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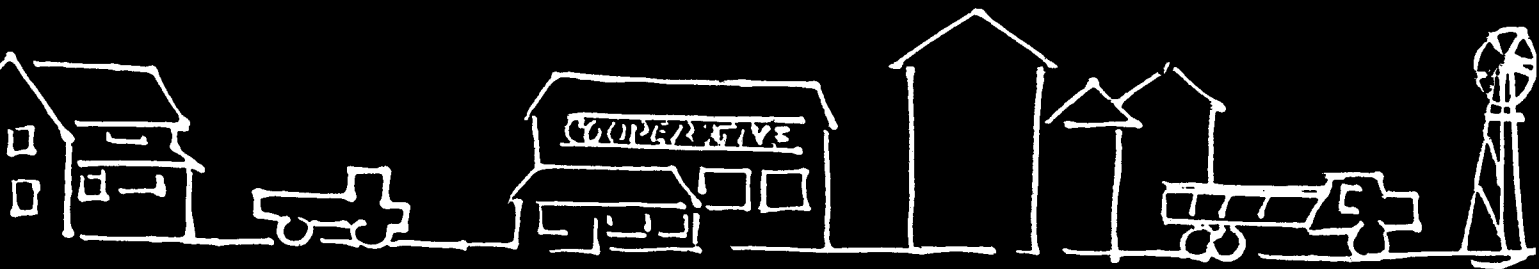


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Major Farm Characteristics and Co-op Use



Abstract

Major Farm Characteristics and Co-op Use

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This report describes relationships between major farm characteristics and co-op use and membership. Analyses were based on multivariate logit regression. Statistically significant relationships were found between farm size and farm location and co-op use but relationships varied greatly by farm type and type of use activity. No statistically significant relationship was found between co-op use and operator age. Statistically significant relationships were found between co-op membership and farm size, operator age, and farm location. These relationships varied also by farm type. Data for the study are for 1986 and were obtained from surveys by National Agricultural Statistics Service, U.S. Department of Agriculture.

Key Words: Cooperatives, farmers, co-op use, membership, marketing, purchasing, logit regression.

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Preface

This study examines relationships between some major characteristics of farms and farmer co-op use and membership. The study extends information obtained from ACS Research Report 77 by further analyzing relationships between various farm characteristics and by testing some general hypotheses through multivariate analysis. It is intended for research and educational purposes and to help co-op leaders better serve farmers through the use of additional knowledge.

The study analyzes six activities of co-op use (one marketing and five purchasing) and co-op membership. Analyses are conducted by farm type. Major farm characteristics examined include five categories of farm size, three categories of farm operator age, and eight categories of regional location.

The study focuses on 1,994,096 farm operators. These are representative of just 2.2 million farm operators in 1986. Excluded are those farmers who held membership in cooperatives but were retired or not farming at the time of the surveys, and landlords who rented farmland on a share basis and held co-op memberships because they marketed their share of farm production through, or purchased their share of farm supplies from, cooperatives. Further, the focus centers on farmer cooperatives operating as marketing or farm supply cooperatives, or both. Bargaining associations are counted as marketing cooperatives. Cooperatives that provide services related to marketing or furnishing farm supplies, such as cotton gins and rice dryers, and transportation cooperatives are also included. Excluded from this study are cooperatives organized by farmers to provide production services (farm management, credit, fire, insurance, electricity, and irrigation) and cooperatives that provide personal services and products (hospitals, medical clinics, burial societies, community water systems, and co-op grocery stores).

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Highlights

The most striking finding is that no difference exists between degree of co-op use and age groupings of farm operators. This was true for all farm types and co-op use activities analyzed. However, older operators of cash grain, dairy, and "other" farms had more co-op memberships than younger operators. These findings refuted most expectations.

Relationships between degree of co-op use and specific farm attributes that were significant were found to vary a great deal by the type of farm and activity in question. Some major findings include:

- The largest cash grain farmers (annual sales of \$500,000 or more) used cooperatives less for marketing and purchasing activities but had more co-op memberships than smaller cash grain farmers.
- Dairy farmers and livestock producers grossing \$250,000 to \$499,999 were greater users of cooperatives for purchasing inputs and had more co-op memberships relative to dairy farmers and livestock producers in other size categories.
- The largest size grouping of "other" farmers were the greatest users of cooperatives for marketing and purchasing inputs of all sizes of "other" farmers.
- Dairy farmers in the Lake States had more memberships and used cooperatives to a greater degree for marketing than dairy farmers in other regions.
- Farmers in the Lake States and Northern Plains regions made greater use of cooperatives for purchasing fertilizer and feed than farmers in most other regions.
- Cash grain farmers in almost all regions were greater users of cooperatives and held more memberships than cash grain farmers in the Corn Belt.
- Livestock producers in the Northern Plains, Lake States, and Northeast regions had more memberships and greater co-op use than livestock producers in other regions.
- "Other" farmers in the Northern Plains had more memberships and most often had greater use of cooperatives for input purchases than "other" farmers in the remaining regions.

MAJOR FARM CHARACTERISTICS AND CO-OP USE

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INTRODUCTION

With farm structure in the United States continuing to change, farmer cooperatives must focus on who they are serving and to what extent. Given that cooperatives exist to benefit and serve the needs of the farmers who own and use them, cooperatives must recognize distinguishable attributes that characterize their farmer users and members. Such information allows cooperatives to make management and strategic decisions that may positively affect their cooperative character and future business position. For instance, a study of Midwest and Southeast farmers by Babb¹ found that experienced farm operators patronized cooperatives to a greater extent than did operators with less experience. An implication of this finding is that a member and patronage problem could arise for cooperatives in the future. Having access to such knowledge gives cooperatives an opportunity to plan efforts (for example, attract younger farmers) to circumvent such a problem.

Agricultural Cooperative Service (ACS) periodically publishes reports on farmer cooperative members and use. The most recent study² provides a comprehensive aggregate description of U.S. farmers' membership in and use of agricultural cooperatives. The report describes some major characteristics of farmer members and nonmembers of marketing and supply cooperatives in 1986 and changes since 1980.

Provided with this information, the overall

objective of the present study was to further analyze the relationships between cooperative use and membership and some major farm characteristics. More specifically, the objective related to identifying and examining (a) significant relationships between major characteristics of farms³ involved in marketing and purchasing and levels of co-op use and (b) relationships between major farm characteristics and levels of co-op membership.

DATA

Data analyzed originates from questions included in the June 1987 Acreage and Livestock Enumerative Survey conducted by the National Agricultural Statistics Service (NASS) for the year 1986. The basic survey method employed was an area frame design based on land use stratification and subsequent optimal allocation of the total sample to the strata. With this scheme, about 17,000 farmers were personally interviewed by trained enumerators. The result was a stratified sample of 13,736 usable questionnaires that represent a cross-sectional data base of U.S. farmers. This type of sampling allowed for the generation of expansion factors equal to the inverse of the selection probability.⁴ Application of these expansion factors yields a total of 1,994,096 farm operators covered by the NASS survey.⁵

³In this study, farms are places from which \$1,000 or more of agricultural products are sold, or normally would be sold, during the year.

⁴For more on the survey design and sampling technique, see J. Cotter and J. Nealon. *Area Frame Design For Agricultural Surveys*, National Agricultural Statistics Service, United States Department of Agriculture, Washington, D.C., August 1987.

⁵In ACS Research Report 77, data were adjusted to represent the total population (2.2 million) of U.S. farmers.

¹Babb, Emerson M. *Farmers' Buying and Selling Patterns, Implications for Cooperatives*, ACS Research Report 73, Agricultural Cooperative Service, U.S. Department of Agriculture, Washington D.C., July 1988.

²Kraenzle, Charles A., et al. *Farmer Cooperatives: Members and Use*, ACS Research Report 77, Agricultural Cooperative Service, U.S. Department of Agriculture, Washington, D.C., April 1989.

PROCEDURES

Levels of Co-op Use and Membership

The amount of activity by farmers⁶ in cooperatives was the basis used to categorize farmers into levels of co-op use. Activity is defined here as the two functions of marketing and purchasing. Marketing refers to farm gross sales marketed through cooperatives, while purchasing refers to inputs purchased from cooperatives. Inputs include petroleum, chemicals, fertilizer, seed, and feed. Thus, six activities were analyzed for co-op use—one for marketing, and five for purchasing.

Due to the differences in operational function among farm types, the study of co-op use according to activity was done separately for each farm type.⁷ Those farmers assumed as not taking part in an activity were not classified into co-op use categories for that specific activity. In other words, co-op use for the various activities was not assumed to be homogeneous across the four different farm types for all activities. Also, analysis by farm type yields more substantial information.

By activity and relevant farm type, farmers were categorized into four levels of co-op use: no use (did not use cooperatives for the activity), low use (excluding farmers classified as no use, used cooperatives for less than or equal to 50 percent of the activity), high use (used cooperatives for greater than 50 percent but less than 100 percent of the activity), and total use (used cooperatives for 100 percent of the activity). These categories are representative of farmers' degree or intensity of co-op use.

All four farm types were assumed to be relevant to marketing and purchasing petroleum. Therefore, analyses were carried out for all four farm types for these activities. The farm types of dairy, cash grain, and "other" were analyzed for

the activities of purchasing chemicals, fertilizer, and seed. For the feed purchasing activity, only dairy and livestock farm types were analyzed. (See appendix tables 1-6 for the percentage of activity in these categories of co-op use.)

To categorize co-op membership, farmers were classified as having no membership, one membership, or two or more memberships in cooperatives. This classification was completed for each farm type (see appendix table 7).

Models

Multiple logit regression models were used to analyze major farm characteristics (independent variables) thought to be associated with coop use and membership (dependent variables). The major farm characteristics (the independent variables) included: farm size (measured in terms of gross sales as \$1,000 to \$39,999, \$40,000 to \$99,999, \$100,000 to \$249,999, \$250,000 to \$499,999, and \$500,000 and over), operator⁸ age (under 36 years, 36 to 54 years, and over 55 years), and region (Northeast, Southeast, Lake States, Corn Belt, Northern Plains, South Central, Mountain, and Pacific). Figure 1 shows the States included in these regions.

The first application of the models was for the analysis of co-op use. A model was estimated for each activity of co-op use by each farm type relevant to each activity. Therefore, models were developed for co-op use of the marketing activity, and for the five purchasing activities (petroleum, chemicals, fertilizer, seed, and feed). Again, models were specified for each activity by only the farm types assumed to significantly take part in the particular activity.

The basic co-op use model estimated was
co-op use = f(farm size, operator age, region).

The second application pertained to co-op membership, and a model was estimated for

⁶Because it is the farmer, and not the farm, who actually uses cooperatives and holds membership, the term farmer is generally used throughout this report.

⁷Farm types, e.g., dairy, cash grain, livestock, and "other," are classified by the main source of farm gross revenue. "Other" refers to tobacco, cotton, other field crops, vegetables, fruits and nuts, poultry, and miscellaneous.

⁸Operator refers to the principal member of the farming enterprise. In a partnership, the operator is the person making day-to-day decisions, or the oldest partner if the decisionmaking is shared equally.

Figure 1—Regional Breakdown of the United States



each farm type. The basic model for co-op membership was

$$\text{co-op membership} = f(\text{farm size, operator age, region})$$

To reiterate, the left-hand sides (dependent variable) of the equations⁹ represent categories of co-op use and membership. And these are presented as functions of major farm characteristics (independent variables) contained in the parentheses on the right-hand sides. Also, the independent variables are categorical, that is, farmers were classified into specific categories within

⁹Equations were formulated as logit models and were estimated using the LOGIST procedure of SAS (Statistical Analysis System). For a description of LOGIST see: Frank E. Harrell, "The Logit Procedure," *Supplemental Library User's Guide*, Chapter 19, SAS Institute Inc., Cary, North Carolina, 1983.

groupings of farm size, operator age, and region (see appendix table 8). Under this scenario, one category from each group of variables is omitted in the logit regression analyses. The omitted category is used as a basis for comparisons of the remaining included categories of the group. It is for this reason that the categories of farm size \$1,000 to \$39,999, operator age under 36, and the Mountain region are not shown in tables 1-7.

RELATIONSHIPS TO CO-OP USE

In short, the object of this study was to further examine relationships between some major farm characteristics and both the level of co-op use and the level of co-op membership. The study was made with the awareness that certain relationships were expected (hypotheses). For example, the cross-tab analysis conducted in ACS Research Report 77 found that the highest percentage of farmers who marketed most of

their farm products through cooperatives (a) were in the Lake States, Pacific, Northern Plains, and Northeast regions, (b) were among dairy and cash grain farms, (c) were from larger farms, and (d) had operators less than 36 years old. From these results, one would infer that farmers located in the Lake States, Pacific, Northern Plains, and Northeast regions, that are less than 36 years old, and that had large operations would make higher use of cooperatives for marketings in 1986. Although somewhat general, inferences (hypotheses) were developed from the study alluded to above, as to the use of cooperatives for marketing and purchasing that conceived comparisons from the multivariate analysis in this study.

It was hypothesized that larger farmers were positively related, and operator age negatively related, to higher levels of co-op use for marketing farm products. Also, farmers located in the Lake States, Northern Plains, and Pacific regions were hypothesized to be greater users of cooperatives.

As for petroleum, chemical, and fertilizer purchasing, positive relationships to higher levels of co-op use were expected for larger farmers, while operator age was hypothesized to be negatively related. Farmers located in the Northern Plains and Lake States were hypothesized to be greater users of cooperatives for purchasing petroleum, chemicals, and fertilizer. Southeast farmers were hypothesized to be greater users of cooperatives for seed purchasing; the Lake States, Northeast, and Northern Plains farmers were hypothesized to be greater users for feed purchasing. No relative difference was hypothesized to take place between farm size and operator age for higher levels of co-op use for seed and feed purchases.

Although these hypotheses were general in nature and were not assumed to be completely adequate across farm types, they formed a base from which the analyses were judged and relative comparisons made.

Tables 1-6 contain the results of the logit regression analyses for use of cooperatives for marketing farm products and for purchasing the inputs of petroleum, chemicals, fertilizer, seed, and feed. The estimated coefficients included in these tables indicate relationships between the variables they are associated with and co-op use.

Significant coefficients (denoted by an asterisk) indicate the following: positive coefficients imply a greater use of cooperatives, and negative coefficients imply less use, relative to the omitted category in the same categorical group. Omitted categories include: the smallest farm size grouping (\$1,000 to \$39,999), the youngest operator age grouping (under 36), and the Mountain region.¹⁰ Magnitude differences of significant coefficients infer a greater or lesser change in co-op use.

Marketing

Results of the logit regression analysis of farmers' use of cooperatives for marketing are included in table 1. The analysis was completed for dairy, cash grain, livestock, and "other" farmers.

Dairy

The dairy farmers in the size groupings of \$100,000 to \$249,999 and \$500,000 or more had greater co-op use relative to the smallest category (\$1,000 to \$39,999). Following in order of greater co-op use relative to the smallest size grouping were the groupings \$40,000 to \$99,999 and \$250,000 to \$499,999. No significant relationship was found between dairy farmers' use of cooperatives for marketing and operator age. Therefore, younger operators exhibited neither greater nor less use of cooperatives for marketing than their older counterparts. Dairy farmers located in the Lake States and Pacific regions used cooperatives for marketing to a greater extent than did those located in the Mountain region. Use of cooperatives for marketing by dairy farmers in the remaining regions was not significantly different from that of those in the Mountain region. Thus, dairy farmers in the Lake States and Pacific regions had greater co-op use for marketing than did dairy farmers in the other regions.

¹⁰The Mountain region was omitted for use as the base. This region had the least number of farms and co-op members in 1986. It also had the second lowest number of marketing and supply cooperatives of all eight regions in 1986 (appendix table 10).

Cash Grain

Cash grain farmers in the largest size category (\$500,000 or more) did not use cooperatives for marketing any more than did the smallest size grouping. Of all sizes, cash grain farmers in the \$100,000 to \$249,999 size grouping had the highest degree of co-op use. Similar to dairy farmers, no significant relationship was found between cash grain operator age and co-op use for marketing. Cash grain farmers located in the Northern Plains region had greater use of cooperatives for marketings than cash grain farmers in the Mountain region. But cash grain farmers in the Northeast and Southeast regions had less use of cooperatives than those in the Mountain region. The use of cooperatives for marketing by cash grain farmers in the remaining regions was

not significantly different than that of cash grain farmers in the Mountain region.

Livestock

Livestock producers in the \$250,000 to \$499,999 size category had the greatest degree of co-op use for marketing relative to livestock producers in the smallest size grouping. The remaining larger size categories had significant positive relationships to greater co-op use relative to the smallest size category also. Operator age was not significant in explaining co-op use for marketing among livestock producers. A significant positive relationship existed between the degree of co-op use and livestock farms in the Northeast, Lake States, Corn Belt, and the Northern Plains regions relative to the Mountain

Table 1—Logit regression analysis of co-op use for marketing by farm type, 1986

Variable	Farm type			
	Dairy	Cash grain	Livestock	"Other"
<i>Coefficients</i>				
Farm size ¹				
\$ 40,000 - \$ 99,999	0.96*	0.58*	1.35*	1.10*
\$100,000 - \$249,999	1.08*	0.68*	1.67*	1.36*
\$250,000 - \$499,999	0.84*	0.64*	1.98*	0.97*
\$500,000 or more	1.08*	0.43	1.56*	1.38*
Operator age ²				
36 - 54	0.10	-0.19	0.09	0.01
55 and over	0.23	-0.15	0.13	0.10
Region ³				
Northeast	0.54	-1.43*	1.33*	0.31
Southeast	0.03	-1.73*	0.12	1.75*
Lake States	1.37*	0.17	1.89*	0.66
Corn Belt	0.57	-0.16	1.07*	-0.05
Northern Plains	0.98	0.52*	1.91*	2.04*
South Central	1.14	-0.14	0.15	1.11*
Pacific	1.32*	0.52	0.31	2.05*
Intercept				
1	-1.42*	-0.68*	-3.69*	-3.54*
2	-1.82*	-1.42*	-4.94*	-3.86*
3	-3.19*	-2.16*	-5.33*	-4.38*
Model Chi-Square	127	255	611	347
Number of observations	1,153	2,561	5,964	4,058

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

region. The other regions were not significantly different than the Mountain region. Thus, livestock producers in the Northeast, Lake States, Corn Belt, and Northern Plains regions used cooperatives to a greater degree than did livestock producers in all other regions.

"Other"

"Other" farmers in the largest size grouping had the greatest use of cooperatives for marketing relative to the smallest size grouping. "Other" farmers in the remaining larger size groupings also had a positive relationship to greater co-op use relative to those in the smallest size grouping. Co-op use among "other" farmers of different ages was not significantly different. Four regions showed significant positive relationships with greater use of cooperatives for marketing by "other" farmers relative to the Mountain region. In order of magnitude, these regions were the Pacific, Northern Plains, Southeast, and South Central, respectively. Use of cooperatives by "other" farmers located in the remaining regions (Northeast, Lake States, and Corn Belt) was not significantly different than "other" farmers in the Mountain region.

Marketing Summary

Across farm types, there was a significant positive relationship between each of the large farm size categories and greater use of cooperatives for marketing, relative to farmers in the smallest size grouping, except for the largest farm size grouping of cash grain farmers. However, the results showed that the size category indicating the greatest use of cooperatives for marketings relative to the smallest category varied by farm type. The \$100,000 to \$249,999 size category showed the greatest use for dairy and cash grain farmers, the \$250,000 to \$499,999 size category for livestock producers, and the \$500,000 or more size grouping for "other" farmers. Therefore, the hypotheses that larger farmers were greater users of cooperatives for marketing than smaller farmers was not found to be strictly true. In many cases, smaller size farmers had greater use of cooperatives than larger size farmers.

Operator age had an insignificant relationship with co-op use for marketing across all farm types. Thus, the expectation that younger operators of farms were greater users of cooperatives for marketing was not supported.

Relationships between region of farm location and greater use of cooperatives for marketing varied by farm type. The hypothesis that farmers in the Lake States, Northern Plains, and Pacific regions used cooperatives to a greater degree for marketing than farmers in other regions was partially supported by the analysis of the four farm types, although no one farm type supported it wholly. For example, for dairy farmers the hypothesis held true for the Lake States and Pacific regions, but not for the Northern Plains region. However, farmers of the other three farm types in the Northern Plains region did have greater use of cooperatives for marketings. Also, there were other significant relationships, which differed from the hypothesis, that occurred between the various regions and co-op use for marketing for cash grain, livestock, and "other" farmers.

Purchasing Petroleum

Table 2 contains the results of the logit regression analysis for use of cooperatives for petroleum purchases. All four farm types are included.

Dairy

Dairy farmers in the farm size grouping \$250,000 to \$499,999 were the greatest users of cooperatives among dairy farmers relative to the smallest grouping for purchasing petroleum. But dairy farmers in the largest category used cooperatives to purchase petroleum to no greater extent than did the smallest size dairy farmers. No one operator age grouping of dairy farmers used cooperatives any more or less to purchase petroleum. Among regions, no statistically significant relationships to co-op use for purchasing petroleum were found for dairy farmers relative to the Mountain region. Therefore, there was no greater use of cooperatives for purchasing petroleum among dairy farmers in any one region of location.

Cash Grain

Cash grain farmers in the size category \$100,000 to \$249,999 had the greatest use of cooperatives for purchasing petroleum relative to the smallest size category. The \$40,000 to \$99,999 and \$250,000 to \$499,999 groupings exhibited more co-op use to about the same degree relative to the smallest size grouping. Similar to dairy, the largest size grouping of cash grain farmers used cooperatives for petroleum purchases to no greater extent than the smallest size grouping. Operator age was insignificant in explaining cash grain farmers' use of cooperatives for petroleum purchases. Cash grain farmers in the Southeast, Northeast, South Central, and Corn Belt regions exhibited less use of cooperatives for petroleum purchases than cash grain farmers in the Mountain region. Co-op use by

cash grain farmers in the remaining regions was not significantly different from that of cash grain farmers in the Mountain region.

Livestock

Greater co-op use for petroleum purchases was exhibited in each larger size grouping of livestock producers relative to the smallest size grouping, but the greatest users were livestock producers in the size category \$250,000 to \$499,999. There was no significant difference in co-op use for petroleum purchases between the older and the younger operator age groupings of livestock producers. The amount of co-op use for petroleum purchases among livestock producers located in the Northeast and Corn Belt regions was not significantly different than that of the Mountain region. But co-op use was greater

Table 2—Logit regression analysis of co-op use for purchasing petroleum by farm type, 1986

Variable	Farm type			
	Dairy	Cash grain	Livestock	"Other"
	<i>Coefficients</i>			
Farm size ¹				
\$ 40,000 - \$ 99,999	0.67*	0.57*	1.12*	1.09*
\$100,000 - \$249,999	0.52*	0.65*	1.30*	0.87*
\$250,000 - \$499,999	1.13*	0.59*	1.90*	1.32*
\$500,000 or more	0.31	0.18	1.24*	1.53*
Operator age ²				
36 - 54	-0.06	-0.04	-0.02	-0.07
55 and over	-0.16	0.09	0.12	0.17
Region ³				
Northeast	-0.46	-1.52*	0.02	-0.69*
Southeast	-0.10	-2.24*	-0.84*	-0.90*
Lake States	0.56	-0.26	0.58*	0.01
Corn Belt	-0.14	-0.47*	-0.05	-1.06*
Northern Plains	1.02	0.25	0.77*	1.18*
South Central	-0.47	-0.67*	-0.98*	-0.69*
Pacific	-1.08	-0.58	-1.05*	-1.50*
Intercept				
1	-1.13*	-0.40*	-1.65*	-1.68*
2	-1.51*	-0.79*	-2.03*	-2.07*
3	-1.68*	-0.97*	-2.26*	-2.26*
Model Chi-Square	99	269	698	257
Number of observations	1,153	2,561	5,964	1,153

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

among livestock producers in the Northern Plains and Lake States, and less among livestock producers in the Pacific, South Central, and Southeast regions relative to the Mountain region.

"Other"

In order of magnitude, "other" farmers in the \$500,000 or more, \$250,000 to \$499,999, \$40,000 to \$99,999, and \$100,000 to \$249,999 categories had greater use of cooperatives for purchasing petroleum than "other" farmers in the smallest size category. Similar to dairy, cash grain, and livestock, "other" farmers' use of cooperatives was not significantly different between the operator age groupings. "Other" farmers in the Northern Plains had greater use of cooperatives for petroleum purchases than "other" farmers in

the Mountain region. Conversely, "other" farmers in the Pacific, Corn Belt, Southeast, Northeast, and South Central regions had less use than "other" farmers in the Mountain region. "Other" farmers in the Lake States region had no significant difference in co-op use than "other" farmers in the Mountain region.

Purchasing Chemicals

The logit regression analysis results for farmer use of cooperatives for chemical purchases are presented in table 3. Dairy, cash grain, and "other" farmers are included.

Dairy

Dairy farmers in the \$250,000 to \$499,999 category had the highest degree of co-op use for

Table 3—Logit regression analysis of co-op use for purchasing chemicals by farm type, 1986

Variable	Farm type		
	Dairy	Cash grain	"Other"
	<i>Coefficients</i>		
Farm size ¹			
\$ 40,000 - \$ 99,999	0.90*	0.45*	0.80*
\$100,000 - \$249,999	0.88*	0.58*	0.69*
\$250,000 - \$499,999	1.07*	0.48*	0.82*
\$500,000 or more	0.01	0.16	1.05*
Operator age ²			
36 - 54	0.06	-0.06	0.01
55 and over	0.17	-0.06	0.08
Region ³			
Northeast	0.12	-0.61	0.38
Southeast	0.52	-0.60*	0.77*
Lake States	0.61	0.32	0.31
Corn Belt	-0.37	-0.23	-0.64
Northern Plains	0.65	0.23	0.94*
South Central	-0.38	-0.59*	0.18
Pacific	-1.35*	-0.78	-0.06
Intercept			
1	-1.16*	-0.48*	-2.08*
2	-1.45*	-0.88*	-2.47*
3	-1.61*	-1.05*	-2.61*
Model Chi-Square	120	119	166
Number of observations	1,153	2,561	4,058

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

purchasing chemicals relative to the smallest size grouping. The dairy farmer size groupings \$40,000 to \$99,999 and \$100,000 to \$249,999 also had greater co-op use than did the smallest size dairy farmers. However, the largest size grouping of dairy farmers showed no significant difference in use of cooperatives for purchasing chemicals than dairy farmers in the smallest size category. Co-op use for purchasing chemicals among the operator age groupings of dairy farms was not found to be significantly different. There was no statistical difference in cooperative use for purchasing chemicals among dairy farmers in any region relative to the Mountain region, except for less use among dairy farmers located in the Pacific region.

Cash Grain

Cash grain farmers in the \$100,000 to \$249,999 category had greater use of cooperatives for chemical purchases than all other sizes of cash grain farmers relative to the smallest size category. The size categories \$40,000 to \$99,999 and \$250,000 to \$499,999 of cash grain farmers had greater use of cooperatives for chemical purchases than did the smallest size category of cash grain farmers. The largest size category had no significant difference in co-op use than cash grain farmers in the smallest size category. Operator age was not a significant factor in explaining co-op use for purchasing chemicals among cash grain farmers. While Southeast and South Central cash grain farmers used cooperatives less for chemical purchases than cash grain farmers in the Mountain region, cash grain farmers in the remaining regions did not significantly differ from cash grain farmers in the Mountain region.

“Other”

The larger size groupings of “other” farmers used cooperatives to a greater extent than the smallest size “other” farmers for chemical purchases. “Other” farmers in the largest grouping were the greatest users relative to the other size categories. Similar to dairy and cash grain, there was not a significant difference in cooperative use among “other” farmers of different ages. Relative to the Mountain region, a positive rela-

tionship was found between use of cooperatives by “other” farmers for chemical purchases and the regions of the Northern Plains and the Southeast; none of the other regions had a significant relationship.

Purchasing Fertilizer

Table 4 includes the results of the logit regression analysis of dairy, cash grain, and “other” farmers’ use of cooperatives for fertilizer purchases.

Dairy

As farm size among dairy farmers increased up to \$499,999, an increased use of cooperatives occurred for purchasing fertilizer. However, use by the largest farm size category was not significantly different from the smallest farm size category. Older dairy farmers did not use cooperatives any more or less to purchase fertilizer than did their younger counterparts. Dairy farmers in the Northern Plains and Lake States were greater users of cooperatives for purchasing fertilizer than dairy farmers in the Mountain region. Dairy farmers in the remaining regions did not significantly differ in their use of cooperatives for purchasing fertilizer from dairy farmers in the Mountain region.

Cash Grain

Cash grain farmers in the \$100,000 to \$249,999 category exhibited greater use of cooperatives for purchasing fertilizer than the cash grain farmers in the other size categories. Cash grain farmers in the \$40,000 to \$99,999 and \$250,000 to \$499,999 categories showed greater use of cooperatives than the smallest size category, while co-op use of cash grain farmers in the \$500,000 or more category was not significantly different than that of those in the smallest size category. Operator age was not a significant factor in explaining use of cooperatives for purchasing fertilizer by cash grain farmers. Similar to dairy, cash grain farmers in the Northern Plains and Lake States regions had greater cooperative use for purchasing fertilizer than cash grain farmers in the Mountain region and remaining regions.

"Other"

As "other" farm size increased, the coefficient on its associated variable was significantly more positive than the coefficient on the next smaller farm size category. Thus, "other" farmers' co-op use for fertilizer purchases increased with increase in size. Older "other" farmers did not use cooperatives any more or less than younger "other" farmers to purchase fertilizer. "Other" farmers located in the Northern Plains, Southeast, and Lake States had greater use of cooperatives for fertilizer purchases than "other" farmers located in the Mountain region. Use of cooperatives for fertilizer purchases by "other" farmers in the remaining regions was similar to that of "other" farmers in the Mountain region.

Purchasing Seed

Table 5 shows the results of the logit analysis for farmer use of cooperatives for seed purchases by dairy, cash grain, and "other" farmers.

Dairy

Dairy farmers of the \$250,000 to \$499,999 category exhibited greater use of cooperatives for purchasing seed than dairy farmers of all other size groupings. The older operator age categories of dairy farmers were similar to the youngest operator age category in co-op use for purchasing seed. Only one region showed a significantly different relationship than the Mountain region with co-op use by dairy farmers for seed purchases. Dairy farmers in the

Table 4—Logit regression analysis of co-op use for purchasing fertilizer by farm type, 1986

Variable	Farm type		
	Dairy	Cash grain	"Other"
	Coefficients		
Farm size ¹			
\$ 40,000 - \$ 99,999	0.60*	0.43*	0.36*
\$100,000 - \$249,999	0.68*	0.60*	0.39*
\$250,000 - \$499,999	0.82*	0.57*	0.65*
\$500,000 or more	-0.52	0.13	0.99*
Operator age ²			
36 - 54	0.08	-0.12	-0.08
55 and over	-0.12	-0.02	0.10
Region ³			
Northeast	0.32	0.42	0.46
Southeast	1.08	-0.13	0.98*
Lake States	1.18*	0.87*	0.55*
Corn Belt	0.09	0.31	-0.22
Northern Plains	1.46*	1.11*	1.08*
South Central	-0.01	0.36	0.23
Pacific	-0.78	-0.37	-0.19
Intercept			
1	-1.20*	-0.96*	-1.88*
2	-1.54*	-1.34*	-2.22*
3	-1.70*	-1.48*	-2.32*
Model Chi-Square	140	164	176
Number of observations	1,153	2,561	4,058

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

Southeast region had a higher degree of cooperative use for purchasing seed than did dairy farmers in the other regions.

Cash Grain

Cash grain farmers in the \$100,000 to \$249,999 size grouping were the only group that had a significant relationship with cooperative use for purchasing seed relative to the smallest size category. Operator age was not found to be a significant factor in explaining co-op use of seed purchases by cash grain farmers. While cash grain farmers in the Northeast and Southeast regions were greater users of cooperatives for seed purchases than were cash grain farmers in the Mountain region, farmers in the remaining regions used cooperatives to the same degree as those in the Mountain region.

"Other"

No significant difference of "other" farmers' use of cooperatives for seed purchases was found between the two largest farm size categories and the smallest category. However, "other" farmers in the \$40,000 to \$99,999 and \$100,000 to \$249,999 groupings used cooperatives to a greater degree for seed purchases than did the smallest size grouping. "Other" farmers located in the Southeast and Northern Plains regions were greater users of cooperatives for seed purchases than were their counterparts in the Mountain region. "Other" farmers in the remaining regions, except for the Pacific region, were not significantly different than "other" farmers in the Mountain region. "Other" farmers in the Pacific region used cooperatives less for seed purchases than "other" farmers in the Mountain region.

Table 5—Logit regression analysis of co-op use for purchasing seed by farm type, 1986

Variety	Farm type		
	Dairy	Cash grain	"Other"
	Coefficients		
Farm size ¹			
\$ 40,000 - \$ 99,999	0.26	0.14	0.35*
\$100,000 - \$249,999	0.32	0.30*	0.49*
\$250,000 - \$499,999	0.84*	0.33	0.37
\$500,000 or more	-0.21	0.16	0.64
Operator age ²			
36 - 54	-0.03	0.06	0.15
55 and over	0.18	-0.01	0.17
Region ³			
Northeast	0.47	0.87*	0.33
Southeast	1.48*	0.76*	1.14*
Lake States	0.68	0.65	0.19
Corn Belt	-0.31	0.29	-0.49
Northern Plains	0.31	0.34	0.76*
South Central	0.36	0.65	0.15
Pacific	-0.64	0.81	-0.75*
Intercept			
1	-1.59*	-1.71*	-2.37*
2	-2.54*	-2.48*	-2.78*
3	-2.69*	-2.70*	-2.90*
Model Chi-Square	80	28	230
Number of observations	1,153	2,561	4,058

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

Purchasing Feed

Only dairy and livestock farm types were included in the analysis of farmer use of cooperatives for purchasing feed. The results are shown in table 6.

Dairy

No farm size grouping of dairy farmers using cooperatives for feed purchases was significantly different from any other. Operator age also was found to be insignificant in explaining co-op use for purchasing feed by dairy farmers. Dairy farmers located in the Northern Plains used cooperatives to a greater extent for feed purchases than did dairy farmers in all other locations. Dairy farmers in the Lake States region exhibited the next greatest use, while

dairy farmers in the remaining regions did not differ significantly from those farmers in the Mountain region.

Livestock

Livestock producers in the \$250,000 to \$499,999 category used cooperatives to the greatest degree for purchasing feed relative to the smallest size grouping of livestock producers. The other larger size groupings also had positive relationships to co-op use for purchasing feed relative to the smallest grouping. Similar to dairy, operator age was insignificant in explaining co-op use for feed purchases by livestock producers. Livestock producers in the Northeast, Northern Plains, Lake States, Southeast, and Corn Belt had greater use of cooperatives for purchasing feed than did livestock producers in the Mountain region. Use of cooperatives for feed purchases by livestock producers in the South Central and Pacific regions was not significantly different from that of livestock producers in the Mountain region.

Table 6—Logit regression analysis of co-op use for purchasing feed by farm type, 1986

Variable	Farm type	
	Dairy	Livestock
	<i>Coefficients</i>	
Farm size ¹		
\$ 40,000 - \$ 99,999	0.07	0.37*
\$100,000 - \$249,999	0.13	0.40*
\$250,000 - \$499,999	0.29	0.90*
\$500,000 or more	-0.76	0.76*
Operator age ²		
36 - 54	0.02	-0.03
55 and over	0.06	-0.01
Region ³		
Northeast	0.52	0.99*
Southeast	0.73	0.62*
Lake States	1.02*	0.72*
Corn Belt	0.12	0.58*
Northern Plains	1.24*	0.79*
South Central	0.20	0.05
Pacific	-0.06	-0.17
Intercept		
1	-0.72*	-1.25*
2	-1.50*	-1.86*
3	-1.86*	-2.11*
Model Chi-Square	67	201
Number of observations	1,153	5,964

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

Purchasing Summary

For purchases of petroleum, chemicals, and fertilizer, co-op use was greater among larger farmers relative to farmers in the smallest size grouping, but the farm size category showing the greatest use of cooperatives for purchasing these inputs varied by farm type. For dairy farmers, it was the \$250,000 to \$499,999 category, for cash grain farmers it was the size grouping \$100,000 to \$249,999, for "other" farmers it was the \$500,000 or more size category, and for livestock producers it was the \$250,000 to \$499,999 category (petroleum purchases only). In every case, at least two of the other larger categories relative to the smallest size category showed a significant positive relationship to co-op use. The variability of these results makes it impossible to fully support the hypothesis that use of cooperatives for purchasing petroleum, chemicals, and fertilizer was positively related to larger farm sizes. In all cases but one, the relationships were not strict. That is, each increase in farm size did not bring about an increase in co-op use. Only the results of "other" farmers and the use of cooperatives to purchase fertilizer showed a

strict relationship between larger farm sizes and greater co-op use.

The hypothesis that no relationship exists between farm size and co-op use for purchases of seed and feed was refuted in all cases but one; only the analysis pertaining to dairy farmers and feed purchases supported the hypothesis. For use of cooperatives to purchase seed, each farm type analyzed showed a positive relationship with at least one of the larger farm size groupings relative to the smallest size grouping. The size categories indicating the highest degree of co-op use for seed purchases were \$250,000 to \$499,999 for dairy and \$100,000 to \$249,999 for cash grain and "other." Also, positive relationships occurred between the larger farm size groupings of livestock producers and co-op use for feed purchases relative to the smallest size grouping. The size category showing the greatest degree of co-op use relative to the smallest grouping was the \$250,000 to \$499,999 grouping.

Contrary to the hypothesis that operator age is negatively related to use of cooperatives for purchases of petroleum, chemicals, and fertilizer, the results indicated that operator age had no significance in the degree of co-op use for these input purchases. Therefore, younger operators of farms used cooperatives no more or less than middle-aged or older operators for purchasing petroleum, chemicals, or fertilizer.

The analysis of farm use of cooperatives for seed and feed purchases also found that operator age was not related to the degree of co-op use. Thus, this finding supported the hypothesis that no relationship exists between operator age and level of co-op use for seed and feed purchases.

The hypothesis that farmers located in the Northern Plains and Lake States regions use cooperatives to a greater degree for purchasing petroleum, chemicals, or fertilizer than farmers in other regions was, as expected, only partially supported. The use of cooperatives for petroleum purchases by livestock farms supported this hypothesis, as did the results for dairy and cash grain farmers' use of cooperatives for fertilizer purchases. For the other analyses, there was much variability by farm type as to the relationships between farm region and co-op use.

The hypothesis that farmers in the Southeast region use cooperatives to a greater degree than other regions for seed purchases was

supported by the results for dairy and "other." For cash grain farmers, the Northeast region proved to have the greatest users of cooperatives for purchasing seed, with farmers in the Southeast region next, relative to the Mountain region. "Other" farmers in the Northern Plains region also exhibited greater use of cooperatives, while those in the Pacific region exhibited less use, than those in the Mountain region.

For the analysis of farmer use of cooperatives for feed purchases, farmers in the Northeast, Lake States, and Northern Plains regions were hypothesized to be greater users of cooperatives. For dairy, the results partially supported this hypothesis in that dairy farmers in the Northern Plains and Lake States were found to be greater users; but farmers in the Northeast were not. For livestock, the results fully supported the hypothesis in that livestock producers in the Northeast, Northern Plains, and Lake States were the greatest users of cooperatives. In addition, livestock producers in the Southeast and Corn Belt regions also were greater users of cooperatives for feed purchases, relative to livestock producers in the Mountain region.

RELATIONSHIPS TO CO-OP MEMBERSHIP

Hypotheses were also developed for co-op membership status in a manner similar to that of co-op use. The hypotheses were: a positive relationship to membership was expected for dairy and larger farmers, and a negative relationship was expected with operator age. Farmers located in the Lake States and Northern Plains were hypothesized to have more memberships, while those in the South Central region were hypothesized to have fewer memberships.

Table 7 presents the results of the logit regression analysis for co-op membership. Recall from the preceding section that coefficients indicated relationships between their associated variables and co-op use, and that significant coefficients implied greater, or less, use of cooperatives, relative to the omitted category. In the context of membership, coefficients again indicate relationships. However, in this case they indicate the relationships of their associated variables with co-op membership. Inferences to significant coefficients are as follows: significant

positive coefficients imply more memberships in cooperatives, significant negative coefficients imply less memberships in cooperatives, relative to the omitted category of the same categorical group. Magnitude differences of significant coefficients infer a greater, or lesser, change in co-op memberships.

Membership

Dairy

Each larger dairy farm size category was positively related to co-op membership relative to the smallest dairy farm size category (table 7). The most memberships were exhibited among dairy farmers in the \$250,000 to \$499,999 category. For dairy farmers, operator age was not significant in explaining memberships in

cooperatives. Dairy farmers in the Lake States, Northern Plains, and Northeast had more memberships in cooperatives than dairy farmers in the Mountain region. Dairy farmers in the remaining regions were not significantly different from dairy farmers in the Mountain region.

Cash Grain

As farm size increased for cash grain farmers, the coefficient on its associated variable was significantly more positive than the coefficient on the next smaller farm size variable. Thus, as cash grain farmers increased in size, they exhibited more memberships in cooperatives. Turning to operator age, the results indicated that cash grain farmers 55 years old and over had more memberships than cash grain farmers under 36 years of age. Operators in the 36 to 54 year age

Table 7—Logit regression analysis of membership of farmer cooperatives by farm type, 1986

Variable	Farm type			
	Dairy	Cash grain	Livestock	"Other"
	<i>Coefficients</i>			
Farm size ¹				
\$ 40,000 - \$ 99,999	1.27*	0.96*	1.46*	1.08*
\$100,000 - \$249,999	1.68*	1.19*	1.82*	1.45*
\$250,000 - \$499,999	1.91*	1.31*	2.10*	1.39*
\$500,000 or more	1.02*	1.52*	1.88*	1.85*
Operator age ²				
36 - 54	0.26	0.16	0.09	0.22
55 and over	0.36	0.31*	0.28*	0.36*
Region ³				
Northeast	0.90*	-1.19*	0.55*	-0.08
Southeast	0.61	-1.34*	0.07	0.60*
Lake States	2.01*	-0.19	1.18*	0.45*
Corn Belt	0.51	-0.86*	0.24	-0.72*
Northern Plains	1.50*	0.30	1.21*	1.13*
South Central	0.95	-0.81*	-0.76*	-0.18
Pacific	0.33	-0.43	-0.57*	0.40
Intercept				
1	-1.15*	-0.04	-1.57*	-1.71
2	-2.60*	-1.51*	-3.13*	-3.37*
Model Chi-Square	249	439	1008	388
Number of observations	1,153	2,561	5,964	1,153

* Significant at the 1 percent level of confidence.

¹ Omitted farm size, \$1,000 - \$39,999.

² Omitted operator age under 36.

³ Omitted Mountain region.

group were not significantly different from operators under 36. For cash grain farmers in the Lake States, Northern Plains, and Pacific region, there was no significant difference in number of co-op memberships relative to cash grain farmers in the Mountain region. However, cash grain farmers in the Southeast, Northeast, Corn Belt, and South Central regions had less memberships than those farmers in the Mountain region.

Livestock

A positive relationship existed between livestock producers in the larger size categories and co-op membership when compared to the smallest size category. Livestock producers in the \$250,000 to \$499,999 category had the most memberships, followed by the \$500,000 or more, the \$100,000 to \$249,999, and the \$40,000 to \$99,999 category, respectively. Similar to cash grain, livestock producers over 55 years of age had more memberships in cooperatives than did livestock producers under 36, and livestock producers 36 to 54 years old had the same amount of memberships as those under 36. Livestock producers in the Lake States, Northern Plains, and Northeast had more memberships than livestock producers in the Mountain region. But livestock producers in the South Central and Pacific regions had less memberships than those in the Mountain region. Livestock producers in the Southeast and Corn Belt had comparable membership to livestock producers in the Mountain region.

"Other"

"Other" farmers in the larger size groupings had more memberships than "other" farmers in the smallest size grouping. Relative to the smallest size grouping, the most memberships were exhibited by "other" farmers in the \$500,000 or more category. "Other" farmers 55 years and over had more memberships than "other" farmers under 36 years of age. Operators 36 to 54 years of age were not significantly different in memberships from those under 36 years for "other" farms. "Other" farmers located in the Northern Plains, Southeast, and Lake States had more memberships than "other" farmers in the

Mountain region, while "other" farmers in the Corn Belt had less memberships. "Other" farmers located in the Northeast, South Central, and Pacific were comparable in memberships to "other" farmers in the Mountain region.

Membership Summary

The hypothesis that larger farmers have a positive relationship to membership in cooperatives was only strictly supported by cash grain farmers. For dairy, livestock, and "other" farmers, the size categories exhibiting more farmer memberships in cooperatives varied compared to the smallest size category, so a strict positive relationship between farm size and co-op membership did not occur for these farmers.

For dairy, operator age was not a significant factor in explaining co-op membership. However, for cash grain, livestock, and "other" farmers, the 55-and-over operator age category had a positive relationship with co-op membership relative to the youngest operator age category. Overall, the results refuted the hypothesis that co-op membership is not related to operator age.

The hypothesis that farmers located in the Northern Plains and Lake States have more, and farmers located in the South Central region have less, memberships than farmers in other regions was only partially supported. For dairy farmers, the Lake States, Northern Plains, and Northeast regions had more memberships than all other regions (partial hypothesis support). For cash grain farmers, the Southeast, Northeast, Corn Belt, and South Central regions had less memberships than those in the Mountain, Lake States, Northern Plains, and Pacific regions (some, but little support). For livestock producers, the Lake States, Northern Plains, and Northeast regions had more, and producers in the South Central and Pacific regions had less, memberships than livestock producers in the Mountain, Corn Belt, and Southeast regions (partial support). Finally, "other" farmers in the Northern Plains, Southeast, and Lake States had more, and farmers in the Corn Belt had less, memberships than those in the Mountain, Northeast, Pacific, and South Central regions (some support).

CONCLUSIONS AND IMPLICATIONS

In most cases, farmers in the larger size groupings made greater use of cooperatives than those in the smallest size grouping. However, by farm type and activity of use, the specific order of the size groupings relative to degree of co-op use varied a great deal (table 8).

By and large, the results suggest that co-op use was not greater among the largest dairy and cash grain farmers in the context of purchasing activities relative to the smallest, and some other, size categories. Further, the largest size grouping of cash grain farmers had more memberships in cooperatives than the other groupings, but they did not use cooperatives for purchasing or marketing activities to any greater degree than the smallest size grouping of cash grain farmers. On the other hand, co-op use by the largest size grouping of "other" farmers was strong relative to the other size groupings of "other" farmers. Overall, the \$250,000 to

\$499,999 size grouping of dairy and livestock farmers were greater users of, and had more memberships in, cooperatives than the other size groupings of dairy and livestock farmers. For cash grain, those in the \$100,000 to \$249,999 size grouping were the greatest users.

The greater use of, and memberships in, cooperatives that many of the larger size groupings of farmers had reflects positively on cooperatives. However, some size groupings of farmers did not use, or did not have as much membership in, cooperatives as others. This implies that cooperatives need to determine what size groupings of the various types of farms they are presently serving well and then evaluate how best to derive more membership and business from those farmers who are less committed to cooperatives.

The "no use" co-op use category included a high percentage of farmers (appendix tables 1-6). This was true across all co-op use activities and all farm types. Excluding dairy farmers, a large

Table 8—Ranking order of farm size in relation to greater use of and membership in farmer cooperatives¹

Activity	Farm type			
	Dairy	Cash grain	Livestock	"Other"
	<i>Ranking order²</i>			
Marketing	B,D,C,A	B,C,A ³	C,B,D,A	D,B,A,C
Purchasing Petroleum	C,A,B	B,C,A	C,B,D,A	D,C,A,B
Purchasing Chemicals	C,A,B	B,C,A	NA	D,C,A,B
Purchasing Fertilizer	C,B,A	B,C,A	NA	D,C,B,A
Purchasing Seed	C	B	NA	B,A
Purchasing Feed	Same	NA	C,D,B,A	NA
Membership	C,B,A,D	D,C,B,A	C,D,B,A	D,B,C,A

¹ Ranking order refers to magnitude of significant positive coefficients of farm size variables relative to the farm size of \$1,000 - \$39,999.

² A - farm size category \$40,000 - \$99,999.

B - farm size category \$100,000 - \$249,999.

C - farm size category \$250,000 - \$499,999.

D - farm size category \$500,000 or more.

³ Missing letters mean that the corresponding size is not significantly different from the \$1,000 - \$39,999 size.

Same - all farm sizes have same impact.

NA - not applicable, farm type was not in analysis.

number of farmers also had no memberships in cooperatives (appendix table 7). However, the finding, alluded to above, that many of the farmers in the larger size grouping had greater co-op use and more memberships than farmers in the smallest size grouping implies that most farmers who were classified as "no use" or "nonmember" were likely farmers in the smallest size category. The high number of farmers in the smallest size grouping, and the results that reflected less use of and membership in cooperatives by these farmers, indicates that some extra business is available for cooperatives by way of small farmers. However, before proceeding to plan and work toward attracting more small farmers to the co-op way of doing business, cooperatives must determine whether it would be feasible and beneficial to do so.

The most surprising finding of this study was that the age of the principal farm operator was not a significant factor in explaining farmers' use of cooperatives for marketing or purchasing. The implication may be that cooperatives need not be concerned with the age of their farmer patrons. However, it would be unwise for co-op leaders to not strive to attract younger farmers to the co-op way of doing business. Forty-three percent of farm operators in the United States are over the age of 55, and 86 percent are over the age of 36. If the number of farmers remains somewhat fixed, that is, if older operators are replaced by younger farmers, then cooperatives are going to have more young farm operators to work with in the future. This implies that cooperatives are going to have to address changing attitudes with respect to long-term capital investment and revolvment of old equities. Remember that a significant relationship exists between older operators of cash grain, livestock, and "other" farms and co-op memberships. This indicates that cooperatives serving those farmers need to be concerned with gaining memberships from younger operators and should plan efforts in that area.

The highest number of dairy farmers in the United States were in the Lake States, Northeast, and Corn Belt (appendix table 2). Of these regions, the Lake States was the only region that showed greater use of cooperatives by dairy farmers for the marketing activity and some of the purchasing activities. The Northern Plains

region was also important in that dairy farmers in this region were greater users of cooperatives for purchasing the inputs of fertilizer and feed than dairy farmers in other regions. Further, dairy farmers in the Lake States, Northern Plains, and Northeast had more memberships than dairy farmers in the other regions. These findings imply a couple of things. First, it appears that cooperatives in the Lake States and Northern Plains regions are doing an adequate job with dairy farmers. Second, cooperatives in some regions of the country, perhaps most specifically the Northeast and Corn Belt regions, have room to increase co-op use by dairy farmers by offering improved services and other programs. Finally, a plus for cooperatives was the significant positive relationship between dairy farmers in the Pacific region and co-op use for marketing; although the Pacific region has only six percent of the Nation's dairy farms, they tend to be larger farms.

Although 40 percent of cash grain farmers are located in the Corn Belt, they did not use, nor have more memberships in, cooperatives to any greater degree than did cash grain farmers in most other regions. This implies that cooperatives who serve cash grain farmers in the Corn Belt would benefit if more cash grain farmers in that area became greater users of cooperatives. A positive reflection on cooperatives serving cash grain farms in the Northern Plains region was apparent. For marketing and fertilizer purchases, the cash grain farmers in the Northern Plains region had greater co-op use than cash grain farmers in other regions, and a significant number of the Nation's cash grain farmers (20 percent) are located there.

Most livestock producers are located in the Southeast, South Central, and Corn Belt regions. A positive relationship to co-op use was found among livestock producers in the Corn Belt region for both marketing and feed purchasing, while Southeast livestock producers had a positive relationship only to greater use for feed purchases, relative to the Mountain region. For petroleum purchases, there was no relationship to greater co-op use among livestock producers in the Corn Belt, Southeast, and South Central region. Livestock producers in the Northern Plains, Lake States, and Northeast regions had more memberships than those in the other

regions, and the producers in these regions more often than not exhibited greater co-op use. The South Central region, which had 26 percent of the livestock farms, had proportionately fewer livestock producer co-op memberships than all other regions. Similarly, livestock producers in the Southeast region did not have more co-op memberships than the Mountain region even though the Southeast had significantly more livestock producers (27 percent compared to five percent). These results imply that cooperatives who serve livestock producers would benefit from obtaining more memberships and, in some cases, greater use from livestock producers. The South Central and Southeast regions should be areas of concern for attracting both more memberships and more business from livestock producers. The Corn Belt should also be an area for concern, mainly for additional memberships, since this region had greater co-op use but lower memberships relative to most other regions. Cooperatives that serve livestock producers need to take a hard look at how effectively they serve farmers. If what they find is not satisfactory, then efforts should be undertaken to increase membership and use.

Overall, for cooperatives serving "other" farmers, the Northern Plains and Southeast regions were the most important in the context of cooperative use and membership. This, in part, was a good sign for cooperatives since the Southeast region had the largest amount (36 percent) of "other" farmers in the United States. "Other" farmers in the Pacific and South Central regions had greater co-op use for marketing, but did not have greater use for purchasing petroleum, chemicals, or fertilizer relative to the Mountain region. Less membership of "other" farmers was also found in these regions relative to the Mountain region. Since the Pacific and South Central regions have the second and third most "other" farms, respectively, it appears that cooperatives providing inputs in these regions would benefit from attracting membership and business from these "other" farmers. Also, while memberships were higher among "other" farmers in the Lake States region, co-op use by these farmers was low for all activities, except purchasing fertilizer, relative to the Mountain region.

In many instances, when there was greater (less) use of cooperatives by farmers in a region, there were also more (less) memberships in that region relative to the Mountain and other regions. The implication of this is that cooperatives would benefit from obtaining additional memberships in regions where co-op use is low because the two appear to go hand in hand. Broadening the membership base is the first strategy that cooperatives should employ to increase use. This will strengthen co-op character and provide additional business. (There were some instances where membership was higher but co-op use was lower, and vice versa). Such trends need to be watched and addressed if they continue since serious problems could arise in the future. This falls back to the basic co-op principle that cooperatives are used by the farmers who own them.

Overall, there was a great deal of variability in the analyses of co-op use and membership by farm type. The implication is that co-op leaders must identify by the farm attributes those farmers associated with less use of, or less membership in, cooperatives, or both. Attention should be paid to the size groupings and locations of the farm types that use the services that cooperatives provide (marketing, farm supplies, or both).

Once farmers with specific attributes that could represent increased use and/or membership are identified (the role of this study), then strategies for bringing them into cooperatives can be developed. Knowledge of the characteristics of the farmers that (a) use cooperatives to a greater degree, or don't use cooperatives much, and (b) hold more membership, or don't, allows for the development of more targeted strategies. This strategic education and planning must be a continuous process for co-op leaders.

Appendix Tables

Appendix table 1—Use of farmer cooperatives for marketing by farm type ¹

Use category ²	Farm type				All farms
	Dairy	Cash grain	Livestock	"Other"	
	<i>Percent ³</i>				
No use	42	64	91	86	80
Low use	9	14	6	3	7
High use	28	10	1	4	6
Total use	22	12	2	7	7

¹ Based on 1,994,096 farms, 1986.

² No use: ag. cooperative not used for marketing.

Low use: > 0 but ≤ 50% of gross sales marketed through ag. co-op.

High use: > 50 but < 100% of gross sales marketed through ag. co-op.

Total use: 100% of gross sales marketed through ag. co-op.

³ Percent of farm type in each category.

Figures may not add due to rounding.

Appendix table 2—Use of farmer cooperatives for purchasing petroleum by farm type ¹

Use category ²	Farm type				All farms
	Dairy	Cash grain	Livestock	"Other"	
	<i>Percent ³</i>				
No use	65	62	84	88	79
Low use	7	8	4	3	5
High use	3	4	2	1	2
Total use	25	26	10	7	14

¹ Based on 1,994,096 farms, 1986.

² No use: ag. cooperative not used to purchase input.

Low use: > 0 but ≤ 50% of input purchased from ag. co-op.

High use: > 50 but < 100% of input purchased from ag. co-op.

Total use: 100% of input purchased from ag. co-op.

³ Percent of farm type in each category.

Figures may not add due to rounding.

Appendix table 3—Use of farmer cooperatives for purchasing chemicals by farm type ¹

Category of use ³	Farm type ²			All farms
	Dairy	Cash grain	"Other"	
	<i>Percent ⁴</i>			
No use	55	60	81	69
Low use	7	9	5	7
High use	3	3	2	3
Total use	35	28	12	22

¹ Based on 1,994,096 farms, 1986.

² Livestock farm types are assumed not to be significant purchasers of chemicals.

³ Refer to appendix table 2 for definition of co-op use categories.

⁴ Percent of farm type in each category. Figures may not add due to rounding.

Appendix table 4—Use of farmer cooperatives for purchasing fertilizer by farm type ¹

Category of use ³	Farm type ²			All farms
	Dairy	Cash grain	"Other"	
	<i>Percent ⁴</i>			
No use	52	57	77	66
Low use	8	8	5	7
High use	3	3	1	2
Total use	37	32	16	25

¹ Based on 1,994,096 farms, 1986.

² Livestock farm types are assumed not to be significant purchasers of fertilizer.

³ Refer to appendix table 2 for definition of co-op use categories.

⁴ Percent of farm type in each category.
Figures may not add due to rounding.

Appendix table 5—Use of farmer cooperatives for purchasing seed by farm type ¹

Category of use ³	Farm type ²			All farms
	Dairy	Cash grain	"Other"	
	<i>Percent ⁴</i>			
No use	70	76	84	79
Low use	15	11	5	9
High use	2	2	1	2
Total use	13	11	11	11

¹ Based on 1,994,096 farms, 1986.

² Livestock farm types are assumed not to be significant purchasers of seed.

³ Refer to appendix table 2 for definition of co-op use categories.

⁴ Percent of farm type in each category. Figures may not add due to rounding.

Appendix table 6—Use of farmer cooperatives for purchasing feed by farm type ¹

Category of use ³	Farm type ²		All farms
	Dairy	Livestock	
	<i>Percent ⁴</i>		
No use	50	68	66
Low use	18	11	12
High use	7	4	4
Total use	25	17	18

¹ Based on 1,994,096 farms, 1986.

² Cash grain and "other" farm types are assumed not to be significant purchasers of feed.

³ Refer to appendix table 2 for definition of co-op use category.

⁴ Percent of farm type in each category. Figures may not add due to rounding.

Appendix table 7—Membership in farmer cooperatives by farm type ¹

Category of membership	Farm type				All farms
	Dairy	Cash grain	Livestock	"Other"	
	<i>Percent ²</i>				
No membership	24	49	74	69	64
One membership	31	29	18	22	22
Two or more memberships	45	23	8	9	14

¹ Based on 1,994,096 farms, 1986.² Percent of farm type in each category. Figures may not add due to rounding.**Appendix table 8—Descriptive statistics of major farm characteristics, 1986 ¹**

Variables	Mean ²	Standard deviation	Minimum value	Maximum value
Farm type				
Cash Grain	0.21	0.41	0	1
Dairy	0.08	0.27	0	1
Livestock	0.46	0.50	0	1
"Other"	0.25	0.43	0	1
Farm size (gross sales)				
\$ 1,000 - \$ 39,999	0.73	0.44	0	1
\$ 40,000 - \$ 99,999	0.13	0.34	0	1
\$100,000 - \$249,999	0.10	0.30	0	1
\$250,000 - \$499,999	0.03	0.16	0	1
\$500,000 and over	0.02	0.12	0	1
Operator age			0	1
Under 36	0.14	0.35	0	1
36 - 54	0.43	0.49	0	1
55 and over	0.43	0.49	0	1
Region				
Northeast	0.06	0.25	0	1
Southeast	0.24	0.43	0	1
Lake States	0.11	0.31	0	1
Corn Belt	0.21	0.41	0	1
Northern Plains	0.09	0.28	0	1
South Central	0.17	0.38	0	1
Mountain	0.05	0.22	0	1
Pacific	0.07	0.25	0	1

¹ Based on 1,994,096 farms, 1986.² Variables are specified in the analysis as (1,0) binary variables; therefore, means represent percents.

Appendix table 9—Major farm characteristics by farm type, 1986 ¹

Category	Farm type				All farms
	Dairy	Cash grain	Livestock	"Other"	
	<i>Percent ²</i>				
Farm size (gross sales)					
\$ 1,000 - \$ 39,999	24	57	85	81	73
\$ 40,000 - \$ 99,999	35	20	8	9	13
\$100,000 - \$249,999	30	17	5	6	10
\$250,000 - \$499,999	7	4	1	2	3
\$500,000 and over	4	2	1	2	1
Operator age					
Under 36	26	18	11	14	15
36 - 54	46	40	42	46	43
55 and over	28	42	48	40	43
Region					
Northeast	20	3	4	10	6
Southeast	8	9	27	36	24
Lake States	37	13	5	10	11
Corn Belt	18	40	20	9	21
Northern Plains	4	20	7	3	9
South Central	5	8	26	12	17
Mountain	2	5	5	6	5
Pacific	6	2	6	14	7
Membership status					
Members	76	52	26	29	36
Nonmembers	24	48	74	71	54
All farms	8	21	46	25	100

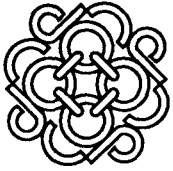
¹ Based on 1,994,096 farms, 1986.

² Percent of farm type in each category.

Appendix table 10—Number of marketing and supply farmer cooperatives in the United States by region, 1986 ¹

Region	Marketing cooperatives	Supply cooperatives	Regional total
Northeast	192	138	330
Southeast	256	290	546
Lake States	544	438	982
Corn Belt	597	370	967
Northern Plains	712	363	1,075
South Central	605	216	821
Mountain	220	123	343
Pacific	294	92	386
Overall total	3,420	2,030	5,450

¹ Source: Richardson, Ralph, et al. Farmer Cooperative Statistics, 1986. ACS Service Report 19, Agricultural Cooperative Service, U.S. Department of Agriculture, Washington, D.C., December 1987.



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