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Factors Associated with the Selection of Cooperative vs. Proprietary Handlers of Milk in Tennessee

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Factors that influenced the decision by dairy farmers to select cooperative milk handlers versus proprietary handlers were examined. In a 1989 survey, Tennessee dairy farmers were asked to indicate reasons that influenced their choice of milk handler, such as better price, an assured market, and better service. Characteristics of the dairy farmers were then compared between those who selected a specific reason and those who did not. Better service and an assured market were the most often cited reasons by cooperative members, and higher price and lower deductions were cited more often by nonmembers. Farmers who cited price as a reason tended to have larger dairy farms, be less diversified, and more indebted than those who did not cite price as a reason. Those who selected service as a reason had more dairying experience and were less indebted than those who did not select service.

The objective of this study was to ascertain what factors influence the decision by dairy farmers to select cooperative handlers of milk versus proprietary handlers. A 1989 survey of Tennessee dairy farmers presented a number of possible reasons for choosing milk handlers, such as better price, an assured market, and better service. The dairy farmers were asked to indicate each reason that influenced their choice of milk handlers. The characteristics of the dairy farms were then compared between the groups of dairy farmers who selected a reason and those who did not. This methodology provides the advantage that information regarding the specific reasons why a handler was selected can be obtained, as well as information regarding possible influences of the characteristics of the dairy farmers and their farms upon the reasons selected.

Several studies have examined farmers' opinions regarding the effectiveness of cooperatives compared with proprietary firms. Cain, Toensmeyer, and Ramsey found that a high percentage of the responding customers of cooperative stores in Maryland and Delaware believed that cooperatives were more willing to provide low-profit products and services than were proprietary firms. However, the responding farmers did not believe that cooperatives paid more for their commodities. Schrader, Babb, Boynton, and Lang found that although farmers perceived that cooperatives provided

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more dependable outlets and better quality of products and services, they believed that proprietary firms paid higher prices.

Other studies have analyzed the characteristics of cooperative members and nonmembers. Bravo-Ureta and Lee compared the socioeconomic and technical characteristics of dairy cooperative members with those of nonmembers to determine which characteristics influenced the choice of type of milk handler. They found that demographic characteristics, such as age and education, had little influence upon whether or not a dairy farmer was a member of a cooperative. However, having Extension Service contacts and operating a smaller farm had positive influences on the chances of a dairy farmer being a cooperative member. Unlike Bravo-Ureta and Lee's findings, Black found that the average Texas cooperative member owned and leased nearly twice the amount of land as the average Texas farmer or rancher. Although Black found that the average size of farm was larger for cooperative members, farmers of very large operations (more than 2,600 acres) were not usually cooperative members.

Although past studies have hypothesized the choice of type of milk handler to be a function of characteristics of the dairy farmers and the farms they operate, this study took a somewhat different approach. A problem with hypothesizing the choice of handler as a function of the characteristics of the dairy farmers and the dairy farms is that the results do not reveal much about why these characteristics influence the decision. One of the objectives of this study was to attempt to bridge the gap between characteristics of the farmers and their dairy farms and the choice of milk handlers, with inclusion of specific reasons for selecting a milk handler. Therefore, the reasons for choosing milk handlers were compared between cooperative members and nonmembers. The characteristics of the dairy farms were then compared between those dairy farmers who selected a reason and those who did not.

Data

A survey of Tennessee dairy farmers was conducted in 1989. The survey was designed to gather information on farmers selling milk in Tennessee and their opinions regarding milk marketing. The survey was mailed to 594, or 33 percent, of the nearly 1,800 dairy farmers in Tennessee holding licenses to sell grade A milk in 1988. The 594 were randomly selected from the list of dairy farmers. Of the 594 dairy farmers to whom the survey was mailed, 265 provided usable responses, giving a 45 percent response rate. The survey results included information regarding type of milk handler, reasons for selecting milk handlers, and characteristics of the responding dairy farmers and their dairy farms. About 58.1 percent of the farmers who responded to the survey were members of a cooperative. The responding dairy farmers indicated that five different milk handlers served dairy farmers across Tennessee.

A comparison of characteristics of the responding dairy farmers with those from a 1982 survey of Grade A dairy farms in Tennessee conducted by Whipple, showed similarities between the two samples. For example, the results from Whipple's survey indicated that the dairy farmers had an average of 18 years of dairying experience, average herd size was 86 cows, average milk production per cow was 13,200 pounds per year, and 93 percent of the dairy farmers received at least 70 percent of the farm's revenues from the sale of milk and dairy animals. The average years of dairying experience by the dairy farmers in this study was a little over 21 years, average herd size was 72 cows, average production per cow was 14,574 pounds per year, and 89

percent of the dairy farmers received at least 70 percent of the farm's revenues from the sale of milk and dairy animals.

Methodology

The respondents were presented with several possible reasons for selecting their current milk handler and were asked to indicate which ones influenced their decision. The reasons were: the handler paid the highest price, the services offered by the handler were better, it was the only choice the farmer had, the handler had friendly personnel, the handler had the lowest deductions, the handler provided an assured market, other farmers recommended it, and "other" reasons.[1] The percentages of cooperative members who selected each reason were then calculated and compared with the percentages of nonmembers who selected the reasons. Tests were conducted to evaluate whether or not the probability that a respondent chose a cooperative handler was independent of the probability of selecting the reasons.

The responses were then divided into groups, depending upon whether or not the respondent indicated a reason influenced their choice of milk handler. Dairy farm characteristics were compared between farmers who selected a given reason and those who did not. For example, average herd sizes were compared between the farmers who selected price as a reason, and those who did not select price. Characteristics that were considered included years of dairying experience, the number of cows milked, the percentage of farm revenues from the sale of milk and dairy animals, and the percent equity in dairy farm and herd.[2] These characteristics were selected because they provided measures of demographic characteristics, farm size, debt load, and diversification.

The survey responses were evaluated with two types of statistical methods depending upon the type of response elicited. Some questions in the survey were designed to elicit qualitative responses, such as whether or not a reason influenced the choice of milk handler. For these types of responses, analyses of frequency of occurrences were used. For example, the percentages of cooperative members and nonmembers who selected a reason for choosing a milk handler were calculated for each of the reasons. Chi-squared (X^2) tests were then used to evaluate whether or not the probability of selecting a reason was independent of the probability of selecting a cooperative handler.[3] Other questions were designed to elicit responses that were continuous numbers, such as the age of the operator, years of dairying experience, or number of cows milked. In order to evaluate whether or not the mean responses to these questions were different between those who selected a reason and those who did not, t-tests were used.[4]

Results

The percentages of dairy farmers who selected reasons for choosing milk handlers are shown in table 1. As seen in table 1, 64.9 percent of cooperative members cited an assured market and payment as a reason, while only 27.9 percent of nonmembers cited that reason. A higher percentage of cooperative members than nonmembers also cited better services and that they believed the handler was their only choice. However, 70.3 percent of the nonmembers selected highest price, while only 15.6 percent of the cooperative members selected that reason. A higher percentage of nonmembers than members also cited lowest deductions and friendly personnel as reasons. About the same percentages of members and nonmembers indicated that

Table 1.—Percentage of Cooperative Members and Nonmembers Who Selected Reasons for Choosing Milk Handlers

Reasons for Choosing Milk Handlers	Percentage of: Cooperative Members (N = 154)	Non-Members (N = 111)[a]	Calculated Q
Pays the Highest Price	15.6	70.3	81.4*
Assured Market and Payment	64.9	27.9	35.3*
Lowest Deductions	3.2	13.5	9.7*
Services Offered Are Better	38.3	20.7	9.3*
Friendly Personnel	23.4	40.5	8.9*
Only Choice I Have	13.6	3.6	7.6*
Other Farmers Recommended	16.9	18.9	0.2

[a]Throughout this document, N is the number of responses to a given question.
*Calculated Q>Critical Value $\chi^2 = 2.71$ for the 90% confidence level with 1 df.

other farmers recommending a handler was an influence on their choice of milk handler. Very few dairy farmers cited other reasons. Therefore, other reasons were not included in the analysis.

The characteristics of the dairy farms were then compared between those farmers who stated that a given reason influenced their choice of milk handler and those who did not. In table 2, the average years of dairying experience of those who selected a reason are compared with those who did not. Average number of cows milked by those who did and did not select a reason are presented in table 3. In table 4, the percent equity in the dairy farm and herd is compared between farmers who selected a reason and those who did not. Lastly, comparison of diversification of the dairy farms operated by those who selected a reason and those who did not is shown in table 5.

As seen in table 2, the dairy farmers who selected service as a reason had more years of dairying experience, with an average of 25.1 years, than those who did not select service, who had an average of 21.2 years experience. The dairy farmers who selected lower deductions had an average of 27 years of dairying experience, while those who did not select the reason had 22 years of experience. The average years of dairying experience did not appear to differ much between those who selected or did not select the other reasons, including price, only choice, friendly personnel, other farmers recommended, or an assured market.

As shown in table 3, dairy farmers who selected price milked a greater number of cows than those who did not select price. The dairy farmers who selected price milked an average of 87.9 cows, and those who did not select the reason milked 62.1 cows on average. Those who selected lowest deductions also milked a greater number of cows than those who did not select that reason. However, the dairy farmers who chose a milk handler, at least in part, because other farmers recommended the handler, milked a smaller number of cows than those who did not choose a milk handler for this reason. The farmers who believed the handler was their only choice milked about 53 cows, while those who did not select that reason milked about 73 cows. The farmers who cited an assured market and payment as a reason, on the average, milked about

Table 2.—Average Years of Dairying Experience of the Dairy Farmers, Grouped by Whether or Not a Reason for Choosing Milk Handlers Was Selected

Reason for Choosing Milk Handlers	Average Years of Experience Dairying Since Age 18 of Those Who: Selected the Reason	Did Not Select the Reason	Calculated t
Services Offered Are Better	25.1 (N = 79)	21.2 (N = 179)	2.3*
Lowest Deductions	27.0 (N = 19)	22.04 (N = 239)	1.6
Assured Market and Payment	23.2 (N = 126)	21.6 (N = 132)	1.1
Pays the Highest Price	21.3 (N = 99)	23.1 (N = 159)	1.0
Only Choice I Have	24.3 (N = 25)	22.2 (N = 233)	0.8
Other Farmers Recommended	21.2 (N = 44)	22.6 (N = 214)	0.7
Friendly Personnel	22.1 (N = 78)	22.5 (N = 180)	0.3

*Calculated t>Critical Value of t for the 90% confidence level and the appropriate degrees of freedom.

the same number as those who did not cite that reason. Similarly, there did not appear to be large differences in the number of cows milked by those who selected service as a reason and those who did not, or by those who selected friendly personnel and those who did not.

The results in table 4 indicate dairy farmers who selected price tended to have a lower percent equity in the dairy farm and herd than those who did not select price. About 44 percent of the dairy farmers who selected price were in the highest equity group and 22.6 percent were in the lowest equity group. However, 57.3 percent of those who did not select price were in the highest equity group and only 14 percent were in the lowest equity group. Those who believed that the handler was their only choice tended to have a higher percent equity than those who did not believe the handler was their only choice. A somewhat higher percentage of the farmers who selected service were in the highest equity group. The equity levels did not appear to differ greatly between those who did and did not select the other reasons.

As shown in table 5, the dairy farmers who selected price as a reason tended to be less diversified than those who did not select price. Nearly 67 percent of those who selected price received at least 80 percent of their farm revenues from the sale of milk and dairy animals. Only 49.1 percent of those who did not select price received at least 80 percent of their farm revenues from the sale of milk and dairy animals. In contrast, the farmers who selected service as a reason tended to be more diversified

Table 3.—Average Number of Cows Milked by the Dairy Farmers, Grouped by Whether or Not a Reason for Choosing Milk Handlers Was Selected

Reason for Choosing Milk Handlers	Average Number of Cows Milked by Those Who: Selected the Reason	Did Not Select the Reason	Calculated t
Pays the Highest Price	87.9 (N=98)	62.1 (N=159)	3.3*
Other Farmers Recommended	59.9 (N=46)	74.5 (N=211)	2.6*
Lowest Deductions	91.8 (N=19)	70.3 (N=238)	1.6*
Only Choice I Have	57.3 (N=25)	73.5 (N=232)	1.4
Assured Market and Payment	68.0 (N=127)	75.8 (N=130)	1.1
Services Offered Are Better	67.6 (N=79)	73.8 (N=178)	0.8
Friendly Personnel	68.1 (N=76)	73.5 (N=181)	0.8

*Calculated t>Critical Value of t for the 90% confidence level and the appropriate degrees of freedom.

than those who did not select service as a reason. The level of diversification of the farm was not significantly different between those who did and did not select the other reasons.

Summary and Conclusions

The results of this study suggest that an assured market and better services were key reasons for dairy farmers to choose to market their milk through cooperative milk handlers. However, higher prices and lower deductions were influences upon dairy farmers who chose to market their milk through proprietary handlers.

The dairy farmers who indicated that price was an important influence on their choice of milk handler milked a greater number of cows, tended to be more indebted, and were less diversified than those who did not select price. These findings are not too surprising, since farmers with high debt loads and cash flow requirements and who devote most of their resources to the dairying portion of the farm would likely be strongly influenced by price in choosing a handler.

In contrast, dairy farmers who cited service as an influence on their choice of milk handler had more years of dairying experience, were more diversified, and tended to have a higher percent equity in the dairy farm than those who did not select service as a reason. These results suggest that farmers with more experience, who have had more time to pay off debts, and therefore have lower cash flow requirements are

Table 4.—Percentage of Dairy Farmers With Low, Medium, and High Equity, Grouped by Whether or Not a Reason for Choosing Milk Handlers Was Selected[a]

Reasons for Choosing Milk Handlers	Percentage of Dairy Farmers Whose Equity Was:			Calculated Q
	Low	Medium	High	
Price				
Selected (N=93)	22.6	33.3	44.1	4.9*
Did Not Select (N-157)	14.0	28.7	57.3	
Only Choice				
Selected (N=24)	20.8	41.7	37.5	2.4
Did Not Select (N=226)	16.8	29.2	54.0	
Service				
Selected (N=80)	15.0	26.2	58.8	1.9
Did Not Select (N=170)	18.2	32.4	49.4	
Other Farmers Recommended				
Selected (N=43)	14.0	37.2	48.8	1.2
Did Not Select (N=207)	17.9	29.0	53.1	
Assured Market and Payment				
Selected (N=125)	15.2	30.4	54.4	0.7
Did Not Select (N=125)	19.2	30.4	50.4	
Lowest Deductions				
Selected (N=18)	11.1	33.3	55.6	0.5
Did Not Select (N=232)	17.7	30.2	52.1	
Friendly Personnel				
Selected (N=76)	17.1	29.0	54.0	0.1
Did Not Select (N=174)	17.3	31.0	51.7	

[a]Farmers who stated they could retain less than 25% of the sales value of the farm, if it were sold and all debts paid, were categorized in the low equity group. Those who could retain 25–74% were categorized in the medium equity group. The farmers who could retain more than 75% were categorized in the high equity group.
*Calculated Q>Critical Value $\chi^2 = 4.61$ for 90% confidence level with 2 degrees of freedom.

probably less constrained by price received for their milk. Consequently, they may be able to base their choice of milk handler on other factors, such as quality of service.

The farmers who selected lowest deductions milked a greater number of cows than those who did not select that reason. This result could indicate that as the dairy farmers milked larger herd sizes, they might have an increasing preference for a fixed plus variable system of deductions, in which the deduction per hundredweight decreases as the quantity of milk sold increases.

Finally, a higher percentage of the cooperative members than nonmembers believed that their milk handler was the only choice they had. Those who believed that their milk handler was their only choice tended to have smaller dairy herds than those who believed they had other alternatives. This finding could reflect the preference of proprietary firms to handle milk from larger dairy farms. The factors considered by handlers in choosing which dairy farmers to serve are not examined

Table 5.—Percentage that Sales of Milk and Dairy Animals Made Up of Farm Sales, Grouped by Whether or Not a Reason for Choosing Milk Handlers Was Selected

Reason for Choosing Milk Handlers	Percentage of Farmers Whose Sales of Milk and Dairy Animals Made Up: Less than 80% of Farm Sales	80% or Greater of Farm Sales	Calculated t
Price			
Selected (N = 102)	33.3	66.7	7.9*
Did Not Select (N = 163)	50.9	49.1	
Service			
Selected (N = 82)	52.4	47.6	3.3*
Did Not Select (N = 183)	40.4	59.6	
Only Choice			
Selected (N = 25)	56.0	44.0	1.6
Did Not Select (N = 240)	43.0	57.0	
Lowest Deductions			
Selected (N = 20)	55.0	45.0	1.0
Did Not Select (N = 245)	43.3	56.7	
Friendly Personnel			
Selected (N = 81)	42.0	58.0	0.2
Did Not Select (N = 184)	45.1	54.9	
Other Farmers Recommended			
Selected (N = 47)	42.5	57.5	0.1
Did Not Select (N = 218)	44.5	55.5	
Assured Market and Payment			
Selected (N = 131)	45.0	55.0	0.1
Did Not Select (N = 134)	43.3	56.7	

*Calculated Q>Critical Value $\chi^2 = 2.71$ for 90% confidence level with 2 degrees of freedom.

in this study. Certainly, these considerations likely have impact on how dairy farmers market their milk and merit examination in future research.

Notes

1. The category of "other reasons" provided an opportunity for the farmers to indicate reasons, other than those listed, that influenced their decision.

2. The percent equity was the farmer's assessment of the percentage of the sales value that the farmer could retain if the entire farm and herd were sold and all debts paid.

3. Contingency tables were used to present cross-tabulation of two variables X and Y. For example, X could represent whether or not a reason was selected, and Y could represent cooperative membership. The rows of the tables are X_i, where i = 1,2,..R, and the columns of the tables are Y_j, where j = 1,2,..C. The probability of a randomly selected individual being classified in the i,jth cell is p_{ij}, where the sum of the $p_{ij} = 1$. The null hypothesis is $p_{ij} = p_i p_j$. The calculated test statistic is

$$Q = \Sigma_i \Sigma_j (n_{ij} - m_{ij})^2 / m_{ij}$$

where n_{ij} is the number of responses in the ijth cell, and $m_{ij} = n_i n_j / n$, such that n_i is the total number of responses in row i and n_j is total number of responses in column j (Fienberg). If calculated Q is greater than the critical value of X^2 for a given confidence level and $(R-1)(C-1)$ degrees of freedom (df), then the null hypothesis is rejected.

4. The null hypothesis is that the means of two groups are equal. If calculated t critical value of t for a selected confidence level and appropriate degrees of freedom, then the null hypothesis was rejected. Two different calculated t statistics were used, depending upon whether the variances of the two samples were assumed to be equal (Steel and Torrie). If the variances were assumed to be equal, then the calculated t can be expressed as:

$$t = (\bar{x}_1 - \bar{x}_2) / \sqrt{s_p^2 (1/N_1 + 1/N_2)},$$

where s^2 is the pooled variance, N_1 and N_2 are the numbers of responses to the question for the two groups, and $_1$ and $_2$ are the mean responses for the two groups. The degrees of freedom used to conduct the test are $N_1 + N_2 - 2$. If the two variances could not be assumed to be equal, then the calculated t statistic is:

$$t = (\bar{x}_1 - \bar{x}_2) / \sqrt{(s_1^2/N_1 + s_2^2/N_2)},$$

where s_1^2 and s_2^2 are the variances of the two groups. The degrees of freedom to conduct the test are:

$$df = \frac{(s_1^2 / N_1 + s_2^2 / N_2)^2}{(s_1^2 / N_1)^2 /(N_1 - -1) + (s_2^2 / N_2)^2 /(N_2 - 1)}$$

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