Factors Influencing Southern Dairy Farmers' Choice of Milk Handlers

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Abstract

Survey data of 2,538 dairy farmers located in 12 southern states were used to analyze the factors influencing farmers' choice of milk handlers. Results from a qualitative response model indicate that a combination of price and non-price factors contribute to dairy farmers' attitudes toward their milk handlers. Specifically, the decision to change milk handlers was significantly influenced by prices paid and deductions charged. However, non-price factors including field services, friendly personnel, and loyalty to a handler contributed to the longer term affiliation of dairy farmers with their milk handlers.

Key words: dairy farmers, milk handlers, market channels, qualitative response

Dairy farmers have the option of selling their milk through several types of marketing firms. Broadly categorized, these are milk marketing cooperatives and proprietary handlers. Cooperatives, with or without processing facilities, generally guarantee a market for their members' milk. They may also provide their customers with an agreed-upon supply of milk and various marketing services through a contractual arrangement. Proprietary handlers, who may purchase all their milk direct from dairy farmers or who may purchase up to 100 percent from cooperatives, may provide some of the same services, but are not obligated to do so. Hypothetically, the dairy farmers chose a specific milk handler by assessing the benefits of these services and by evaluating the overall performance of alternative marketing firms.

The primary objective of this paper is to identify the factors that may be important in influencing southern dairy farmers' decision to change or not to change milk handlers.

Identification of the factors contributing to a long-term affiliation with the same milk handler by dairy farmers will provide beneficial information for long-term planning by cooperative organizations and proprietary firms. This may result in improved market stability and efficiency.

Milk cooperatives perhaps had their greatest success in the 1970s. In the 1980s, however, dairy farm dissatisfaction with the overall performance and services of the cooperatives seems to have increased. In 1987, of the 21.1 billion pounds of the Grade A milk sold to plants and dealers in the south, 79 percent was sold through milk marketing cooperatives and 21 percent was sold directly to proprietary handlers. This compares with 83 percent of the 20.1 billion pounds sold through cooperatives in 1980 (Liebrand, Carley, and Ling). In the four-state east-south-central region (Alabama, Kentucky, Mississippi, and Tennessee), two-thirds of the milk was sold through cooperatives in 1987 compared with 84 percent in 1980. The decrease in the percentage of milk marketed by cooperatives

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suggests that some dairy farmers have changed their buyer affiliation to proprietary milk buyers.

The marketwide services performed in the process of farm assembly of milk, hauling to the processing location, and balancing processors needs with the supply from farmers may be costly (Manchester). When farmer-member milk production is less than needed to satisfy customer needs, cooperatives encounter added supply costs. In periods of milk surplus, cooperatives must dispose of the surplus and pay the costs. Cooperative members, if not compensated by the ultimate buyers, bear the additional cost of supply balancing. This becomes a deduction from the price they receive for milk. Dairy farmers selling to proprietary handlers avoid the supply balancing costs.

Because of milk supply balancing and its costs, processing costs, and market competition faced by cooperatives, there has been at times a disparity in prices received by cooperative members and farmers selling direct to proprietary handlers. The price received by southern dairy farmers who sold milk to cooperatives ranged from $0.12 to $0.67 per cwt less than farmers who sold milk to proprietary handlers (Carley). Prices that do not recognize differences in the services rendered can accelerate dairy farmer dissatisfaction and distort competitive relationships among dairy farmers, proprietary milk handlers and cooperatives (Carley et al.).

Price and income disparity among dairy farmers influences choices of affiliating with cooperatives versus proprietary handlers. Dairy farmers may change milk handlers depending on the price received, marketing costs and deductions, and the various non-price service functions that are performed. Berry, Dabney and Voth estimated that a cooperative may pay a difference of about $0.20 per cwt lower in the price to dairy farmers without losing members to other handlers that pay higher prices.

In a study of dairy farmers in the northeastern United States, several reasons for switching milk handlers were identified. These included the special assessment charged by cooperatives, reblended prices after deductions, prices too low, excessive hauling costs, and inadequate provision of on-farm services (Wilkins and Stafford). Similar reasons were identified to affect southern dairy farmers' degree of satisfaction with a milk handler. Southern dairy farmers indicated that the price received, assessments and deductions, market assurance, and hauling costs were most important in affecting the degree of satisfaction with a milk handler (Liebrand, Carley, and Ling).

In an analysis of data obtained from a national survey, factors influencing dairy farmers in switching milk handlers were (1) to get a better price, (2) to reduce risk of market payment loss, (3) the plant closed, (4) to reduce hauling costs, (5) to obtain more accurate weights and tests, and (6) to obtain better field services (Boynton and Babb).

Liebrand and Ling observed that dairy farmers may accept lower prices in return for an assured market for their milk. Jensen further observed that farmer chose between cooperatives and proprietary handlers because of an assured market and better services as opposed to higher prices and lower deductions.

Conceptual Relationships and Methodology

Dairy farmers make an important decision when they choose a milk handler. Assuming that dairy farmers have objectives other than profit maximization, their choice of milk handlers may be hypothesized to be based on the premise of utility maximization. Based on the premise of utility maximization, dairy farmers may assess several factors dealing with income maximization, risk minimization, and satisfaction maximization in order to maximize utility. Dairy farmers' desire to maximize income to the dairy farm operation is influenced by prices received, the amount of assessments and deductions, and hauling rates. Factors that lead to risk minimization are the stability and security of the milk handler to pay for the milk and the assurance that the milk will be purchased. Factors that relate to satisfaction are the capability and friendliness of milk handler personnel, the degree of loyalty that increases over time, and the kind of on-farm field services provided by the milk handler. Conceptually, there should exist some combination of levels of the factors contributing to income maximization, risk minimization, and satisfaction maximization that maximizes a farmer's utility.

Given the nature of the study and the assumption that a combination of several factors exists that maximizes a farmer's utility, a qualitative choice model is utilized in the analysis. This methodology, based on the premise of random utility maximization developed by McFadden, provides the appropriate theoretical foundation for model formulation.

Consider a sample of T dairy farmers, each facing a set of M discrete alternatives. Each alternative $i(i = 1, ..., M)$ provides utility, U_i, to farmer $t(t = 1, ..., T)$. A dairy farmer is said to choose an alternative i that maximizes his utility among the M alternatives. The maximum utility attainable given each alternative i can be expressed as:

$$U_i = u(A_k, S_n),\ k = 1, ..., K; \qquad n = 1, ..., N. \quad (1)$$

Where U_i is the maximum utility attainable when alternative i is chosen; A_k is a vector of K attributes or characteristics associated with alternative i; and S_n is a vector of N socioeconomic characteristics of farmer t. For estimation purposes, the $u(.)$ is assumed to be a linear function of A_k and S_n, and it can be decomposed into a deterministic component $(A_k, S_n; \Theta)_i$ and a stochastic component (τ_i). Thus, equation (1) can be rewritten as:

$$U_i = (A_k, S_n; \Theta)_i + \tau_i, \quad (2)$$

where Θ is a vector of parameters associated with A_k and S_n.

In the decision-making process, the dairy farmer is assumed to evaluate and compare the utility derived from each alternative i as specified in (2). An individual will choose alternative j, if and only if it provides the highest utility.

$$U_j \geq \max (U_i \mid i = 1, ..., M; j \neq i). \quad (3)$$

In practice, U_j represents a latent variable, which is unobservable, and only the outcome of the decision process is observed. Thus, let Y be the observed variable that is ordinal in nature and $Y = j$ is the observed outcome when response category j is chosen.

In this analysis there are only two choices. The dependent variable, Y_t, equals one $(Y_t = 1)$ if the dairy farmer reported to have changed milk handler and $(Y_t = 0)$ otherwise. Thus, the regression relation implied by equation (3) can be specified as a probit model and estimated with appropriate statistical procedures:

$$Y_t = X_t\beta + \varepsilon_t, \quad (4)$$

and

$$\Pr(Y_t = 1) = 1 - \Phi(-X_t\beta), \quad (5)$$

where X_t is a matrix of explanatory variables that represent A_k and S_n in equation (2) and β is a vector of unknown parameters; ε_t is a vector of error terms assumed to be independently and identically normally distributed, i.e., $\varepsilon_t \sim N(0, \sigma^2)$; and $\Phi(.)$ denotes the standard normal cumulative distribution function.

The coefficient vector β is estimated using maximum likelihood estimation. Maximum likelihood estimation computes the value of β that maximizes the log-likelihood function:

$$\log L = \Sigma_{t=1, ..., T}\, Y_t \log \Phi(X_t\beta) + \Sigma_{t=1, ..., T}\, (1-Y_t) \log [1-\Phi(X_t\beta)] \quad (6)$$

Consistent parameter estimates for the β vector that maximize the log-likelihood function can be obtained by applying the probit procedure available in the LIMDEP computer package (Greene).

The Variables and the Data

Data for the study were obtained from dairy farmers located in 12 southern states. Agricultural economists located in each state chose a random sample of Grade A dairy farmers located in their state. A questionnaire was mailed to 5,660 dairy farmers in the region early in 1989. Useable responses were obtained from 2,538 dairy farmers for a 44.8 percent return. The responses represented approximately 25 percent of the total Grade A dairy farmers in the 12-state region. The general characteristics of the dairy farmers who responded to the survey are shown in table 1.

Table 1. Simple Statistics of the Southern Dairy Farmers Responding to the Survey

Item	Unit	Value
Type of milk handler		
Bargaining cooperative	no. farmers	657
Bargaining-operating cooperative	no. farmers	1423
Proprietary	no. farmers	427
Not classified	no. farmers	31
Total	no. farmers	2538
Herd size	avg. no. cows	152
Production per cow	avg. lbs milk	14,578
Land	avg. acres	377
Individual owner	% herds	60
Partnership owned	% herds	27
Other owned	% herds	13
Age principal operator	avg. years	47
Years dairy farmed	avg. years	22
Changed milk handler		
No	no. farmers	2,003
Yes	no. farmers	447
Type of handler change		
Co-op to co-op	% farmers	39
Co-op to prop.	% farmers	29
Prop. to co-op	% farmers	18
Prop. to prop.	% farmers	14

Respondents were asked to indicate whether they have changed milk handlers during the last five years. Of the 2,450 responses, 447 indicated that they had changed handlers.[1] Of the farmers that changed handlers in the past five years, 39 percent changed from one cooperative to another, 18 percent of the farmers changed from a proprietary handler to a cooperative, and 29 percent changed from a cooperative to a proprietary handler. The remaining 14 percent of the farmers changed from one proprietary handler to another proprietary handler.

The dairy farmers were asked to rate the degree of influence of various reasons for changing or not changing milk handlers in an ordered sequence of strong; moderate; weak; and none. The major reasons listed in the survey were the influence of (1) importance of price received, (2) importance of special assessments and deductions, (3) favorable or excessive hauling charges, (4) field or on-farm services offered by the milk handler, (5) friendly personnel, and (6) loyalty to the handler.

The degree of influence of the above factors in the milk producer's decision to change or not change a handler reveals some noticeable differences (table 2). Farmers who changed handlers were clearly influenced by the importance of prices received and deductions charged. However, producers who did not change milk handlers seem to be more influenced by favorable hauling ,charges, on-farm services, friendly personnel, and loyalty toward the handler.

Respondents were also asked to indicate what percent of the sales value would they be able to retain (after all debts had been paid) if they sold their entire farming operation. Of 2,416 responding to this question, 6 percent of the dairy farmers indicated that their debt exceeded assets and about 20 percent were debt free. Among the remaining respondents, the debt-asset ratio of 63 percent of the milk producers was less than 0.5.

Table 2. Percentage of Dairy Farmers Expressing Degree of Influence of the Following Factors on the Decision to Change or Not to Change Milk Handlers

Factors	Degree of influence			
	Strong	Moderate	Weak	None
	percent			
Price				
Change	45	9	3	43
Non-change	30	34	8	28
Deductions				
Change	25	12	5	58
Non-change	15	34	13	38
Hauling charges				
Change	14	11	6	69
Non-change	32	32	10	26
Field services				
Change	10	7	6	77
Non-change	35	25	10	30
Friendly personnel				
Change	14	6	3	77
Non-change	44	27	6	23
Loyalty				
Change	8	7	3	82
Non-change	32	25	9	34

Model Specification

For this analysis of dairy farmer affiliation with milk handlers, due to exclusion of respondents who failed to provide complete answers to a number of questions used in the variable construction, data were available for 2020 dairy farmers. Based on the conceptional relationships, variables were identified that provide reasons for southern dairy farmers changing or selling to the same milk handler. Changing or not changing was the dependent variable. Variables selected to explain the choice made by the dairy farmers were one set of variables related to the characteristics of the dairy farmers including the debt-asset level of the farmer, the size of the dairy herd, and the age of the principal operator.

Dairy farmers with a high debt to asset relationship may be expected to change milk handlers if they believed it would improve their income by receiving a higher price for their milk. Therefore, the higher the ratio, the more likely the farmer would change milk handlers. That dairy farmers with larger herds may be more likely to change handlers as they seek higher milk prices and lower marketing costs. Also, milk handlers may attempt to get larger producers to sell to them since it may reduce field man and other marketing costs. Older dairy farmers were expected to be less likely to change handlers than younger ones as they probably had sold to the same buyer longer and they probably are less likely to desire a change.

Another set of variables were related to the influence of milk handler monetary factors on dairy farmers opinions including low prices versus better prices, high versus low deductions and assessments and excessive versus favorable hauling charges. A group of non-monetary factors included the field services offered, the friendliness of handler personnel, and loyalty to versus personal problems with the handler.

Receiving low prices, deductions and assessments that were believed too high, and excessive hauling charges might influence a dairy farmer to change handlers. Likewise, poor field

Table 3. Definition and Summary Statistics of the Variables Used in the Model

Variable	Definition	Mean	Standard deviation
State Dummies			
Georgia Alabama Arkansas Florida Kentucky Louisiana Mississippi North Carolina South Carolina Tennessee Texas Virginia	If respondent is from a specified state = 1; otherwise = 0.		
Debt	If debt exceeds or equals asset then Debt = 1, if debt asset ratio (dar) = .9 to .76 then Debt = 2, if dar = .75 to .51 then Debt = 3, if dar = .50 to .26 then Debt = 4, if dar = .25 to .01 then Debt = 5, if debt free than Debt = 6.	4.0683	1.4574
Price and Non-Price Factor			
Price	Influence of the factor on the decision to change	2.7317	1.1878
Deductions	or not to change; 1 = none, 2 = weak, 3 = moderate,	2.2797	1.1463
Hauling charges	and 4 = strong.	2.6020	1.2018
Field services		2.5238	1.2518
Friendly personnel		2.7881	1.2505
Loyalty		2.4396	1.2659
Herd Size			
HS1	If the size of the dairy herd is 100 or less = 1; 0 otherwise.	0.5782	0.4940
HS2	If the size of the dairy herd is 101 to 200 = 1; 0 otherwise.	0.2852	0.4516
HS3	If the size of the dairy herd is 201 to 300 = 1; 0 otherwise.	0.0644	0.2455
HS4	If the size of the dairy herd is more than 300 = 1; 0 otherwise.	0.0723	0.2590
Age	Actual age of the respondent in years.	46.874	12.139

services, non-friendly personnel, and a lack of loyalty to a handler may influence a dairy farmer to change handlers. In addition, the state location of the dairy farmer was included as a variable. Table 3 presents a summary of variable definitions and related descriptive statistics.

Empirical Results

The estimation results from the probit model are presented in table 4. In addition, several goodness-of-fit measures are reported. One measure is the log-likelihood ratio. A second measure used is the pseudo-R^2 (Maddala, p. 40). A third measure examines how well the model classified the respondents correctly based on the estimated probabilities. These measures indicate that the model had satisfactory explanatory power and fitted the data reasonably well. The results suggest that the overall ability of the model to yield correct predictions on dairy farmers' decision to change handlers was 88 percent.

Table 4. Probit Estimates and the Probabilities of Changing Milk Handlers

Variable	Estimated coefficient	Significance level	Probability[a]
Constant	0.7013	0.0129	
STATE			
Georgia (Base)			0.0919
Alabama	0.3708	0.1001	0.1689
Arkansas	-1.4863	0.0000	0.0024
Florida	-0.4162	0.1184	0.0404
Kentucky	0.1452	0.4780	0.1182
Louisiana	-0.0618	0.7702	0.0821
Mississippi	0.0163	0.9444	0.0946
North Carolina	-0.0117	0.9555	0.0900
South Carolina	0.1070	0.6456	0.1108
Tennessee	0.3566	0.0817	0.1653
Texas	-0.5605	0.0164	0.0294
Virginia	-0.2918	0.1768	0.0525
DEBT	-0.0755	0.0097	
Debt = 1			0.5916
Debt = 2			0.5620
Debt = 3			0.5321
Debt = 4			0.5021
Debt = 5			0.4720
Debt = 6			0.4420
PRICE	0.2626	0.0000	
Price = 1			0.3265
Price = 2			0.4259
Price = 3			0.5301
Price = 4			0.6324
DEDUCTIONS	0.2074	0.0000	
Deduction = 1			0.5290
Deduction = 2			0 6103
Deduction = 3			0.6871
Deduction = 4			0.7565
HAULING CHARGES	-0.1855	0.0000	
Hauling charges = 1			0.8395
Hauling charges = 2			0.7901
Hauling charges = 3			0.7328
Hauling charges = 4			0.6685
FIELD SERVICES	-0.1857	0.0001	
Field services = 1			0.7638
Field services = 2			0.7030
Field services = 3			0.6358
Field services = 4			0.56[illegible]
FRIENDLY PERSONNEL	-0.2864	0.0000	
Friendly personnel = 1			0.7498
Friendly personnel = 2			0.6507
Friendly personnel = 3			0.5402
Friendly personnel = 4			0.4264
LOYALTY TO Handler	-0.2935	0.0000	
Loyalty = 1			0.5937
Loyalty = 2			0.4775
Loyalty = 3			0.3632
Loyalty = 4			0.2599
HERD SIZE			
HS1 (up to 100; base)			0.0580
HS2 (101-200)	0.1525	0.1308	0.0779
HS3 (201-300)	-0.0279	0.8762	0.0548
HS4 (above 300)	0.3284	0.0859	0.1068
AGE[a]	-0.0109	0.0025	-0.0014

Summary statistics:
Number of observations = 2020
-2 x Log-likelihood ratio = 79.474[b]
Pseudo-R^2 = 0.423
Percent correctly classified = 88

[a] For the continuous variable Age, the value shown is the probability derivative. For all other discrete variables, the values shown are the actual probabilities associated with the variables.

[b] The likelihood ratio statistic is distributed as Chi-square with 22 degrees of freedom and is significant at the .01 significance level.

Georgraphic Difference

Many of the estimated coefficients were statistically significantly different from zero at the ten percent significance level. The coefficient estimates for the state variables indicate that dairy farmers in Alabama, Kentucky, Mississippi, South Carolina, and Tennessee are more likely to change handlers than those dairy farmers in Georgia. Further, the likelihood of not changing handlers is higher in Arkansas, Florida, Louisiana, North Carolina, Texas, and Virginia than in Georgia. However, the estimated coefficients for Florida, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, and Virginia were not statistically significantly different from zero at the ten percent significance level. This result could have connotation regarding the performance of the cooperatives or proprietary handlers in an individual state. Dissatisfaction of farmers with the performance of their current handler may be a sufficient reason to change handlers.

Debt

The negative sign for the debt variable suggests that farmers with more favorable debt-to-asset levels are less likely to change handlers. A possible explanation for this relationship between debt and likelihood of changing handlers may be that farmers with higher debts were more likely to actively explore the alternatives to maximize income of their dairy farm operation such as changing to another handler who may pay a higher price.

Herd Size

The coefficient estimates of the herd size variables indicate that larger operations are more likely to change handlers. The estimated sign associated with dairy herds of more than 300 cows (HS4) was positive implying that dairy farmers with this herd size were more likely to change handlers than farmers with up to 100 cows. The positive sign for the variable representing 101 to 200 cows (HS2) (statistically significant at the .13 significance level) also supports the hypothesis that larger operations are more likely to change handlers. However, the estimated coefficient associated with dairy herds of 201 to 300 cows (HS3) was not statistically significantly different from zero. A few cents more per hundredweight of milk from higher prices, lower deductions, and lower hauling charges resulting in greater absolute income from the larger herds may have influenced the changes. Even though some milk handlers may seek out the larger herds, this was not evident in this study as there was no statistically significant difference in herd size distribution among various milk handlers. In addition, results show that older dairy farmers were less likely to change handlers than their younger counterparts.

Price and Deduction

Results show that dairy farmers' decision to change handlers is significantly influenced by prices paid and deductions charged by the handlers. The estimated signs associated with both price and deductions variables were positive implying that dairy farmers were more likely to change milk handlers if they believed their prices received were too low and/or deductions were too high. Wilkins and Stafford, and Boynton and Babb also identified similar reasons for changing handlers. With respect to hauling charges, the results suggested that favorable hauling charges had more influence on the farmers' decision to not change handlers, rather than the decision to change.

Non-Price Service Factors

All the non-price service factors (field services, friendly personnel, and loyalty) were found to be statistically significant in the dairy farmers' decision of not changing handlers. The negative effects associated with field services, friendly personnel, and loyalty suggest that these non-price factors contribute to the longer term affiliation of the farmers to their milk handlers.

For qualitative choice models, the estimated coefficients should be interpreted in the sense that they affect the probability that certain events would occur. This interpretation can be obtained by computing the probability derivatives (marginal probabilities) from the estimated model. The marginal probability is used to measure the change in probability of each choice with respect to a change in explanatory variable. The probability derivatives for binary variables, however, do not exist. Therefore, the predicted probability for a given binary variable was calculated by holding all other variables at their sample means. The

estimated marginal probabilities and probabilities are presented in the last column in table 4.

Probability of Changing Handlers

Farmers of Alabama and Tennessee had the highest probability of changing handlers. The probability of changing handlers was the lowest for the dairy farmers in Arkansas. The probabilities associated with the debt variable suggest that as the debt-to-asset ratio of the farmer improves, the probability of changing handlers decreases. A farmer whose debts exceed assets has a probability of 0.59 of being willing to change handlers. However, for those who are free from debts, the estimated probability of changing handlers is considerably less (0.44).

With respect to the price and deductions variables, the results suggest that those farmers who attached more importance to a higher price received and lower deduction charges, the probability of changing handlers increased significantly. In contrast, those dairy farmers who attached more importance to hauling charges, field services, friendly personnel, and loyalty, the probability of changing handlers decreased. For example, farmers who considered field services offered to be a very important factor had a probability of about .56 of changing handlers in comparison to a probability of as high as .76 for farmers who considered field services not important.

The estimated probabilities also suggest that larger dairy farm operations have a higher probability of changing handlers. In particular, farmers with more than 300 head had a probability of about .11 in comparison to a probability of .06 for those who had up to 100 head. The probability derivative of -.0014 for the age variable indicates that each one year increase in the age of a dairy farmer decreases the probability of changing handlers by .0014. This result suggests that as the dairy farmer gets older he is less likely to change handlers.

Summary and Conclusions

Most southern dairy farmers have the opportunity to sell their milk to more than one handler. They may change handlers depending on several income, risk, and satisfaction factors. However, changing milk handlers may result in some degree of organizational and market instability among dairy farmers and dairy farmer organizations.

A survey of dairy farmers located in 12 southern states indicated that 18 percent of 2,450 farmers had changed milk handlers during the previous five years. Six major reasons for changing or not changing milk handlers were the influence of price received, assessments and deductions, hauling charges, on-farm field services, friendliness of handler personnel and loyalty to the handler.

A qualitative choice model was used to determine the degree to which a set of alternatives influenced dairy farmers to change or not change milk handlers. Dairy farmers located in Alabama and Tennessee had the highest probabilities for changing handlers while those located in Arkansas, Florida, and Texas had the lowest probabilities for changing handlers.

Dairy farmers with less favorable asset-to-debt levels were more likely to change handlers. This implies they may have been seeking factors that may improve their income such as price received, level of deductions, and hauling charges. Dairy farmers with larger herds had a higher probability of changing handlers than those with smaller herds.

The decision to change handlers was significantly influenced by prices paid and deductions charged by handlers. However, hauling charges had more influence on not changing handlers. Non-price factors including field services, friendly personnel, and loyalty to a handler were important variables in the dairy farmers' decisions to not change handlers. Positive effects associated with non-price factors contributed to the longer term affiliation of dairy farmers with their milk handlers. This result supports the finding that dairy farmers may accept lower prices for their milk in return for an assured market and other non-price factors and reinforces the hypothesis that the dairy farmers are not solely profit maximizers.

The results of this study show evidence that a combination of price and non-price factors contribute to dairy farmers' attitudes toward their milk handlers. Milk prices, deductions, and milk hauling charges are important to dairy farmers but not necessarily the only factors resulting in

organizational and market stability. Milk handlers must consider a bundle of price and non-price factors as they seek to maintain a stable supply of milk to meet their everyday customer needs in the marketplace. While cooperatives must maintain a competitive price structure to attract or retain members, they must also be competitive in terms of costs of operation and other non-price services. Further, milk handlers in need of milk should target younger and larger producers as potential recruits because they will have a higher probability of success.

This study, using the qualitative choice model, provided a method to identify those factors that indicate the decision-making process of a dairy farmer that leads to maximization of the utility among several alternatives in choosing a milk handler. However, conclusions and implications to be drawn from this study are limited by the geographical coverage of the survey. Attempts to generalize and apply the results of this study to a broader context should be exercised with caution. In addition, it is recognized that the study did not explore why some farmers attach more importance to financial factors than others. The availability of this information would provide further insight for studying milk producers' decision-making processes.

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Endnotes

[1] Observations were omitted for those producers who were forced to change milk handlers because their previous milk handlers either went out of business or closed plants.