than $10,000 per year were more likely to drive 10 or more miles

to purchase hardware than those with net family incomes of $10,000 or more. A statistically significant relationship was also noted between community size and the number of miles driven by operators to purchase hardware. None of the remaining variables were significantly related to the number of miles driven to purchase hardware.

Whereas 34 percent of the farm and ranch operators drove less than 10 miles for banking services, 35 percent drove between 10 and 19 miles, and less than 31 percent drove over 20 miles for banking services (Appendix Table 7). Once again indicators related to farm size were not significantly related to the number of miles driven for banking services. There was, however, a statistically significant relationship between community size where banking services were located and the number of miles operators drove to reach that community. In general, the larger the community size, the more miles operators drove for banking services.

Greater distances were driven to purchase furniture than to purchase other items. Only 15 percent of the operators traveled less than 10 miles and only 19 percent drove between 10 and 19 miles for furniture purchases. However, over 66 percent of those surveyed reported that they usually traveled 20 miles or more to purchase furniture (Appendix Table 8). Although no statistically significant relationships were noted between the various indicators of size of operation and the number of miles driven to purchase furniture, a statistically significant relationship was observed between the size of the community where furniture was usually purchased and the number of miles driven to that community.

Appendix Table 9 shows the number of miles driven by farm and ranch operators to purchase automobiles. Nearly 20 percent of the operators drove less than 10 miles to purchase automobiles, 21 percent drove between 10 and 19 miles to make such purchases, and 59 percent of them drove 20 miles or more. Only community size was significantly related to the number of miles driven to purchase automobiles; greater distances were driven to make automobile purchases in larger communities. Owners of larger operations were no more likely to drive greater distances to make automobile purchases than were the owners of smaller farms.

One-fourth of the operators surveyed reported that they drove less than 10 miles to purchase farm machinery. Nearly one-third drove between 10 and 19 miles for their purchases, and an additional 42 percent drove 20 miles or more to make purchases of farm machinery (Appendix Table 10). Operators of larger farms or ranches were no more likely to drive farther to make their farm machinery purchases than were their counterparts on smaller operations. Only community population was significantly related to the number of miles driven to purchase farm machinery.

Population of Communities Where Goods and Services Were Purchased

The size of the community where farm and ranch operators obtained banking services and purchased hardware and food tended to be smaller on the average than those communities where they purchased farm machinery, automobiles, and furniture. The median number of community residents where

banking services, hardware, and food were purchased was 1,496; 1,967; and 2,119, respectively. On the other hand, the median community sizes where farm machinery, automobiles, and furniture were purchased were 7,774; 7,442; and 15,513 people, respectively (Table 3).

TABLE 3. AVERAGE COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985, NORTH DAKOTA

Goods and Services	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
Food	926	11,150.0	2,119	16,443.7	36	61,383
Hardware	925	9,743.2	1,967	15,287.2	51	61,383
Banking services	930	6,530.2	1,496	11,525.8	24	61,383
Furniture	913	20,167.2	15,513	19,473.6	93	61,383
Automobiles	918	15,851.5	7,442	18,780.6	112	61,383
Farm machinery	906	7,897.4	7,774	12,996.7	21	61,383

As shown in Appendix Table 11, the median size of communities where operators made their purchases varied among the three regions of the state. Median community population where banking services, food, hardware, and farm machinery were purchased was larger in the Central region than in either of the other two regions. Median community size where furniture was purchased was largest in the Red River Valley region while the median population where automobiles were purchased was largest in the Western region.

It was anticipated that variables used to measure the size of the operations would have an impact on what size of community an operator would patronize when purchasing goods and services. However, none of these variables was strongly correlated with the population size where the operator usually made purchases of various goods and services. Table 4 displays the strength of the relationship between (1) community population where various goods and services were purchased and (2) the demographic and economic variables used as indicators of operation size. These results were consistent across the three regions of the state (Appendix Tables 12, 13, and 14).

Appendix Tables 15 through 20 provide further detail on the relationship between the demographic and economic variables and the average population size of the communities where farm and ranch operators purchased goods and services. Nearly one-quarter of the operators usually purchased food in communities with populations of less than 2,500. Forty-five percent of the operators purchased their food in communities with populations between 2,500 and 14,999. The remaining 27 percent usually shopped for food in places with 15,000 people or more (Appendix Table 15). Of the indicators of farm size, only total farm assets were significantly related to the size of community where food was purchased. Operators with assets between $200,000 and $399,999 were more likely to purchase food in places with populations of less than 10,000. Thus, the notion that the operators of larger farms or ranches are more likely to trade in larger communities than are their counterparts on smaller operations

TABLE 4. RELATIONSHIP BETWEEN COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.004 877	.009 876	.032 882	.098* 865	.020 869	-.070* 858
Total farm assets	.047 883	.067* 883	.077* 888	.086* 871	.037 875	-.002 863
Acres of wheat harvested	.000 695	-.017 695	.029 699	.001 684	-.030 692	-.030 682
Head of cattle raised	.100* 426	.080 429	.082 430	.085 420	.094* 423	.036 416
Other Indicators						
Net family income	-.032 903	-.025 902	.000 908	.032 891	-.060 896	-.065 883
Operator's age	-.043 924	-.004 923	.020 928	-.066Y 911	-.050 916	.010 904
Miles traveled for purchase	.535* 926	.508* 925	.352* 930	.462* 913	.454* 918	.308* 904

Note: Top number in each row is the Pearson correlation coefficient and bottom number is the number of respondents. The * indicates $p \leq .05$.

cannot be supported. The distance the operator lives from the community is significantly related to the population of the community where food is purchased. Nearly one-half of the operators who usually purchased food in a community of less than 2,500 people drove less than 10 miles to do so. Nearly 75 percent of those who usually purchased their food in communities with populations of over 15,000 needed to travel 20 miles or more to make their purchases.

Appendix Table 16 displays the populations of communities where hardware is purchased. About one-quarter of the operators usually purchased their hardware in communities of less than 2,500 people and an additional one-quarter purchased their hardware in communities with 15,000 people or more. The remaining 50 percent purchased their hardware in places with populations between 2,500 and 14,999 people. None of the variables used to define size of operation were significantly related to the population size of

places where hardware was purchased. A significant relationship was found between the number of miles the operator drives to make hardware purchases and community population. Of those operators who usually traveled less than 10 miles to make purchases of hardware, just under one-half made their purchases in places with less than 2,500 people. Of those operators who drove 20 miles or more, just over one-half made their hardware purchases in places with populations of 15,000 people or more.

One-third of the operators conducted their banking in communities with populations of less than 2,500. An additional one-third usually banked in communities with populations between 2,500 and 9,999. The remaining third used banks in communities with 10,000 people or more. Only 12 percent of the operators surveyed used banking services in communities larger than 15,000 people (Appendix Table 17). A statistically significant relationship was found between gross farm income and the populations of communities where banking services were used. Over 71 percent of those operators with gross farm incomes between $40,000 and $99,999 usually banked in communities with populations of less than 9,999. This compares with 67 percent of operators with gross farm incomes of less than $40,000, and 63 percent for those with incomes $100,000 or more. A strong relationship was observed between community size and the distance the operator lived from the community in which banking services were used.

Only 6 percent of the operators stated that they purchased their furniture in communities with populations of less than 2,500. An additional 20 percent purchased their furniture in places with populations between 2,500 and 9,999, and 23 percent made their purchases in communities with between 10,000 and 14,999 people. However, over 50 percent usually made their furniture purchases in communities with populations of 15,000 or greater. As shown on Appendix Table 18, no statistically significant relationships were found between the various indicators of operation size and the size of the communities where furniture was purchased. A significant relationship was found between community size and the distance operators lived from the communities where furniture was purchased.

Nearly 39 percent of the operators purchased their automobiles in communities with populations of greater than 15,000 but less than 13 percent of the operators purchased their automobiles in communities with populations less than 2,500 people. The remaining one-half made their automobile purchases in communities with populations between 2,500 and 14,999 people (Appendix Table 19). Family corporations were more likely to make their automobile purchases in places with populations greater than 10,000 people than were single-family farms or partnerships. However, single-family farms were more likely than partnership farms to purchase automobiles in the larger communities. Size of cattle herd was also related to the size of communities where automobiles were purchased. Operators with larger herds were more likely to purchase automobiles in smaller communities than were their counterparts on smaller operations. A statistically significant relationship was noted between community size and the distance operators traveled to purchase automobiles.

Appendix Table 20 lists the number of farm operators who purchased their farm machinery in various community sizes. Most of the operators (58 percent) purchased their farm machinery in communities with populations of

less than 10,000. About 20 percent of the operators purchased their machinery in places with 15,000 people or more while the remaining operators made their purchases in communities with populations between 10,000 and 14,999. A statistically significant relationship was found between gross farm income and community size. Those operators with smaller gross farm incomes were more likely to patronize communities with populations of 10,000 people or more for their farm machinery than were their counterparts with larger gross farm incomes. Forty-five percent of the operators with gross farm incomes less than $40,000 made their machinery purchases in communities with 10,000 people or more compared with 40 percent of those with gross farm incomes between $40,000 and $99,999 and 36 percent of those with gross farm incomes of $100,000 or more. A significant relationship was found between community population and distance the operator lived from the community where machinery was purchased.

Miles Driven to Market Agricultural Products

The farm and ranch operators included in the survey were asked to name the community where they sold their crops and livestock and how many miles they needed to drive to sell these items. Because wheat was listed as the primary crop and cattle was listed as the primary livestock enterprise by the majority of North Dakota farmers and ranchers, these two products were used in the following analysis.

Of the 895 operators who reported growing crops, 655 (or 73.2 percent) listed wheat as their primary crop (Table 5). They drove an average of 12.1 miles to market their wheat. Of the 563 farmers and ranchers who raised livestock for market, 439 (or 78.0 percent) of them reported beef cattle as their primary type of livestock enterprise. They drove an average of 64.6 miles to market their cattle.

TABLE 5. AVERAGE NUMBER OF MILES TRAVELED BY WHEAT AND CATTLE PRODUCERS TO SELL AGRICULTURAL PRODUCTS IN 1985, NORTH DAKOTA

Product	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
		- - - - - - - - - - miles - - - - - - - - - -				
Wheat (if wheat was main crop)	655	12.1	9	29.0	1	700
Cattle (if beef cattle were main livestock enterprise)	439	64.6	50	76.3	0	800

As listed on Table 6, differences were noted in the number of miles traveled to market wheat and cattle among the three regions of the state. Shorter distances were driven in the Red River Valley region and Central

TABLE 6. AVERAGE NUMBER OF MILES TRAVELED TO SELL AGRICULTURAL PRODUCTS IN 1985 BY PRODUCT AND REGION OF NORTH DAKOTA

Product	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
			miles			
WESTERN REGION						
Wheat (if wheat was main crop)	219	16.9	12	48.1	1	700
Cattle (if beef cattle were main livestock enterprise)	201	52.1	40	70.0	2	800
CENTRAL REGION						
Wheat (if wheat was main crop)	310	10.4	8	10.3	1	90
Cattle (if beef cattle were main livestock enterprise)	183	73.2	50	87.7	0	650
RED RIVER VALLEY REGION						
Wheat (if wheat was main crop)	126	8.1	7	5.9	1	35
Cattle (if beef cattle were main livestock enterprise)	55	81.7	75	44.6	4	185

region than in the Western region to market wheat. The mean number of miles traveled to market wheat in the Western region was over twice the number of miles driven in the Red River Valley region (16.9 miles and 8.1 miles, respectively). The driving patterns to market wheat in the three regions of the state were exactly opposite those to market livestock. Operators in the Western region traveled fewer miles to market their livestock than the operators in the Red River Valley region or in the Central region. The mean number of miles driven to market livestock ranged from 81.7 miles in the Red River Valley region to 73.2 miles in the Central region compared with 52.1 miles in the Western region.

Table 7 displays the strength of relationship between the number of miles driven to market wheat and cattle and demographic and economic variables. Of the variables used to account for the range in miles traveled to market wheat, only the population of the community where wheat was marketed

TABLE 7. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO MARKET AGRICULTURAL PRODUCTS IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle were main livestock enterprise)
Operation Size Variables		
Gross farm income	.000 618	.150* 413
Total farm assets	.072 624	.176* 417
Acres of wheat harvested	.010 655	.066 339
Head of cattle raised	.052 304	.212* 420
Other Indicators		
Net family income	.044 635	-.010 429
Operator's age	.001 653	-.017 438
Distance operator lives from the community	.902* 564	.079 428

Note: Top number in each row is the Pearson correlation coefficient and bottom number is the number of respondents. The * indicates $p \leq .05$.

was strongly correlated with the number of miles driven (r = .902). On the other hand, the population of the community where cattle were marketed was not strongly correlated with the number of miles driven to market cattle. Three variables were moderately correlated with the number of miles driven to market cattle: gross farm income (r = .150), total farm assets (r = .176), and head of cattle (r = .212).

There were differences between the three regions in the state regarding the variables which were correlated with the number of miles driven to market wheat. In the Western and Red River Valley regions, the population of the communities where wheat was marketed was strongly correlated with the number of miles driven (r = .997 and r = .513, respectively). In the Central region, net family income was moderately correlated to the number of miles driven to market wheat (r = .152) (Appendix Tables 21, 22, and 23).

Head of cattle was correlated with the number of miles driven to market cattle in the Western and Central regions ($r = .329$ and $r = .220$, respectively), but the number of cattle raised was not strongly correlated with the number of miles driven to sell them in the Red River Valley region ($r = .054$). Interestingly, the number of acres of wheat harvested in the Red River Valley region was related to the number of miles those operators drove to market their livestock ($r = .328$). Total farm assets were correlated with miles driven in the Western region ($r = .205$) and in the Central region ($r = .213$) but not in the Red River Valley region ($r = .000$).

Whereas 58 percent of those operators who reported wheat as their primary crop traveled between 10 and 19 miles to market their wheat, only 18 percent drove over 20 miles to market it, and the remaining 32 percent drove less than 10 miles (Table 8). A significant relationship was observed between the number of cattle raised as an indicator of size of operation and the number of miles driven to market wheat. The larger the herd, the greater the distance traveled to market wheat. A significant relationship was also found between the number of miles driven to market wheat and the size of the community where it was marketed--the greater the community population, the greater the distance traveled to market wheat.

Table 9 lists the number of operators who traveled various distances to market their cattle. Just over 32 percent of the operators whose principal livestock was cattle drove less than 30 miles to market their beef cattle. This compares with just over 40 percent who drove 60 miles or more to market. The remaining 28 percent traveled between 20 and 59 miles. None of the variables used as indicators of operation size were significantly related with the number of miles driven to market cattle. The community's size was significantly related with the number of miles driven. The greater the community population, the more miles the operator traveled to market cattle there.

Population of Communities Where Products Were Marketed

There was a marked difference between the average size of communities where wheat was sold and where beef cattle were sold. The median population was 479 people for communities where wheat was sold by those operators whose primary crop was wheat. The median population of communities where cattle were marketed by operators whose main livestock was cattle was 10,099 people (Table 10).

Differences were noted among the three regions of the state regarding the size of communities where wheat and cattle were marketed. As shown in Appendix Table 24, the average population of communities where wheat was sold was larger in the Western region than in the Central region and the Red River Valley region. The median population of communities where wheat was marketed by operators in the Western region was 766 people. This compares with median populations of 355 people in the Central region and 4,695 people in the Red River Valley region. The largest median community size (13,336 people) where operators marketed cattle was also found in the Western region. The smallest median community size (13,335 people) where cattle were sold was found in the Central region. The median community size where operators from the Red River Valley region marketed cattle was 10,099 people.

TABLE 8. NUMBER OF MILES TRAVELED BY NORTH DAKOTA FARM OPERATORS IN 1985 TO MARKET WHEAT BY RESPONDENT CHARACTERISTICS AND SELECTED VARIABLES

Respondent Characteristics	Number of Miles Traveled to Market Wheat (if wheat was farmer's principal crop)						Total
	Less than 10 miles		10-19 miles		20 miles or more		
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	63	47.37	56	42.11	14	10.53	133
$40,000-$99,999	134	52.76	93	36.61	27	10.63	254
$100,000 or more	132	57.14	65	28.14	34	14.72	231
Total Farm Assets							
Less than $200,000	91	56.88	54	33.75	15	9.38	160
$200,000-$399,999	117	52.00	85	37.78	23	10.22	225
$400,000 or more	123	51.46	79	33.05	37	15.48	239
Acres of Wheat Harvested							
Less than 180 acres	91	49.73	70	38.25	22	3.36	183
180-359 acres	113	54.33	77	37.02	18	8.65	208
360 acres or more	148	56.06	79	29.92	37	14.02	264
Head of Cattle Raised							
Less than 40 head	57	57.00	35	35.00	8	8.00	100*
40-79 head	47	46.08	41	40.20	14	13.73	102
80 head or more	35	34.31	45	44.12	22	21.57	102
Other Indicators							
Net Family Income							
Less than $10,000	118	53.88	77	35.16	24	10.96	219
$10,000-$24,999	114	58.16	64	32.65	18	9.18	196
$25,000 or more	108	49.09	79	35.91	33	15.00	220
Type of Farm							
Single-family	290	54.41	187	35.08	56	10.51	533
Partnership	51	50.50	32	31.68	18	17.82	101
Family-corporation	10	52.63	7	36.84	2	10.53	19
Operator's Age							
Less than 35	85	56.29	52	34.44	14	9.27	151
35-44	76	53.90	50	35.46	15	10.64	141
45-54	94	52.51	59	32.96	26	14.53	179
55-64	96	52.75	64	35.16	22	12.09	182
Community Size of Market Place							
Less than 2,500	217	58.49	124	33.42	30	8.09	371*
2,500-9,999	54	45.00	53	44.17	13	10.83	120
10,000-14,999	13	33.33	16	41.03	10	25.64	39
15,000 or more	7	20.59	9	26.47	18	52.94	34

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

TABLE 9. NUMBER OF MILES TRAVELED BY NORTH DAKOTA FARM OPERATORS IN 1985 TO MARKET CATTLE BY RESPONDENT CHARACTERISTICS AND SELECTED VARIABLES

Respondent Characteristics	Number of Miles Traveled to Market Beef Cattle (if cattle were farmer's principal livestock)						
	Less than 30 miles		30-59 miles		60 miles or more		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	37	37.76	25	25.51	36	36.73	98
$40,000-$99,999	59	32.60	55	30.39	67	37.02	181
$100,000 or more	33	24.63	35	26.12	66	49.25	134
Total Farm Assets							
Less than $200,000	29	29.00	32	32.00	39	39.00	100
$200,000-$399,999	55	34.59	37	23.27	67	42.14	159
$400,000 or more	44	27.85	46	29.11	68	43.04	158
Acres of Wheat Harvested							
Less than 180 acres	41	36.94	27	24.32	43	39.74	111
180-359 acres	29	26.36	33	30.00	48	43.64	110
360 acres or more	34	28.81	31	9.14	53	15.63	118
Head of Cattle Raised							
Less than 40 head	38	28.36	39	29.10	57	42.54	134
40-79 head	40	30.53	34	25.95	57	43.51	131
80 head or more	49	31.61	43	27.74	63	40.65	155
Other Indicators							
Net Family Income							
Less than $10,000	51	29.14	46	26.29	78	44.57	175
$10,000-$24,999	45	34.88	32	24.81	52	40.31	129
$25,000 or more	34	27.20	43	34.40	48	38.40	125
Type of Farm							
Single-family	110	31.61	96	27.59	142	40.80	348*
Partnership	23	29.49	23	29.49	32	41.03	78
Family-corporation	1	9.09	4	36.36	6	54.55	11
Operator's Age							
Less than 35	27	29.35	23	25.00	42	45.65	92
35-44	26	27.37	30	31.58	39	41.05	95
45-54	42	33.60	36	28.80	47	37.60	125
55-64	38	30.16	34	26.98	54	42.86	126
Community Size of Market Place							
Less than 2,500	20	41.67	9	18.75	19	39.58	48*
2,500-9,999	53	52.48	18	17.82	30	29.70	101
10,000-14,999	29	20.28	31	21.68	83	58.04	143
15,000 or more	28	20.59	62	45.59	46	33.82	136

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

TABLE 10. AVERAGE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE SOLD BY PRODUCT IN 1985, NORTH DAKOTA

Product	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
		- - - - - - - -		population	- - - - - - - -	
Wheat (if wheat was main crop)	567	3,042.8	479	16,803.8	20	370,951
Cattle (if beef cattle were main livestock enterprise)	430	11,852.4	10,099	13,758.9	47	61,383

As displayed in Table 11, a strong relationship was found between the populations of the communities where wheat was sold and the number of miles driven to market the product ($r = .902$). The relationship between the populations of the communities where cattle were sold and the number of miles driven to sell them was surprisingly weak ($r = .079$).

The relationship between the demographic and economic variables and the populations of communities where agricultural products were sold varied among the three regions of the state. In the Western and Red River Valley regions, the number of miles driven to market wheat and community size were significantly correlated ($r = .967$ and $r = .513$, respectively). Population size was negatively correlated with miles driven to market cattle for operators in the Red River Valley region ($r = -.220$) (Appendix Tables 24, 25, and 26).

Over 63 percent of the operators marketed their wheat in communities with populations less than 2,500 people. Only 8 percent marketed their wheat in places with populations between 10,000 and 14,999, and 7 percent marketed it in places with populations greater than 15,000. The remaining 22 percent marketed their wheat in places with populations between 2,500 and 9,999 people (Table 12). A significant relationship was found between the population of the community where the operators marketed their wheat and the number of miles they lived from that place.

Only 37 percent of the operators surveyed marketed their cattle in communities with populations less than 10,000 people. The remaining 63 percent of the operators reported that they marketed their livestock in communities with populations of 10,000 people or more (Table 13). Significant relationships were found between population size and gross farm income, cattle herd size, farmers' age, and the number of miles driven to market cattle.

TABLE 11. RELATIONSHIP BETWEEN THE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE MARKETED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle were main livestock enterprise)
Operation Size Variables		
Gross farm income	-.028 537	-.049 404
Total farm assets	.054 542	.007 408
Acres of wheat harvested	.020 567	-.033 332
Head of cattle raised	-.001 272	-.066 411
Other Indicators		
Net family income	-.022 550	.055 420
Operators's age	-.022 565	.104* 429
Distance operator lives from the community	.902* 564	.079 428

Note: Top number is the Pearson correlation coefficient and bottom number is the N. The * indicates $p \leq .05$.

Summary and Implications

The focus of this study was to investigate the trade patterns of North Dakota farm and ranch operators. Specifically, interest was in gaining a better understanding of the purchasing and marketing trade patterns evident in our state. To accomplish this goal, the number of miles operators traveled to obtain goods and services and the size of community in which these purchases were typically made was analyzed. Secondly, the number of miles operators traveled to market agricultural products and the size of community they typically selected to conduct their trade was investigated. These data allowed the examination of the assumption that a minimum population level or threshold exists below which certain types of businesses may not be profitably operated (i.e., central place theory). Finally, the trade patterns of operators were compared in order to assess whether or not the size of their agricultural enterprise influenced their trade pattern.

TABLE 12. NUMBER OF NORTH DAKOTA FARM OPERATORS MARKETING WHEAT IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECTED VARIABLES

Respondent Characteristics	Community Size Where Operator Marketed Wheat (if wheat was main crop)								
	Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	84	62.22	33	24.44	11	8.15	7	5.19	135
$40,000-$99,999	174	63.97	53	19.49	23	8.46	22	8.09	272
$100,000 or more	168	62.69	61	22.76	24	8.96	15	5.60	268
Total Farm Assets									
Less than $200,000	107	60.45	45	25.42	15	8.47	10	5.65	177
$200,000-$399,999	145	61.70	53	22.55	21	8.94	16	6.81	235
$400,000 or more	176	66.17	50	18.80	23	8.65	17	6.39	266
Acres of Wheat Harvested									
Less than 180 acres	57	61.96	25	21.17	5	5.43	5	5.43	92
180-359 acres	59	62.11	24	25.26	6	6.32	6	6.32	95
360 acres or more	64	62.75	21	20.59	10	9.80	7	6.86	102
Head of Cattle Raised									
Less than 40 head	59	62.11	21	22.11	9	9.47	6	6.32	95
40-79 head	52	61.90	20	23.81	6	7.14	6	7.14	84
80 head or more	56	57.73	30	30.93	5	5.15	6	6.19	97
Other Indicators									
Net Family Income									
Less than $10,000	151	63.98	58	24.58	12	5.08	15	6.36	236
$10,000-$24,999	131	63.59	39	18.93	19	9.22	17	8.25	206
$25,000 or more	155	62.25	53	21.29	28	11.24	13	5.22	249
Type of Farm									
Single-family	372	65.72	118	20.85	40	7.07	36	6.36	566
Partnership	67	54.92	28	22.95	17	13.93	10	8.20	122*
Family-corporation	11	61.11	5	27.78	2	11.11	0	0.00	18
Operator's Age									
Less than 35	83	68.03	22	18.03	9	7.38	8	6.56	122
35-44	80	62.50	31	24.22	8	6.25	9	7.03	128
45-54	104	68.87	29	19.21	10	6.62	8	5.30	151
55-64	107	65.24	36	21.95	12	7.32	9	5.49	164
Distance Operator Lives from the Community									
Less than 10 miles	96	73.85	27	20.77	5	3.85	2	1.54	130
10-19 miles	124	61.39	53	26.24	16	7.92	9	4.46	202*
20 miles or more	30	42.25	13	18.31	10	14.00	18	25.35	71

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

TABLE 13. NUMBER OF NORTH DAKOTA FARM OPERATORS MARKETING CATTLE IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECTED VARIABLES

Respondent Characteristics	Community Size Where Beef Cattle Were Marketed (if cattle were main livestock)								Total
	Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	20	16.81	27	22.69	29	24.37	43	36.13	119*
$40,000-$99,999	28	12.84	54	24.77	63	28.90	73	33.49	218
$100,000 or more	16	10.13	39	24.68	65	41.14	38	24.05	158
Total Farm Assets									
Less than $200,000	14	11.48	26	21.31	43	35.25	39	31.97	122
$200,000-$399,999	28	14.58	50	26.04	55	28.65	59	30.73	192
$400,000 or more	22	11.89	43	23.24	62	33.51	58	31.35	185
Acres of Wheat Harvested									
Less than 180 acres	13	11.93	23	21.10	33	30.28	40	36.70	109
180-359 acres	10	9.09	27	24.55	27	33.64	37	32.73	110
360 acres or more	12	10.62	28	24.78	40	35.40	33	29.20	113
Head of Cattle Raised									
Less than 40 head	6	5.45	12	10.91	51	46.36	41	37.27	110*
40-79 head	12	11.54	34	32.69	31	29.81	27	25.96	104
80 head or more	17	15.89	31	28.97	24	22.43	35	32.71	107
Other Indicators									
Net Family Income									
Less than $10,000	30	14.49	47	22.71	61	29.47	69	33.33	207
$10,000-$24,999	23	14.47	35	22.01	52	32.70	49	30.82	159
$25,000 or more	12	8.28	39	26.90	52	35.86	42	28.97	145
Type of Farm									
Single-family	55	13.19	100	23.98	131	31.41	131	31.41	417*
Partnership	9	10.11	24	26.97	29	32.58	27	30.34	89
Family-corporation	2	15.38	0	0.00	7	53.85	4	30.77	13
Operator's Age									
Less than 35	12	12.90	20	21.51	42	45.16	19	20.43	93*
35-44	14	15.05	17	18.28	29	31.18	33	35.48	93
45-54	18	14.75	33	27.05	35	28.69	36	29.51	122
55-64	4	3.31	30	24.79	39	32.23	48	39.67	121
Distance Operator Lives from the Community									
Less than 10 miles	20	15.38	53	40.77	29	22.31	28	21.54	130*
10-19 miles	9	7.50	18	15.00	31	25.83	62	51.67	120
20 miles or more	9	10.67	30	16.85	83	46.63	46	25.84	178

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

Purchasing Trade Patterns

The findings indicated that the trade patterns of farm and ranch operators in North Dakota were quite sensitive to community size and location, the basic premise of central place theory. For example, purchases of hardware and food by farmers and ranchers were typically made in the state's smaller communities. The median community size where these purchases took place in 1985 was approximately 2,000 residents. Operators traveled, on the average, 18 miles to purchase food and hardware. The state's farmers and ranchers were less discriminating in obtaining banking services in that they traveled fewer miles (17 on average) and patronized offices in smaller communities (i.e., median size under 1,500). In contrast, larger durable goods were usually purchased in the state's major urban centers. The median community size where furniture was purchased, for example, was over 15,000 residents. Farmers and ranchers traveled an average of 36 miles to these communities to purchase furniture. One should keep in mind, however, that spatial characteristics of the state differ. The western third of North Dakota is more sparsely populated and contains fewer larger cities than the east. As a result, residents in the west must travel greater distances if they opt to obtain goods and services from the larger towns.

Marketing Trade Patterns

The trade pattern for marketing agricultural products was noticeably different than that observed for obtaining goods and services. Grain elevators for marketing wheat, for example, were located in many of the state's small communities. In fact, the median community size in which respondents from the study reported marketing their grain was approximately 500 people. As a result, operators indicated that they traveled an average of only 12 miles to market their wheat.

It should be noted that production density may be a more important factor in the location of grain elevators than is population density. The Red River Valley offers one illustration in that the number of elevators in the region has been increasing over the past decade. The Valley currently has nearly twice as many elevators per county as the Central region and over three times as many elevators per county as the Western region (Figure 2).

Wheat has been one of the predominant agricultural products raised in each region of the state (Figure 3). The number of bushels of wheat raised in the state has steadily increased from 209 million in 1974 to 296 million in 1982 (1982 Census of Agriculture). Intuitively, one would predict that, because more wheat is available, more elevators could be profitably operated. Ironically, this is not the case as the average number of elevators per county has steadily declined in both the Central and Western regions of the state for the past two decades. The average number of elevators per county in the Red River Valley region declined between 1965 and 1975 but has increased since that time. The trend suggests that while the number of elevators in the state may be declining, the storage capacity of elevators is increasing (Casavant and Griffin 1983). Thus, wheat growers in the future will be forced to travel greater average distances to market their wheat.

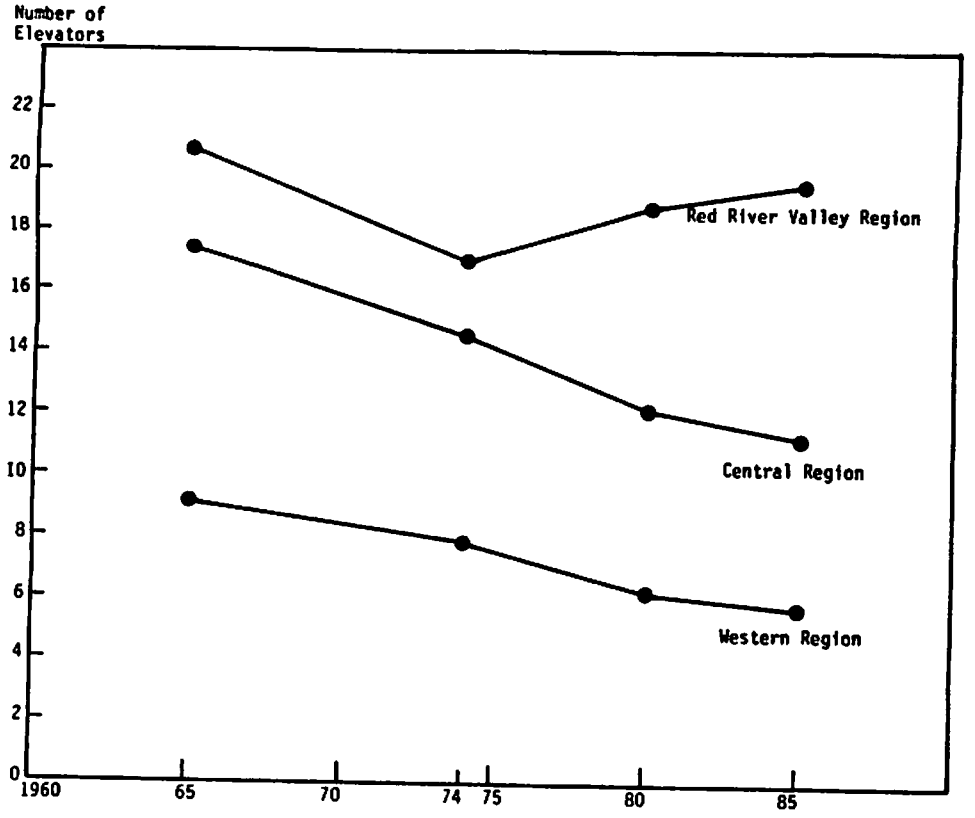

Figure 2. Average Number of Elevators per County in the Three Regions of North Dakota, 1965-1985

SOURCE: Directory of Licensed and Bonded Country Elevators in North Dakota, 1965, 1974, 1981, and 1985.

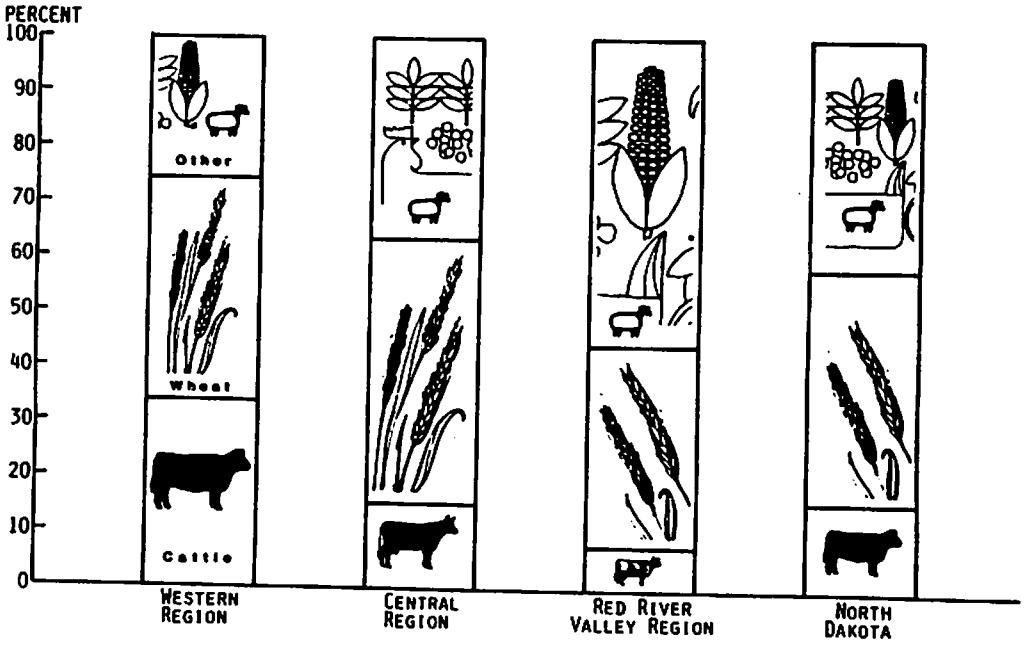

Figure 3. Percent of Total Agricultural Sales in North Dakota and in Three Regions of the State by Type of Agricultural Product, 1982

SOURCE: 1982 Census of Agriculture.

One particular anomaly found in contrasting the state's purchasing and marketing trade patterns was that cattle producers in the sparsely populated Western region traveled shorter distances (an average of 52 miles) to market their cattle than did operators in either of the other two more populous regions. Operators in the Central and Red River Valley regions traveled an average of 73 and 82 miles, respectively. Furthermore, the median size of the communities (13,300 residents) where operators in the Western region marketed their cattle was larger than the median community size where operators from either of the other two regions marketed their cattle. Operators from the Central and Red River Valley regions marketed their cattle in communities with median populations of 10,100 and 3,300, respectively.

These disparities are due, in part, to the distribution of livestock terminals and auction market locations. Although the number of terminals and auction markets have remained virtually unchanged over the past three decades (Figure 4), there are substantial regional differences. In 1986, the Red River Valley had but two marketing locations as compared with the thirteen locations in the Central region and nine locations in the Western region. This may help to explain the greater average distance traveled (mean = 81.7 miles) and the smaller variation in number of miles traveled by operators in the Red River Valley (standard deviation = 44.6 miles).

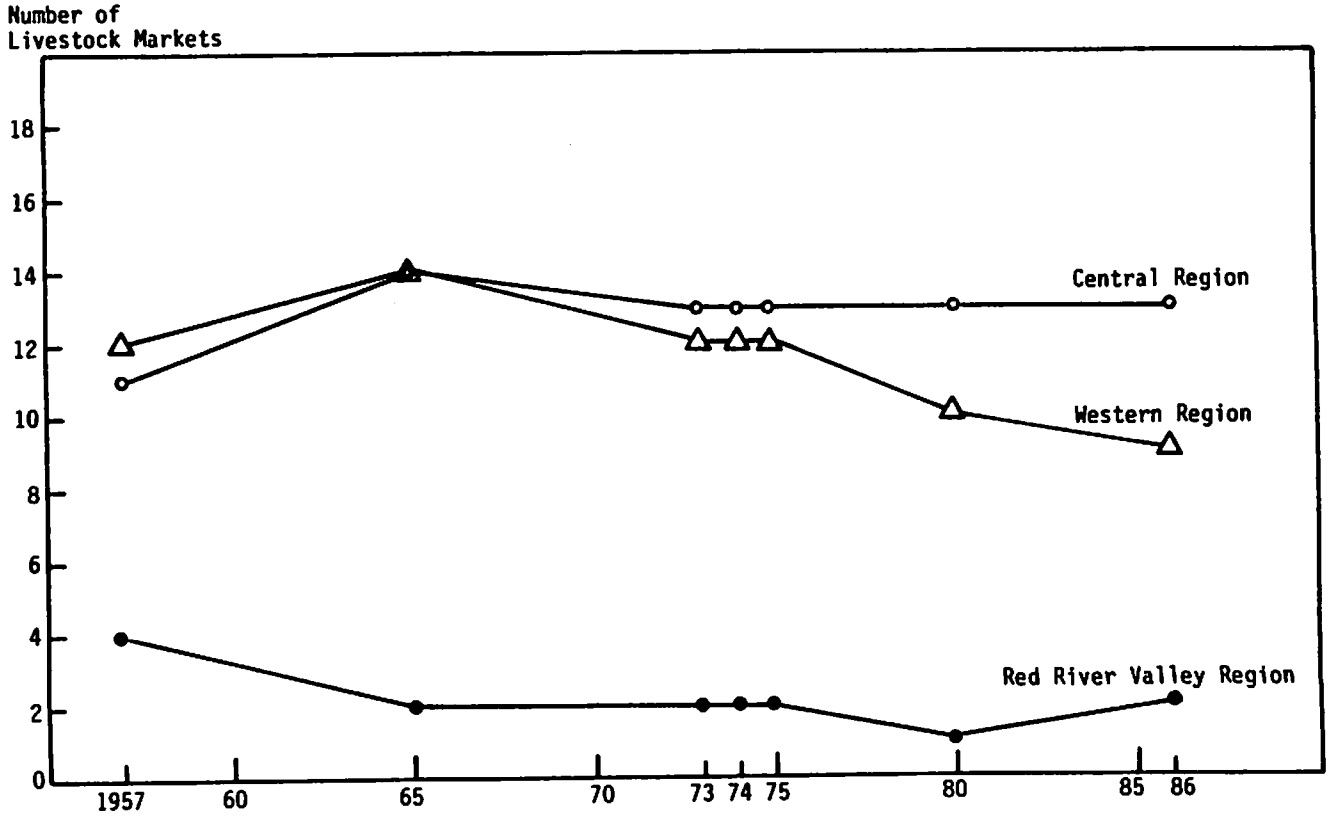

Figure 4. Number of Livestock Markets in the Three Regions of North Dakota, 1957-1986

SOURCE: Feil, 1982; Smebakken, 1986.

A second explanation is that the type of cattle marketed in the three regions differs. In the Western, northern Central, and Red River Valley regions, few cattle are finished; most are sold as feeder calves. In the southern Central region, there are more feedlot operations where cattle are sold for slaughter. These animals are frequently shipped to the larger livestock markets in Sioux Falls, South Dakota, or South St. Paul, Minnesota. This results in the large mean (73.2 miles) and an even larger standard deviation (87.7 miles) previously displayed in Table 6.

Size of Operation

Little support was found for the Goldschmidt Hypothesis which suggests that trade patterns differ by size of agricultural operation. There was little indication from our data that operators of larger farms or ranches purchased goods and services in larger communities or drove greater distances to make their purchases than did their counterparts on smaller operations. These results are similar to those of Korsching (1984) in his study of Iowa farmers.

Although individual cases of large-farm operators bypassing small, local communities in favor of larger trade centers may be cited, this is done with near equal frequency by operators of smaller farms. While the operators of larger farms may be financially *able* to travel greater distances to enjoy the competitive prices offered in larger communities, the operators of smaller farms may do so out of financial *necessity*. On the other hand, operators of both large and small farms may find with equal frequency that trading locally can be a more cost-effective means of obtaining goods and services, all things considered.

Where a relationship was observed between one of the measures of operation size and trade patterns, it was frequently in the *opposite* direction from that predicted by the Goldschmidt Hypothesis. In other cases, a bimodal distribution was found. For example, operators of large and small operations frequented the larger communities more often than did operators of medium-size operations. The only variables which were strongly related were the number of miles traveled to purchase or market goods and services and community size where the transactions were made.

A number of policy implications may be derived from the results of this study. First, the trend in declining numbers of people on farms will probably continue. This will lower the number of people living within the areas of rural trade centers. As the number of persons dwindles below the threshold of profitability for particular types of businesses, these businesses may be forced to close. The population thresholds for furniture and automobile businesses are typically higher than those for farm machinery, food, hardware, or banks. Consequently, businesses with higher population thresholds will be adversely affected sooner than those with lower thresholds. In other words, the furniture store in a rural community may experience financial stress before the grocery store does.

Second, as rural populations decrease and certain goods and services are no longer available to persons in rural communities, greater distances will be driven to make their needed purchases. Further, as higher order retail

services (such as furniture and autos) become less available in the smaller rural communities, the ability of some of the larger towns to maintain a viable business sector may be impaired. Business leaders and public officials should be cognizant of current patterns and recent trends and consider these factors in planning for future needs.

APPENDIX

APPENDIX TABLE 1. AVERAGE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985 BY REGION OF NORTH DAKOTA

Goods and Services	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
				-miles-		
WESTERN REGION						
Food	309	22.2	16.0	18.4	0	99
Hardware	309	21.8	15.0	18.9	0	100
Banking services	309	19.8	16.0	15.5	0	100
Furniture	306	42.9	35.0	39.6	0	380
Automobiles	306	38.7	30.0	39.6	0	400
Farm machinery	305	22.0	18.0	16.8	0	130
CENTRAL REGION						
Food	410	16.7	13.0	15.0	0	95
Hardware	410	17.0	13.0	16.1	0	120
Banking services	410	17.2	13.0	18.8	0	160
Furniture	408	35.7	26.5	35.2	0	350
Automobiles	410	31.0	23.0	31.7	0	260
Farm machinery	407	22.8	17.0	20.5	0	135
RED RIVER VALLEY REGION						
Food	214	15.3	10.5	13.9	0	70
Hardware	214	14.7	11.0	13.7	0	75
Banking services	214	11.2	10.0	7.7	0	35
Furniture	214	29.0	25.0	21.8	0	125
Automobiles	213	26.9	20.0	27.9	0	240
Farm machinery	212	16.3	13.5	13.4	0	99

APPENDIX TABLE 2. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, WESTERN REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased or Service Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.006 298	-.110 298	-.097 298	.075 295	.070 295	-.038 294
Total farm assets	.046 297	-.040 297	-.009 297	-.018 294	-.059 294	.018 293
Head of cattle raised	.102 192	.003 192	-.014 192	-.010 190	-.025 189	.025 189
Acres of wheat harvested	.008 239	-.103 239	-.048 239	.050 236	.089 237	-.059 236
Other Indicators						
Net family income	-.079 304	-.031 304	-.023 304	-.001 301	.031 301	-.046 300
Operator's age	-.073 308	.043 308	.045 308	-.139* 305	-.112* 305	.049 304
Size of community goods or services are obtained	.563* 306	.573* 309	.396* 309	.454* 301	.408* 304	.375* 300

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 3. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, CENTRAL REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased or Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.014 383	.002 383	.090 383	-.009 382	.074 383	-.076 380
Total farm assets	-.050 389	.016 389	.079 389	-.006 388	.075 389	.067 386
Head of cattle raised	-.062 331	-.033 331	.004 331	-.008 329	-.044 331	-.072 329
Acres of wheat harvested	.151* 186	.186* 186	.114 186	.059 185	.094 186	.055 185
Other Indicators						
Net family income	-.047 397	-.053 397	-.022 397	.045 396	-.106* 397	-.032 394
Operator's age	-.082 409	-.012 409	-.084 409	-.040 407	-.077 409	.094 406
Size of community goods or services are obtained	.562* 408	.484* 404	.372* 408	.630* 401	.665* 402	.317* 398

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 4. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO PURCHASE GOODS OR OBTAIN SERVICES IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, RED RIVER VALLEY REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Purchased					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	.029 203	-.027 203	.071 203	.189* 203	.096 202	-.028 201
Total farm assets	.056 204	.005 204	.092 204	.100 204	.049 203	.031 202
Head of cattle raised	.150 132	-.052 132	.023 132	.143 132	-.041 132	-.016 130
Acres of wheat harvested	.028 53	-.038 53	.030 53	.274* 53	.087 53	-.030 52
Other Indicators						
Net family income	-.048 209	-.085 209	-.024 209	.063 209	-.019 208	-.039 207
Operator's age	-.088 214	-.121 214	-.006 214	-.018 214	-.025 213	-.153* 212
Size of community goods or services are obtained	.677* 212	.611* 212	.345* 213	.522* 211	.373* 212	.292* 206

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 5. NUMBER OF MILES TYPICALLY TRAVELED TO PURCHASE FOOD IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled to Purchase Food: Less than 10 Miles		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	63	34.24	56	30.43	65	35.33	184
$40,000-$99,999	123	34.65	101	28.45	131	36.90	355
$100,000 or more	120	34.78	102	29.57	123	35.65	345
Total Farm Assets							
Less than $200,000	77	33.92	62	27.31	88	38.77	227
$200,000-$399,999	119	37.42	100	31.45	99	31.13	318
$400,000 or more	112	32.46	101	29.28	132	38.26	345
Acres of Wheat Harvested							
Less than 180 acres	71	35.50	49	24.50	80	40.00	200
180-359 acres	74	32.74	73	32.30	79	34.96	226
360 acres or more	93	33.70	87	31.52	96	34.78	276
Head of Cattle Raised							
Less than 40 head	44	31.88	43	31.16	51	36.96	138
40-79 head	44	32.35	39	28.68	53	38.97	136
80 head or more	40	25.48	52	33.12	65	41.40	157
Other Indicators							
Net Family Income							
Less than $10,000	94	30.62	91	29.64	122	39.74	307
$10,000-$24,999	104	37.68	85	30.80	87	31.52	276
$25,000 or more	116	35.47	89	27.22	122	37.31	327
Type of Farm							
Single-family	256	34.18	227	30.31	266	35.51	749
Partnership	60	38.71	37	23.87	58	37.42	155
Family-corporation	7	28.00	8	32.00	10	40.00	25
Operator's Age							
Less than 35	74	34.10	54	24.88	89	41.01	217
35-44	64	29.36	73	33.49	81	37.16	218
45-54	94	39.33	63	26.36	82	34.31	239
55-64	90	35.02	83	32.30	84	32.68	257
Community Size Where Food Purchased							
Less than 2,500	153	66.52	66	28.70	11	4.78	230*
2,500-9,999	107	39.19	116	42.49	50	18.32	273
10,000-14,999	32	19.39	53	32.12	80	48.48	165
15,000 or more	28	10.85	37	14.34	193	74.81	258

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 6. NUMBER OF MILES TYPICALLY TRAVELED TO PURCHASE HARDWARE IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled to Purchase Hardware: Less than 10 Miles		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	61	33.15	61	33.15	62	33.70	184
$40,000-$99,999	117	32.96	118	33.24	120	33.80	355
$100,000 or more	130	37.68	103	29.86	112	32.46	345
Total Farm Assets							
Less than $200,000	74	32.60	80	35.24	73	32.16	227
$200,000-$399,999	116	36.48	105	33.02	97	30.50	318
$400,000 or more	120	34.78	104	30.14	121	35.07	345
Acres of Wheat Harvested							
Less than 180 acres	63	31.50	64	32.00	73	36.50	200
180-359 acres	68	30.09	82	36.28	76	33.63	226
360 acres or more	105	38.04	90	32.61	81	29.33	276
Head of Cattle Raised							
Less than 40 head	48	34.78	47	34.06	43	31.16	138
40-79 head	40	29.41	39	28.68	57	41.91	136
80 head or more	39	24.84	58	36.94	60	38.22	157
Other Indicators							
Net Family Income							
Less than $10,000	90	29.32	111	36.16	106	34.53	307*
$10,000-$24,999	108	39.13	88	31.88	80	28.99	276
$25,000 or more	118	36.09	92	28.13	117	35.78	327
Type of Farm							
Single-family	256	34.18	245	32.71	248	33.11	749
Partnership	57	36.77	43	27.74	55	35.48	155
Family-corporation	7	28.00	10	40.00	8	32.00	25
Operator's Age							
Less than 35	77	35.48	68	31.34	72	33.18	217
35-44	63	28.90	83	38.07	72	33.03	218
45-54	87	36.40	66	27.62	86	35.98	239
55-64	92	35.80	82	31.91	83	32.30	257
Community Size Where Hardware Purchased							
Less than 2,500	144	58.54	87	35.37	15	6.10	246*
2,500-9,999	116	40.70	123	43.16	46	16.14	285
10,000-14,999	29	17.37	49	29.34	89	53.29	167
15,000 or more	27	11.89	38	16.74	162	71.37	227

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 7. NUMBER OF MILES TRAVELED FOR BANKING SERVICES IN 1985 FOR BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled for Banking Services: Less than 10 Miles		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	63	34.43	67	36.61	53	28.96	183
$40,000-$99,999	107	30.14	134	37.75	114	32.11	355
$100,000 or more	132	38.26	111	32.17	102	29.57	345
Total Farm Assets							
Less than $200,000	79	34.96	78	34.51	69	30.53	226
$200,000-$399,999	105	33.02	120	37.74	93	29.25	318
$400,000 or more	120	34.78	117	33.91	108	31.30	345
Acres of Wheat Harvested							
Less than 180 acres	64	32.16	69	34.67	66	33.17	199
180-359 acres	67	29.65	87	38.50	72	31.86	226
360 acres or more	102	36.96	92	33.33	82	29.71	276
Head of Cattle Raised							
Less than 40 head	39	28.26	52	37.68	47	34.06	138
40-79 head	38	27.94	50	36.76	48	35.29	136
80 head or more	39	24.84	60	38.22	58	36.94	157
Other Indicators							
Net Family Income							
Less than $10,000	92	30.07	113	36.93	101	33.01	306
$10,000-$24,999	97	35.14	96	34.78	83	30.07	276
$25,000 or more	120	36.70	110	33.64	97	29.66	327
Type of Farm							
Single-family	250	33.42	271	36.23	227	30.35	748
Partnership	59	38.06	46	29.68	50	32.26	155
Family-corporation	8	32.00	8	32.00	9	36.00	25
Operator's Age							
Less than 35	77	35.48	69	31.80	71	32.72	217
35-44	69	31.65	84	38.53	65	29.82	218
45-54	85	35.56	79	33.05	75	31.38	239
55-64	86	33.59	93	36.33	77	30.08	256
Community Size Where Banking Services Obtained							
Less than 2,500	149	47.15	122	38.61	45	14.24	316*
2,500-9,999	113	37.17	121	39.80	70	23.03	304
10,000-14,999	33	22.15	50	33.56	66	44.30	149
15,000 or more	23	14.38	33	20.63	104	65.00	160

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 8. NUMBER OF MILES TRAVELED TO PURCHASE FURNITURE IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled to Purchase Furniture: Less than 10 Miles		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	30	16.48	32	17.58	120	65.93	182
$40,000-$99,999	52	14.73	70	19.83	231	65.44	353
$100,000 or more	49	14.20	57	16.52	239	69.28	345
Total Farm Assets							
Less than $200,000	38	16.89	37	16.44	150	66.67	225
$200,000-$399,999	48	15.14	64	20.19	205	64.67	317
$400,000 or more	49	14.24	59	17.15	236	68.60	344
Acres of Wheat Harvested							
Less than 180 acres	26	13.20	34	17.26	137	69.54	197
180-359 acres	26	11.56	50	22.22	149	66.22	225
360 acres or more	39	14.18	45	16.36	191	69.45	275
Head of Cattle Raised							
Less than 40 head	24	17.39	25	18.12	89	64.49	138
40-79 head	15	11.11	19	14.07	101	74.81	135
80 head or more	18	11.61	32	20.65	105	67.74	155
Other Indicators							
Net Family Income							
Less than $10,000	44	14.52	50	16.50	209	68.98	303
$10,000-$24,999	46	16.67	60	21.74	170	61.59	276
$25,000 or more	47	14.37	53	16.21	227	69.42	327
Type of Farm							
Single-family	108	14.52	142	19.09	494	66.40	744
Partnership	27	17.42	15	9.68	113	72.90	155
Family-corporation	4	16.00	6	24.00	15	60.00	25
Operator's Age							
Less than 35	37	17.13	25	11.57	154	71.30	216
35-44	25	11.57	45	20.64	148	67.89	218
45-54	37	15.48	42	17.57	160	66.95	239
55-64	40	15.81	40	20.95	53	63.24	253
Community Size Where Furniture Purchased							
Less than 2,500	19	32.76	22	37.93	17	29.31	58*
2,500-9,999	62	34.07	64	35.16	56	30.77	182
10,000-14,999	28	13.53	39	18.84	140	67.63	207
15,000 or more	30	6.44	39	8.37	397	85.19	466

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 9. NUMBER OF MILES TRAVELED TO PURCHASE AUTOMOBILES IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled to Purchase Automobiles: Less than 10 Miles		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	38	20.65	34	18.48	112	60.87	184
$40,000-$99,999	63	17.90	81	23.01	208	59.09	352
$100,000 or more	70	20.35	79	22.97	195	56.69	344
Total Farm Assets							
Less than $200,000	50	22.03	49	21.59	128	56.39	227
$200,000-$399,999	51	16.14	73	23.10	192	60.76	316
$400,000 or more	72	20.99	75	21.87	196	57.14	343
Acres of Wheat Harvested							
Less than 180 acres	40	20.00	38	19.00	122	61.00	200
180-359 acres	32	14.22	57	25.33	136	60.44	225
360 acres or more	56	20.36	59	21.45	160	58.18	275
Head of Cattle Raised							
Less than 40 head	23	16.91	30	22.06	83	61.03	136
40-79 head	18	13.24	25	18.38	93	68.38	135
80 head or more	25	16.03	39	25.00	92	58.97	156
Other Indicators							
Net Family Income							
Less than $10,000	52	17.05	64	20.98	189	61.97	305
$10,000-$24,999	55	20.07	60	21.90	195	58.03	274
$25,000 or more	68	20.80	74	22.63	185	56.57	327
Type of Farm							
Single-family	141	18.93	168	22.55	436	58.52	745
Partnership	35	22.58	28	18.06	92	59.35	155
Family-corporation	3	12.00	5	20.00	17	68.00	25
Operator's Age							
Less than 35	42	19.35	43	19.82	132	60.83	217
35-44	33	15.14	54	24.77	131	60.09	218
45-54	48	20.17	41	17.23	149	62.61	238
55-64	55	21.65	65	25.59	134	52.76	254
Community Size Where Automobiles Purchased							
Less than 2,500	53	45.30	33	28.21	31	26.50	117*
2,500-9,999	69	28.28	89	36.48	86	35.25	244
10,000-14,999	27	13.71	44	22.34	126	63.96	197
15,000 or more	28	7.78	36	10.00	296	82.22	360

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 10. NUMBER OF MILES TRAVELED TO PURCHASE FARM MACHINERY IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Number of Miles Traveled to Purchase Farm Machinery: Less than 10		10 to 19 Miles		20 or More Miles		Total
	N	%	N	%	N	%	N
Size Variables							
Gross Farm Income							
Less than $40,000	48	26.23	55	30.05	80	43.72	183
$40,000-$99,999	78	22.41	119	34.20	151	43.39	348
$100,000 or more	91	26.45	114	33.14	139	40.41	344
Total Farm Assets							
Less than $200,000	59	26.22	73	32.44	93	41.33	225
$200,000-$399,999	75	23.89	108	34.39	131	41.72	314
$400,000 or more	84	24.56	110	32.16	148	43.27	342
Acres of Wheat Harvested							
Less than 180 acres	52	26.40	58	29.44	87	44.16	197
180-359 acres	44	19.73	88	39.46	91	40.81	223
360 acres or more	69	25.09	86	31.27	120	43.64	275
Head of Cattle Raised							
Less than 40 head	33	24.26	38	27.94	65	47.79	136
40-79 head	25	18.66	44	32.84	65	48.51	134
80 head or more	28	17.95	57	36.54	71	45.51	156
Other Indicators							
Net Family Income							
Less than $10,000	69	22.92	101	33.55	131	43.52	301
$10,000-$24,999	73	26.64	86	31.39	115	41.97	274
$25,000 or more	82	25.15	107	32.82	137	42.02	326
Type of Farm							
Single-family	183	24.70	246	33.20	312	42.11	741
Partnership	42	27.27	45	29.22	67	43.51	154
Family-corporation	3	12.00	9	36.00	13	52.00	25
Operator's Age							
Less than 35	59	27.31	61	28.24	96	44.44	216
35-44	43	19.82	81	37.33	93	42.86	217
45-54	61	26.07	72	30.77	101	43.16	234
55-64	65	25.49	87	34.12	103	40.39	255
Community Size Where Food Purchased							
Less than 2,500	79	33.47	94	39.83	63	26.69	236*
2,500-9,999	90	29.32	121	39.41	96	31.27	307
10,000-14,999	29	16.57	50	28.57	96	54.86	175
15,000 or more	25	13.44	30	16.13	131	70.43	186

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 11. AVERAGE COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985 BY REGION, NORTH DAKOTA

Goods and Services	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
		- - - - - - - - - population - - - - - - - - -				
WESTERN REGION						
Food	306	11,160.9	2,071	14,943.6	36	44,485
Hardware	309	10,379.7	1,830	14,732.4	71	44,485
Banking Services	309	7,056.7	1,469	11,387.4	71	44,485
Furniture	301	21,031.3	15,924	17,566.0	93	61,383
Automobiles	304	17,319.0	15,513	17,541.9	158	61,383
Farm Machinery	302	8,564.2	1,739	13,126.2	21	44,485
CENTRAL REGION						
Food	408	8,219.9	2,335	11,651.7	62	61,383
Hardware	404	7,572.0	2,335	10,941.5	61	44,485
Banking Services	408	6,430.4	1,538	10,690.6	42	61,383
Furniture	401	15,024.4	7,774	15,621.4	199	61,383
Automobiles	402	12,213.5	3,335	15,006.8	112	61,383
Farm Machinery	398	7,525.1	2,527	10,851.5	24	61,383
RED RIVER VALLEY REGION						
Food	212	16,773.4	1,844	23,502.0	51	61,383
Hardware	212	12,953.1	1,661	21,399.8	51	61,383
Banking Services	213	5,957.5	1,158	13,174.9	24	61,383
Furniture	211	28,708.5	43,765	24,827.3	230	61,383
Automobiles	212	20,645.5	5,293	24,730.1	112	61,383
Farm Machinery	206	7,639.1	1,524	16,238.2	75	61,383

APPENDIX TABLE 12. RELATIONSHIP BETWEEN COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, WESTERN REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.016 295	-.092 298	-.062 298	.047 290	-.064 293	-.115* 292
Total farm assets	.047 294	-.015 297	.028 297	-.018 289	-.079 292	-.060 290
Head of cattle raised	-.035 236	-.103 239	-.060 239	-.008 231	.032 236	-.056 235
Acres of wheat harvested	.137 190	.051 192	.048 192	.063 187	.066 189	.045 185
Other Indicators						
Net family income	-.061 301	-.039 304	-.001 304	-.072 296	-.079 300	-.029 297
Operator's age	.020 305	.085 308	.095 308	-.067 300	-.046 303	.082 301
Distance operator lives from the community	.563* 306	.573* 309	.396* 309	.454* 301	.408* 304	.375* 300

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 13. RELATIONSHIP BETWEEN COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, CENTRAL REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.010 381	.027 377	.119* 382	-.019 375	.023 375	-.056 371
Total farm assets	.036 387	.101* 384	.167* 388	.029 381	.040 381	-.001 377
Head of cattle raised	.050 329	.090 326	.102 329	.045 324	- .036 325	-.0004 321
Acres of wheat harvested	.100 185	.170* 184	.143* 186	.014 182	.044 181	.027 181
Other Indicators						
Net family income	-.026 395	-.036 391	-.006 396	.056 389	-.101* 389	-.070 385
Operator's age	-.121* 407	-.055 403	-.022 407	-.158* 400	-.106* 401	-.036 397
Distance operator lives from the Community	562* 408	.484* 404	.372* 408	.630* 401	.665* 402	.317* 398

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 14. RELATIONSHIP BETWEEN COMMUNITY SIZE WHERE GOODS WERE PURCHASED AND SERVICES OBTAINED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, RED RIVER VALLEY REGION OF NORTH DAKOTA

Respondent Characteristics	Goods Purchased and Services Obtained					
	Food	Hardware	Banking Services	Furniture	Autos	Farm Machinery
Operation Size Variables						
Gross farm income	-.047 201	.032 201	.022 202	.171* 200	.043 201	-.041 195
Total farm assets	.015 202	.088 202	.038 203	.162* 201	.094 202	.056 196
Head of cattle raised	.045 130	-.022 130	.037 131	.028 129	-.040 131	-.034 126
Acres of wheat harvested	-.079 51	-.052 53	.005 52	.151 51	-.190 53	-.057 50
Other Indicators						
Net family income	-.064 207	-.025 207	.021 208	.067 206	-.028 207	-.102 201
Operator's age	.013 212	-.037 212	-.009 213	.044 211	.123 212	-.016 206
Distance operator lives from the Community	.677* 212	.611* 212	.345* 213	.522* 211	.373* 212	.292* 206

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 15. COMMUNITY SIZE WHERE FOOD WAS PURCHASED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Food Was Purchased: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	47	25.54	49	26.63	27	14.67	61	33.51	184
$40,000-$99,999	91	25.93	110	31.34	61	17.38	89	25.36	351
$100,000 or more	76	22.22	102	29.82	74	21.64	90	26.32	342
Total Farm Assets									
Less than $200,000	54	23.79	61	26.87	50	22.03	62	27.31	227*
$200,000-$399,999	88	28.03	106	33.76	39	12.42	81	25.80	314
$400,000 or more	72	21.05	99	28.95	72	21.05	99	28.95	342
Acres of Wheat Harvested									
Less than 180 acres	53	26.50	59	29.50	24	12.00	64	32.00	200
180-359 acres	52	23.53	73	33.03	41	18.55	55	24.89	221
360 acres or more	65	23.72	83	30.29	48	17.52	78	28.47	274
Head of Cattle Raised									
Less than 40 head	30	21.90	41	29.93	29	21.17	37	27.01	137
40-79 head	40	30.08	40	30.08	19	14.29	34	25.56	133
80 head or more	36	23.08	59	37.82	16	10.26	45	28.85	156
Other Indicators									
Net Family Income									
Less than $10,000	74	24.10	99	32.25	46	14.98	88	28.66	307
$10,000-$24,999	72	26.47	79	29.04	47	17.28	74	27.21	272
$25,000 or more	74	22.84	89	27.47	71	21.91	90	27.78	324
Type of Farm									
Single-family	87	25.17	221	29.74	132	17.77	203	27.32	743
Partnership	37	24.03	44	28.57	24	15.58	49	31.82	154
Family-corporation	5	20.00	6	24.00	8	32.00	6	24.00	25
Operator's Age									
Less than 35	49	22.69	53	24.54	46	21.30	68	31.48	216*
35-44	50	23.15	67	31.02	31	14.35	68	31.48	216
45-54	70	29.66	60	25.42	45	19.07	61	25.85	236
55-64	60	23.44	92	35.94	43	16.80	61	23.83	256
Distance Operator Lives from the Community									
Less than 10 miles	53	47.81	107	33.44	32	10.00	28	8.75	320*
10-19 miles	66	24.26	116	42.65	53	19.49	37	13.60	272
20 miles or more	11	3.29	50	14.97	80	23.95	193	57.78	334

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 16. COMMUNITY SIZE WHERE HARDWARE WAS PURCHASED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Hardware Was Purchased: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	51	27.87	50	27.32	27	14.75	55	30.05	183
$40,000-$99,999	99	28.05	114	32.29	65	18.41	75	21.25	353
$100,000 or more	83	24.41	108	31.76	69	20.29	80	23.53	340
Total Farm Assets									
Less than $200,000	65	28.76	67	29.65	47	20.80	47	20.80	226
$200,000-$399,999	85	27.07	107	34.08	44	14.01	78	24.84	314
$400,000 or more	85	24.78	104	30.32	68	19.83	86	25.07	343
Acres of Wheat Harvested									
Less than 180 acres	57	28.64	63	31.66	26	13.07	53	26.63	199
180-359 acres	56	25.23	72	32.43	46	20.72	48	21.62	222
360 acres or more	75	27.37	87	31.75	45	16.42	67	24.45	274
Head of Cattle Raised									
Less than 40 head	37	26.81	39	28.26	30	21.74	32	23.19	138
40-79 head	37	27.41	45	33.33	22	16.30	31	22.96	135
80 head or more	44	28.21	54	34.62	16	10.26	42	26.92	156
Other Indicators									
Net Family Income									
Less than $10,000	80	26.23	98	32.13	49	16.07	78	25.57	305
$10,000-$24,999	77	28.10	84	30.66	50	18.25	63	22.99	274
$25,000 or more	83	25.70	98	30.34	65	20.12	77	23.84	323
Type of Farm									
Single-family	199	26.78	230	30.96	127	17.09	187	25.17	743
Partnership	41	26.80	46	30.07	30	19.61	36	23.53	153
Family-corporation	5	20.00	7	28.00	9	36.00	4	16.00	25
Operator's Age									
Less than 35	62	28.84	51	23.72	48	22.33	54	25.12	215
35-44	55	25.35	73	33.64	34	15.67	55	25.35	217
45-54	68	28.57	70	29.41	43	18.07	57	23.95	238
55-64	60	23.72	90	35.57	42	16.60	61	24.11	253
Distance Operator Lives from the Community									
Less than 10 miles	144	45.57	116	36.71	29	9.18	27	8.54	316*
10-19 miles	87	29.29	123	41.41	49	16.50	38	12.79	297
20 miles or more	15	4.81	46	14.74	89	28.53	162	51.92	312

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 17. COMMUNITY SIZE WHERE BANKING SERVICES WERE OBTAINED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Banking Services Were Obtained: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N.	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	60	32.61	63	34.24	23	12.50	38	20.65	184*
$40,000-$99,999	136	38.31	117	32.96	51	14.37	51	14.37	355
$100,000 or more	103	30.03	112	32.65	72	20.99	56	16.33	343
Total Farm Assets									
Less than $200,000	75	33.19	76	33.63	43	19.03	32	14.16	226
$200,000-$399,999	114	35.96	108	34.07	38	11.99	57	17.98	317
$400,000 or more	109	31.59	111	32.17	64	18.55	61	17.68	345
Acres of Wheat Harvested									
Less than 180 acres	70	35.35	70	35.35	19	9.60	39	19.70	198
180-359 acres	79	35.11	75	33.33	37	16.44	34	15.11	225
360 acres or more	90	32.61	88	31.88	48	17.39	50	18.12	276
Head of Cattle Raised									
Less than 40 head	45	32.85	45	32.85	23	16.79	24	17.52	137
40-79 head	55	40.44	44	32.35	15	11.03	22	16.18	136
80 head or more	49	31.21	60	38.22	15	9.55	33	21.02	157
Other Indicators									
Net Family Income									
Less than $10,000	107	34.97	108	35.29	34	11.11	57	18.63	306
$10,000-$24,999	94	34.06	85	30.80	50	18.12	47	17.03	276
$25,000 or more	105	32.21	106	32.52	64	19.63	51	15.64	326
Type of Farm									
Single-family	255	34.14	244	32.66	111	14.86	137	18.34	747
Partnership	53	34.42	51	33.12	29	18.83	21	13.64	154
Family-corporation	8	32.00	7	28.00	8	32.00	2	8.00	25
Operator's Age									
Less than 35	80	37.04	59	27.31	45	20.83	32	14.81	216
35-44	73	33.49	77	35.32	28	12.84	40	18.35	218
45-54	88	36.82	69	28.87	39	16.32	43	17.99	239
55-64	76	29.80	97	38.04	37	14.51	45	17.65	255
Distance Operator Lives from the Community									
Less than 10 miles	149	46.86	113	35.53	33	10.38	23	7.23	318*
10-19 miles	122	37.42	121	37.12	50	15.34	33	10.12	326
20 miles or more	45	15.79	70	24.56	66	23.16	104	36.49	285

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 18. COMMUNITY SIZE WHERE FURNITURE WAS PURCHASED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Furniture Was Purchased: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	10	5.59	36	20.11	37	20.67	96	53.63	179
$40,000-$99,999	20	5.73	82	23.50	82	23.50	165	47.28	349
$100,000 or more	25	7.42	58	17.21	79	23.44	175	51.93	337
Total Farm Assets									
Less than $200,000	14	6.28	42	18.83	62	27.80	105	47.09	223
$200,000-$399,999	18	5.81	73	23.55	59	19.03	160	51.61	310
$400,000 or more	24	7.10	62	18.34	75	22.19	177	52.37	338
Acres of Wheat Harvested									
Less than 180 acres	9	4.64	45	23.20	40	20.62	100	51.55	194
180-359 acres	15	6.85	45	20.55	54	24.66	105	47.95	219
360 acres or more	15	5.54	52	19.19	54	19.93	150	55.35	271
Head of Cattle Raised									
Less than 40 head	8	5.84	30	21.90	39	28.47	60	43.80	137
40-79 head	11	8.27	27	20.30	31	23.31	64	48.12	133
80 head or more	11	7.33	38	25.33	19	12.67	82	54.67	150
Other Indicators									
Net Family Income									
Less than $10,000	20	6.67	65	21.67	53	17.67	162	54.00	300
$10,000-$24,999	20	7.43	54	20.07	73	27.14	122	45.35	269
$25,000 or more	18	5.59	62	19.25	76	23.60	166	51.55	322
Type of Farm									
Single-family	48	6.58	140	19.18	169	23.15	373	51.10	730
Partnership	8	5.19	34	22.08	28	18.18	84	54.55	154
Family-corporation	2	8.00	5	20.00	10	40.00	8	32.00	25
Operator's Age									
Less than 35	15	6.98	30	13.95	50	23.26	120	55.81	215
35-44	12	5.63	45	21.13	45	21.13	111	52.11	213
45-54	18	7.66	44	18.72	56	23.83	117	49.79	235
55-64	13	5.24	63	25.40	55	22.18	117	47.18	248
Distance Operator Lives from the Community									
Less than 10 miles	19	13.67	62	44.60	28	20.14	30	21.58	139*
10-19 miles	22	13.41	64	39.02	39	23.78	39	23.78	164
20 miles or more	17	2.79	56	9.18	140	22.95	397	65.08	610

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 19. COMMUNITY SIZE WHERE AUTOMOBILES WERE PURCHASED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECT VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Automobiles Were Purchased: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	22	12.15	40	22.10	31	17.13	88	48.62	181
$40,000-$99,999	43	12.29	100	28.57	79	22.57	128	36.57	350
$100,000 or more	46	13.61	96	28.40	78	23.08	118	34.91	338
Total Farm Assets									
Less than $200,000	31	13.84	57	25.45	58	25.89	78	34.82	224
$200,000-$399,999	36	11.61	77	24.84	57	18.39	140	45.16	310
$400,000 or more	43	12.61	105	30.79	72	21.11	121	35.48	341
Acres of Wheat Harvested									
Less than 180 acres	31	15.58	51	25.63	35	17.59	82	41.21	199
180-359 acres	23	10.36	60	27.03	52	23.42	87	39.19	222
360 acres or more	33	12.18	79	29.15	54	19.93	105	38.75	271
Head of Cattle Raised									
Less than 40 head	14	10.37	30	22.22	40	29.63	51	37.78	135*
40-79 head	14	10.45	39	29.10	31	23.13	50	37.31	134
80 head or more	19	12.34	50	32.47	18	11.69	67	43.51	154
Other Indicators									
Net Family Income									
Less than $10,000	31	10.23	80	26.40	55	18.15	137	45.21	303
$10,000-$24,999	34	12.45	70	25.64	62	22.71	107	39.19	273
$25,000 or more	48	15.00	91	28.44	76	23.75	105	32.81	320
Type of Farm									
Single-family	91	12.36	194	26.36	156	21.20	295	40.08	736*
Partnership	25	16.34	43	28.10	27	17.65	58	37.91	153
Family-corporation	1	4.00	4	16.00	13	52.00	7	28.00	25
Operator's Age									
Less than 35	30	13.89	44	20.37	53	24.54	89	41.20	216
35-44	25	11.74	63	29.58	37	17.37	88	41.31	213
45-54	29	12.39	58	24.79	58	24.79	89	38.03	234
55-64	33	13.04	78	30.83	48	18.97	94	37.15	254
Distance Operator Lives from the Community									
Less than 10 miles	53	29.94	69	38.98	27	15.25	28	15.82	177
10-19 miles	33	16.34	89	44.06	44	21.78	36	17.82	202*
20 miles or more	31	5.75	86	15.96	126	23.38	296	54.92	539

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 20. COMMUNITY SIZE WHERE FARM MACHINERY WAS PURCHASED IN 1985 BY RESPONDENT CHARACTERISTICS AND SELECTED VARIABLES, NORTH DAKOTA

Respondent Characteristics	Community Size Where Farm Machinery Was Purchased: Less than 2,500		2,500 to 9,999		10,000 to 14,999		15,000+		Total
	N	%	N	%	N	%	N	%	N
Size Variables									
Gross Farm Income									
Less than $40,000	52	29.05	46	25.70	30	16.76	51	28.49	179
$40,000-$99,999	82	23.98	123	35.96	70	20.47	67	19.59	342
$100,000 or more	86	25.52	130	38.58	68	20.18	53	15.73	337
Total Farm Assets									
Less than $200,000	63	28.25	62	27.80	47	21.08	51	22.87	223
$200,000-$399,999	70	23.03	120	39.47	54	17.76	60	19.74	304
$400,000 or more	87	25.89	119	35.42	66	19.64	64	19.05	336
Acres of Wheat Harvested									
Less than 180 acres	52	26.80	64	32.99	30	15.46	48	24.74	194
180-359 acres	54	24.88	76	35.02	46	21.20	41	18.89	217
360 acres or more	69	25.46	96	34.42	51	18.82	55	20.30	271
Head of Cattle Raised									
Less than 40 head	26	19.70	45	34.09	34	25.76	27	20.45	132
40-79 head	36	27.48	45	34.35	26	19.85	24	18.32	131
80 head or more	38	24.84	62	40.52	20	13.07	33	21.57	153
Other Indicators									
Net Family Income									
Less than $10,000	76	25.50	110	36.91	49	16.44	63	21.14	298
$10,000-$24,999	73	27.24	76	28.36	55	20.52	64	23.88	268
$25,000 or more	78	24.61	118	37.22	69	21.77	52	16.40	317
Type of Farm									
Single-family	192	26.37	249	34.20	130	17.86	157	21.57	728*
Partnership	40	26.85	49	32.89	34	22.82	26	17.45	149
Family-corporation	4	16.00	7	28.00	11	44.00	3	12.00	25
Operator's Age									
Less than 35	54	25.71	60	28.57	53	25.24	43	20.48	210
35-44	51	23.94	83	38.97	35	16.43	44	20.66	213
45-54	73	31.88	67	29.26	39	17.03	50	21.83	229
55-64	59	23.41	96	38.10	48	19.05	49	19.44	252
Distance Operator Lives from the Community									
Less than 10 miles	79	35.43	90	40.36	29	13.00	25	11.21	223
10-19 miles	94	31.86	121	41.02	50	16.95	30	10.17	295*
20 miles or more	63	16.32	96	24.87	96	24.87	131	33.94	386

* indicates a statistically significant relationship ($p \leq .05$) between the two variables shown by the table using a X^2-test.

APPENDIX TABLE 21. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO MARKET AGRICULTURAL PRODUCTS IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, WESTERN REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle was main livestock enterprise)
Operation Size Variables		
Gross farm income	.014 211	.104 192
Total farm assets	.102 211	.205* 193
Acres of wheat harvested	.021 219	.014 157
Head of cattle raised	.028 136	.329* 189
Other Indicators		
Net family income	.038 215	-.024 196
Operator's age	-.013 218	-.137* 200
Distance operator lives from the community	.967* 201	-.000 197

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 22. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO MARKET AGRICULTURAL PRODUCTS IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, CENTRAL REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle was main livestock enterprise)
Operation Size Variables		
Gross farm income	.068 289	.154* 170
Total farm assets	.043 293	.213* 171
Acres of wheat harvested	.040 310	.035 149
Head of cattle raised	.044 139	.220* 179
Other Indicators		
Net family income	.040 310	.035 149
Operator's age	.030 309	.104 183
Distance operator lives from the community	.118 263	.128 178

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 23. RELATIONSHIP BETWEEN THE NUMBER OF MILES TRAVELED TO MARKET AGRICULTURAL PRODUCTS IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, RED RIVER VALLEY REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle was main livestock enterprise)
Operation Size Variables		
Gross farm income	.001 118	.164 51
Total farm assets	-.011 120	.000 53
Acres of wheat harvested	-.097 126	.316 34
Head of cattle raised	.488* 29	.054 52
Other Indicators		
Net family income	.001 121	.048 55
Operator's age	.007 126	-.049 55
Distance operator lives from the community	.513* 100	.272* 53

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 24. AVERAGE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE SOLD IN 1985 BY PRODUCT AND BY REGION OF NORTH DAKOTA

Product	Number	Mean	Median	Standard Deviation	Range	
					Minimum	Maximum
		- - - - - - - - - -		population	- - - - - - - - - -	
WESTERN REGION						
Wheat (if wheat was main crop)	201	4,436.3	766	26,804.7	21	370,951
Cattle (if beef cattle were main livestock enterprise)	198	12,629.9	13,336	13,722.8	47	44,485
CENTRAL REGION						
Wheat (if wheat was main crop)	266	2,519.3	355	6,575.2	20	32,843
Cattle (if beef cattle were main livestock enterprise)	179	11,143.3	3,335	14,091.5	57	61,383
RED RIVER VALLEY REGION						
Wheat (if wheat was main crop)	100	1,634.1	469.5	6,359.4	51	61,383
Cattle (if beef cattle were main livestock enterprise)	53	11,342.5	10,099	12,819.2	1,335	61,383

APPENDIX TABLE 25. RELATIONSHIP BETWEEN THE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE MARKETED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, WESTERN REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle were main livestock enterprise)
Operation Size Variables		
Gross farm income	-.006 193	.030 189
Total farm assets	.097 194	.001 190
Acres of wheat harvested	-.025 201	-.050 154
Head of cattle raised	.006 126	-.022 186
Other Indicators		
Net family income	.036 197	.022 193
Operator's age	-.010 200	.183* 197
Distance operator lives from the community	.967* 201	-.000 197

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 26. RELATIONSHIP BETWEEN THE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE MARKETED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, CENTRAL REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle were main livestock enterprise)
Operation Size Variables		
Gross farm income	-.047 249	-.114 166
Total farm assets	.021 252	.034 167
Acres of wheat harvested	.085 266	-.017 145
Head of cattle raised	-.158 122	-.171* 175
Other Indicators		
Net family income	.017 257	.101 174
Operator's age	-.024 265	-.007 179
Distance operator lives from the community	.118 263	.128 178

Note: Top number is the Pearson correlation coefficient and bottom number is the N. * indicates $p \leq .05$.

APPENDIX TABLE 27. RELATIONSHIP BETWEEN THE COMMUNITY SIZE WHERE AGRICULTURAL PRODUCTS WERE MARKETED IN 1985 AND SELECTED CHARACTERISTICS OF RESPONDENTS, RED RIVER VALLEY REGION OF NORTH DAKOTA

Respondent Characteristics	Agricultural Products	
	Wheat (if wheat was main crop)	Cattle (if beef cattle were main livestock enterprise)
Size Variables		
Gross farm income	-.083 95	-.108 49
Total farm assets	-.110 96	-.063 51
Acres of wheat harvested	.123 100	.020 33
Head of cattle raised	-.016 24	-.188 50
Other Indicators		
Net family income	-.047 96	.134 53
Operator's age	-.205 100	.178 53
Distance operator lives from the community	.513* 100	.272 53

Note: Top number is the Pearson correlation coefficient and bottom number is the N.

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