Influence of Cost Share and EQIP Incentive Payments on Adoptions of Best Management Practices by Louisiana Dairy Farmers

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Selected paper prepared for presentation at the Southern Agricultural Economics Association annual meeting, February, 2005

Abstract

Adoption of best management practices (BMPs) minimizes the negative externalities created by the manure by-product of milk production. Logistic regression procedure was used to understand the impact of socioeconomic attributes of Louisiana dairy farmers on BMP adoption decision relative to the cost share and incentive payment.

Key Words: Best Management Practices, Environmental Quality Incentive Program, Cost Share, Milk Production, Manure

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Best management practices (BMPs) are voluntary environmental practices recommended for nonpoint source pollution control and funded by the Environmental Quality Incentive Program (EQIP) of the United States Department of Agriculture/Natural Resource Conservation Service (NRCS). The federal government enters into cost share and fixed incentive payment arrangements with farmers who qualify and are willing to incorporate selected BMPs into their farming operations. Despite the government's willingness to underwrite the cost of implementation, BMP adoption rates are uniformly and relatively low. The main reasons cited by farmers for their nonadoption decisions are the associated production and profit reductions, too low percentages of cost share by the government, and too small incentive payments.

Over time, dairy farming in Louisiana has trended downward both in the number of dairy farms and total volume of milk produced. Primary reasons for the decline include the technologically driven intensity of competition from other regions and the cost of compliance with environmental regulations. As a consequence, the Louisiana dairy industry is no longer the engine of economic activity that it once was in areas of the state largely in need of such an engine. Maintaining and enhancing that engine will require Louisiana farmers to remain in compliance with environmental regulations while enhancing the profitability of dairy farming in Louisiana. This most likely will require increases in total milk production both at the farm and industry levels. This translates into more milk per cow and more cows in the state.

Milk production has a great potential to create negative externalities associated with the production, storage and handling of dairy manure. Dairy manure can be both a point and nonpoint source of water pollution. Manure can harm the environment through nutrient buildup in the soil and subsequent runoff and leaching to surface and ground water. The volume of manure can be minimized by reducing cow numbers but that option has negative implications for maintaining and creating a viable dairy industry. An alternative to reducing cow numbers is to implement BMPs for handling and storing dairy manure. Some adoption of dairy manure BMPs has occurred in Louisiana due to the cost share percentages and one-time fixed incentive payments. Encouragement to maintain an established BMP, waste treatment lagoon, through the use of environmental funds for lagoon cleanouts is evidence of a commitment on the local level to maintain both the dairy farms and promote the environment. The perception among dairy farmers in Louisiana is that, as goods, BMPs are publicly desirable but privately too costly. The obvious result is low adoption rates despite the claim from the USDA that all BMPs are profitable (Cooper and Keim 1996).

Objectives

The adoption of BMPs has been studied in Louisiana (Rahelizatovo and Gillespie; Henning and Cardona) and other areas of the country (Valentin, Bernardo, and Kastens; Cooper; Ribaudo and Agapof; Taylor *et al.*). The purposes of this paper are to describe factors bearing on adoption decisions by Louisiana dairy farmers for specific BMPs and to contrast the cost share levels granted to the adopters against the levels identified by nonadopters as being necessary to make them adopt a BMP. To accomplish this, we will:

(1) Relate sets of variables describing Louisiana dairies and dairy farmers to the adoption of BMPs in terms of adoption costs, producer's cost share percentages, and EQIP incentive payments required to entice non-adopters to adopt specific BMPs;

(2) Assess how selected socio-economic characteristics of Louisiana dairy farmers contribute to the likelihood of the adoption of a BMP;

(3) Compare USDA-NRCS benchmark adoption cost estimates with the cost of BMP establishment reported by survey respondents and to identify their cost share percentages and incentive payments by BMP; and

(4) Identify how sources of information might influence the BMP adoption decision.

Data and methods

The tailored design method (Dillman) was followed in the construction and conduct of the survey. A focus group, consisting of dairy farmers and county agents from the three parishes in the principal milk production area of Louisiana, was used to help design and pre-test the survey instrument. The survey was mailed to all 325 Louisiana dairy farmers with an option to complete the survey online. The twelve-page length of the survey was a known negative. Two weeks after the initial mailing, non-respondents were contacted with a postcard reminder request to complete the survey. A second round of surveys was mailed to dairy farmers three weeks after the first round. To further encourage participation, payments of $10 per survey for the first fifty fully completed surveys were promised along with an opportunity for all respondents to qualify for a $250 lottery cash prize drawing. The size and number of payments offered were limited by the availability

of funds. A graduate student repeatedly contacted dairy farmers by phone requesting survey completion. The combination of payments, follow-up post card requests and phone calls resulted in only 49 usable surveys for a 15 percent response rate.

The twelve-page survey had four distinct sections including dairy manure disposal, milk reduction programs, dairy best management practices (BMP) adoption, and socio-economic characteristics of the principal operator.

One section of the survey asked questions related to the adoption of best management practices (BMP) in terms of: 1) cost shares and EQIP incentive payments; 2) sources of information most important in making the adopt /non-adopt decision; and 3) the role of USDA-NRCS in the responder's adoption or non-adoption decision. Eighteen BMPs identified by USDA-NRCS as most appropriate for Louisiana dairy farms were identified in terms of cost-share or EQIP incentive payment per practice. A common format used in presenting each of the eighteen BMP practices and in eliciting responses is presented in Appendix A. The BMP was described in the survey and identified with its USDA-NRCS code number and an estimated reference cost. The BMP reference cost was an average cost based on adoption information of the BMP in Louisiana between 1997 and 2001. It was the reference value used to elicit responses about BMP adoption for the farmer if the farmer was required to use that BMP to produce and sell milk. Because the true cost of a BMP is unique to each dairy farm, responders were asked to estimate their cost of implementing each BMP on their farm. Appendix A identifies each of the 18 BMPs with a definition and estimated reference cost.

The BMP adoption section of the survey also asked producers to identify which of the following reasons best described why they did not adopt a specific BMP: 1) producer

expected to retire from dairy farming; 2) BMP was not cost effective, regardless of cost share; and 3) decided not to adopt BMP after discussions with USDA-NRCS. Additionally, producers ranked 11 sources of information about BMPs according to how well that source contributed to their understanding of that BMP. Section III also had questions about interactions with USDA-NRCS personnel, the EQIP application experience and the producer's view on environmental laws and programs.

The other section of the survey requested socio-economic information about the principal operator of the dairy farm. Standard information regarding length of tenure as the principal farmer, age, educational level, marital status, employment of either spouse off the farm, outside income and financial condition of the dairy operation. This section also asked about use of a personal computer to gather information about dairy farming.

Methods

Consider a scenario where a dairy farmer would either adopt (BMP=1) or not adopt (BMP=0) a best management practice. Let's indicate those variables suggested by the literature that influence the adoption decision such as number of years the farmer has been dairying, education, gender, income from the dairy farm and the debt-to-asset ratio as X. The adoption decision can then be modeled as

Prob (BMP=1) = F(X,b)

Prob (BMP=0) = 1- F(X,b)

The logistic distribution can be used which is

$$\Pr ob(BMP = 1) = \frac{e^{b'X}}{1+e^{b'X}} = \wedge(b'X)$$

The marginal effect can be written as

$$\frac{dE(y \mid X)}{dX} = \wedge(bX)[1 - \wedge(bX)]b$$

In the case of a binary independent variable, the appropriate value of the marginal effect would be Prob [BMP = 1|X^*, d = 1] – Prob [BMP = 1|X^*, d = 0] where X^* denotes the means of all variables in the model except the dummy variable of interest.

Justification of explanatory variables used in the regression

The absence of a guiding theory is a problem in identifying variables that can sufficiently describe the behavior of an agent regarding the adoption of a best management practice. Justification for the inclusion of selected variables in the survey instrument justifies their inclusion in the model to explain their contribution to the BMP adoption decision. The explanatory variables and the rationale for their inclusion in the survey and in the model are as follows.

Number of Years as the Principal Dairy Farm Operator: Traditionally, researchers have used age as a determinant of adoption. The argument is that an older farmer would be more reluctant to adopt new technology than a younger farmer. As an alternative to age, the number of years in the profession can be used to explain the adoption decision. A relatively new entrant would be more likely to adopt new technology because of a stronger desire to be current in the tools of the trade and to address regulations that may otherwise hamper the operation. In addition, a first-time farmer might qualify for a higher cost share on BMP implementation. Therefore, the assumption is that a greater number of years in the business will have a negative effect upon a decision to adopt. This is a continuous variable in the adoption model.

Education: Education is assumed to have a positive impact upon the adoption of a best management practice. A farmer is considered to have implicitly or explicitly recognized the opportunity cost of dairying. Training beyond high school tends to make more opportunities for employment available creating a higher opportunity cost to dairy. The choice to dairy suggests that the dairyman seeks to minimize the opportunity cost to dairy by being as profitable as possible. Thus, the dairyman is likely to be more aggressive in seeking out ways of making his dairy profitable including the adoption of best management practices. Education is considered a binary explanatory variable where 0 indicates a farmer with high school or less education and 1 otherwise.

Continue: A farmer with an heir apparent to continue the dairy operation is more likely to adopt the BMPs than the farmer without an heir apparent. This is a binary variable with 1 indicating an heir apparent.

Net Farm Income from Dairying: A dairy farmer with a positive net cash flow is more likely to adopt a BMP because of the cost share requirement. Net farm income is treated as a binary explanatory variable where 0 represents the respondent reporting negative incomes from dairying and 1 represent those with positive net returns from dairying.

Debt-to-Asset Ratio: A high debt-to-asset ratio suggests that the farmer is less likely to adopt a best management practice. A binary explanatory variable with 0 indicating a debt-to-asset ratio of 40% or less and a 1 indicating a debt-to-asset ratio of greater than 40 percent denotes this variable in the model.

Presence of a Nearby Subdivision (Worth): A nearby subdivision suggests that the dairy farmer is likely to experience higher cost in maintaining environmental

standards. It also suggests that there are alternative uses for the land which drives up its worth thus increasing the opportunity cost to dairy. The combination of potentially greater environmental cost compliance and higher opportunity costs to dairy suggests that the presence of a subdivision would have a negative influence on a BMP adoption decision. The assignment of a 1 to this binary variable reflects the farmer's assessment that the dairy farm is worth more in nonagricultural than agricultural uses.

Respondent's Environmental Attitudes (escale): If a respondent does not care about the environment, he is less likely to choose to adopt a BMP. Therefore, lower values in the environmental attitude scale are suggestive of a lower likelihood of BMP adoption. Respondents ranked three environmentally related questions using a Likert scale of 1 to 5. The values reported by the respondent were aggregated to create a continuous variable indicating the environmental attitude of a respondent. The three questions used in developing this new variable to discern the respondent's attitude toward the environment were:

1. Laws regulating water pollution are needed,
2. Given the economic realities, soil and water conservation programs are often carried too far, and
3. The government should pay farmers to promote practices that enhance soil and water conservation

Results

BMP Adoption Rates, Costs of Adoption, and Incentive Payments

The BMP is the focal point of analysis and synthesis. In table 1, the BMP listing follows the rank order of BMP adoption. Study of Table 1 suggests that the respondents were only fully responsive to a subset of six of the 18 BMPs as evidenced by the absence of information in the average cost of adoption, the average cost share percentage and the willingness to pay (WTP) columns. The response rate of the 49 survey respondents to the 18 BMP ranged from 78 to 94 percent with the greatest response being associated with the waste treatment lagoon BMP and the lowest response with the waste storage facility BMP. Of the seven BMPs with the highest rates of adoption, six of the seven have average cost of adoption rates and average cost share percentages reported. Such reports suggests that the respondents have had actual experiences with these BMPs.

The BMP adoption rates among the 49 respondents ranged from a low of 2.5% on the roof runoff management BMP to a high of 67% on the waste treatment lagoon BMP. A common interpretative format for each BMP can be illustrated using the waste treatment lagoon BMP. The average cost of adopting a waste treatment lagoon BMP was $12,886 with an average cost share of 39 percent. Of the 33 percent of non-adopters of the waste treatment lagoon BMP, 28 percent indicated that would adopt it if their maximum personal cost share to adopt was under 20 percent. Thus, in the case of the waste treatment lagoon BMP, the non-adopters require a minimum cost share contribution of over 80 % in order to adopt while the adopters only realized a 39% cost share.

With a 67% adoption rate, the waste treatment lagoon BMP had the highest percentage of adoption among the 18 BMPs. The closest ranked adopted BMP with a cost share incentive, the waste storage facility, had a 37% adoption rate and an average

cost of $11,800 which had been cost shared at a 33% rate. Of the 63% of non-adopters, thirty percent (30%) indicated a willingness to adopt, but did not provide the information needed to discern the maximum level of cost share they would be willing to bear in order to adopt. Actually, the closest ranked BMP, waste utilization, offered a fixed incentive of $10 per acre with a 100 acre limit or $1000 for two or three years. Forty-one percent (41%) of the responders had adopted this BMP and 55% of the non-adopters indicated a willingness to adopt this BMP. Information to discern an incentive payment level necessary to elicit their participation, however, was not provided.

Among the BMPs with a cost share incentive, the two BMPs with the highest rates of adoption are also the BMPs with the highest average cost of adoption. Experience suggests that these practices were earlier advocated in responding to high levels of *E.coli* in a waterbody within the milkshed which denied its use as a recreational venue. Public outcry led environmental authorities to impose stricter requirements on dairymen to reduce the *E.coli* levels. Voluntary implementation of these BMPs on farms whose runoffs could enter waterbodies off the farm were accepted by the environmental authorities as a compromise to revoking milk parlor permits. At least one-third of all survey respondents had not adopted these practices. This suggests that they were exempt from any implementation mandate probably because the runoffs from their dairies never crossed their property lines.

The rate of adoption reported in Table 1 identifies the most popular BMPs among the 18 identified for Louisiana dairies. Similarly, the percentage of non-adopters who indicated a willingness to adopt at various cost share percentage levels identifies the least popular BMPs among Louisiana dairymen. The correspondence is not exactly linear, but

there appears to be a strong correlation between the relatively high rates of non-adoption and the relatively low rates of non-adopters among the cost share payment group who would adopt if their cost share levels were to be met. For example, the roof runoff management BMP had the highest non-adoption rate of 97.5% and the lowest percentage of nonadopters who would adopt, 19%. As a group, the BMPs with fixed payment incentives had the highest percentages of non-adopters willing to become adopters.

Respondents were asked to identify which sources of information had the greatest influence on their decision to adopt a specific BMP. From among 11 sources of information, the LSU Agricultural Center, USDA-NRCS, and Hoard's Dairyman or other dairy publication were identified as being the most important to the BMP adoption decision regardless of whether the incentive payment was cost-shared or fixed. The majority of nonadopters cited retirement more frequently than cost as the reason for not adopting a BMP.

Likelihood of BMP Adoption

A logit model was estimated to assess the impact of selected explanatory variables upon the BMP adoption decisions of Louisiana dairymen. Matrix singularity resulted in estimation of the model for 11 of the eighteen BMPs. The majority of the regression results suggest that the independent variables were not significant in explaining the BMP adoption decision. Independent variables used in the regression were worth, education, age, debt, net income, environmental scale and continue. A change in the probability of adopting a specific BMP given a one (1) unit increase in the value of an independent variable varies according to the decision maker's reference point as determined by the

values of the independent variables belonging to that decision maker at the time of the decision. This is because a logit model assumes a nonlinear relation between the probability of adoption and the relationships between the explanatory variables. Interpretation becomes much simpler, however, if the adoption of a specific BMP is expressed in terms of the odds rather than in terms of probability. For these reasons, identifications and interpretations of the odds ratio that the independent variables contributed to the BMP adoption decisions are presented here. For the binary variables of education, continue, worth, net income and debt, the interpretation of the odds of a BMP adoption is similar. For the quantitative variables of escale and age, the interpretation of the odds ratio of a BMP adoption is different than the interpretation of the odds ratio for a BMP adoption with the qualitative variables.

The odds ratios identifying the contributions of independent variables to a specific BMP adoption for 13 of the 18 BMPs are presented in Table 2. Education, as a binary variable, uses a 1 to identify a farmer with more than a high school degree. A consistent finding was that the odds of BMP adoptions by farmers with more than high school degrees were greater than the odds of adoption by farmers with a high school or less education for 9 of the 13 BMPs under analysis. In the case of the pest management BMP, the odds of its adoption by farmers with a high school or greater educational level was 6.1 times greater than those farmers with less than a high school education. In the cases of the watering facility and prescribed grazing BMPs, the odds of the more highly educated farmers adopting these practices were reduced by 18 and 11 percent, respectively. In the case of the waste utilization BMP, the educational level had little to no effect upon its odds of adoption.

The variable "continue" represents the situation where the responding farmer thinks there is an heir apparent who will likely continue the farming operation following their retirement. The odds that such a situation would enhance a BMP adoption decision was not only low, but it was uniformly low across all but two of the BMPs, watering facility and pest management. This unexpected finding is contrary to expectations and leads to the suggestions that the present generation of Louisiana dairy farmers are not encouraging the future generation to be dairy farmers.

The variable worth identifies a situation where the dairy farmer thinks that the dairy farm has a greater monetary value in nonagricultural uses. Under this situation, the odds that any BMP other than the waste lagoon and prescribed grazing would be adopted are quite low. The odds strongly favoring adoption of the waste lagoon may be a reflection of the environmental and aesthetic sensitivities to which that farmer is subject to by virtue of the activities on the properties surrounding the farm that are reasons for its enhanced worth. Prescribed grazing is a BMP that can be conducted to promote the aesthetics of country life as well as enhance milk production. All of the other BMPs entail capital investments that would enhance the value of the dairy farm in dairying but even that enhanced value is dwarfed by the appreciated value of the dairy farm in a nonagricultural use. Thus, there is little incentive to enhance its value as a dairy farm through BMP adoptions especially if the farmer intends to liquidate the farm so as to capture its enhanced nonagricultural use value.

The variable "net income" is used as a binary variable in which a 1 indicates a situation in which the annual net income from dairying is greater than $50,000. With the exception of the waste storage facility and prescribed grazing BMPs, a $50,000 net

income enhances the odds of adopting the BMP. Such BMPs provide capital investments that can enhance future milk production and profitability while minimizing the tax burden of a $50,000 income. The combination of cost-share and fixed incentive payments in combination with tax relief would encourage BMP adoptions. The waste facility exception is probably not a profitable BMPs even with the incentive payments and tax relief subsidies that its adoption would provide. This BMP controls manure runoff and provides a product that is a substitute for commercial fertilizer. However, the relative costs of the fertilizer overshadows any savings from the fertilizer. Prescribed grazing is both a capital and labor intensive practice. The incentive payment is probably insufficient to cover the labor costs of implementing it on a $50,000 a year profitable dairy farm

The variable "debt" reflects the situation of farmers whose debt-to-asset ratio is less than 20 percent. Farmers in this situation are more likely to adopt a sediment basin, watering facility, nutrient management, pest management and prescribed grazing BMPs than farmers with greater debt loads.

The explanatory variable "environmental scale" quantifies the farmer's affinity for the environment. This variable is measured using a 15 point scale. The coefficient in table 2 expresses the percentage change in the odds of adopting a specific BMP for each one (1) unit increase in the environmental scale value. In this study, a 1 unit increase in the environmental scale increases the odds of adopting the waste treatment lagoon, the field border and filter strips, the sediment basin, watering facility and residue management BMPs. The highest percentage increase in the odds is for field borders and filter strips. This is the practice where strips of grasses are planted around the boundaries of fields and along drainage ditches and other water bodies to reduce sediment, organic

materials and chemicals carried in the runoff. This is the most visible BMP in terms of its effect in pollution reduction. Therefore, the result is consistent with the real world experience.

Quantitative variable indicating the number of years a farmer has been dairying increases the odds of adoption only for the waste treatment lagoon and field borders and filter strips BMPs. The odds for these BMPs are 0.4 and 3.5, respectively. The relatively few BMPs that would be adopted by a long term dairyman are probably not capital intensive with the decision being driven by a desire to maximize rent returns from the existing set of capital assets and to minimize capital expenditures due to the nearness of retirement. For example, we find that 1 year increase in dairy profession increases the odds of not adopting BMP pest management by 11 percent.

Summary and Conclusions

This work identified 18 BMPs and reports survey findings that identify their rates of adoption and the cost share incentive payments associated with those adoptions. It identifies the percentage of non-adopters who would be willing to become adopters for increases in the cost share incentive payments. The likelihood of a specific BMP adoption was related to the socio-economic and financial variables of years as the principal dairy farmer, level of educational attainment, the presence of an heir apparent, net farm income, debt-to-asset ratio, the worth of the farm in nonagricultural uses and the farmer's affinity for the environment. Data constraints limited the documentation of the average cost of BMP adoption and in ascertaining the survey respondents' willingness to pay to six of the 18 BMPs. Those same constraints limited the statistical significance with which

the reported findings could be held. Out of eleven sources of information, survey respondents identified the LSU Agricultural Center, the NRCS and Hoard's Dairyman and similar publications as being the most important.

References

Cooper, J. C. "A Joint Framework for Analysis of Agri-environmental Payment Programs." *American Journal of Agricultural Economics* 85(2003): 976-87

Cooper, J.C. and R.W. Keim. "Incentive payments to encourage farmer adoption of water quality protection practices." *American Journal of Agricultural Economics* 78(1996):54-64.

Henning, S.A. and H. Cardona "An analysis of factors influencing adoption of BMPs among Louisiana Sugarcane Producers." Selected paper presented at the AAEA meeting, Tampa, Florida, 2000.

Ribaudo, M. and J. Agapoff. "Importance of Cost Offsets for Dairy Farms Meeting a Nutrient Application Standard." Selected paper presented at the AAEA annual meeting, Denver, Colorado, 2004.

Rahelizatovo, N. C. and J.M. Gillespie "The Adoption of Best-Management Practices by Louisiana Dairy Producers" *Journal of Agricultural and Applied Economics* 36(2004):229-40.

Taylor, M. L., R. M. Adams and S. F. Miller. "Farm-level response to agricultural effluent control strategies." *Journal of Agricultural and Resource Economics*. 17 (1992): 173-185.

Valentin, L.,D.J. Bernardo, and T.L. Kastens. "Testing the Empirical Relationship between Best Management Practice Adoption and Farm Profitability." *Review of Agricultural Economics* 26(2004):489-504.

Table 1. Dairy farmers and BMP adoption in Louisiana

BMPs	Respondents		Adopters		Average	Average	Non-adopters	% Nonadopters Who	Cost-share
	Number	Percent %	%	Nos.	Cost of Adoption $	Cost Share %	% Nonadopters	Said They Would Adopt	WTP
Cost Share BMPs									
Waste Treatement Lagoon	46	94	67	31	12886	39	33	28	1.67
Waste Storage Facility	38	78	37	14	11800	33	63	30	
Sediment Basin	40	82	35	14	4550	39	65	21	
Watering Facility	41	84	29	12			71	19	2.57
Field Borders and Filter Strips	41	84	24	10	533	12	76	16	
Fence	43	88	21	9	1000	35	79	21	2.46
Grassed Waterways	41	84	19	8	2000	50	81	15	
Cover and Green Manure Crop	42	86	17	7			83	20	
Heavy use area protection	39	80	15	6			85	12	
Critical Area Planting	38	78	11	4			89	18	
Streambank and Shoreline Protect	41	84	10	4			90	17	
Riparian Forest Buffer	41	84	7	3			93	22	
Roof Runoff Management	40	82	2.5	1			97.5	19	2.27
Incentive Payment BMPs									
Residue Management or CTP	41	84	29	12		3	71		
Nutrient Management	41	84	34	14			66		52
Pest Management	40	82	22	9			78		48
Prescribed Grazing	40	82	30	12			70		54
Waste Utilization	41	84	41	17			59		55

Table 2. Odds ratio

Variables	BMP1	BMP2	BMP5	BMP10	BMP12	BMP13	BMP14	BMP15	BMP16	BMP17	BMP18
Environmental Scale	1.053	0.608	1.48	1.139	1.009	0.989	1.364	0.9	0.941	0.89	0.788
Number of Years in Dairy	1.004	0.979	1.035	0.991	0.996	0.974	0.973	0.939	0.898	0.902	0.981
Education	1.886	3.235	5.433	4.037	0.821	2.606	2.493	1.785	6.105	0.896	1.003
Family Will Continue Dairy	0.626	0.285	0.208	0.37	1.208	0.344	0.272	0.978	1.534	0.29	0.099
Conversion Worths More	3.336	0.135	0.306	0.94	0.752	0.368	0.783	0.44	0.295	1.293	0.483
Dairy Net Income	1.387	5.676	3.268	2.175	1.366	0.783	1.574	1.447	1.3	0.97	1.003
Debt-Asset Ratio	0.588	0.194	0.353	2.114	2.22	0.801	0.801	1.23	29.971	1.086	0.903

Note:

BMP1	**Waste Treatment Lagoon**
BMP2	**Cover and Green Manure Crop**
BMP5	**Field Borders and Filter Strips**
BMP10	**Sediment Basin**
BMP12	**Watering Facility**
BMP13	**Waste Storage Facility**
BMP14	**Residue Management or Conservation Tillage Practices**
BMP15	**Nutrient Management**
BMP16	**Pest Management**
BMP17	**Prescribed Grazing**
BMP18	**Waste Utilization**

Appendix

Dairy BMPs suggested for Louisiana

Sample format of the question asked on each cost-share BMP

1. Waste Treatment Lagoon (NRCS code 359): *An impoundment made by excavation or earth fill for the temporary storage and biological treatment of animal or other agricultural waste. Estimated Reference cost=$11,750 each*

Has this BMP been adopted on your farm?
[ ] YES → **If YES, in which year? _____ If stopped, in what year? _____ Total cost from all sources to install BMP** $ **_____** ***Your*** **cost-share ____**%
[ ] NO → **If NO, would you adopt this BMP on your farm?**
[ ] YES
[ ] NO
[ ] Not suitable for my farm

If YES, what is the maximum percentage of total cost you would pay to adopt this BMP?
[ ] 0 - 9.9% [ ] 10 - 19.9% [ ] 20 - 29.9% [ ] 30 - 40% [ ] more than 40%

2.Cover and Green Manure Crop (NRCS code 340): *A crop of close growing grasses, legumes or small grains primarily for seasonal protection and soil improvement. Estimated Reference Cost = $12 per acre*

3. Critical Area Planting (NRCS code 342): *A planting of vegetation such as trees, shrubs, vines, grasses or legumes on highly erodible areas. Estimated Reference Cost = $415 per acre*

4. Fence (NRCS code 382): *A constructed barrier to livestock, wildlife or people to facilitate the implemention of conservation practices. Estimated Reference Cost = $1 per foot*

5. Field Borders and Filter Strips (NRCS code 386 and 393): *Strips of grasses planted around fields and along drainage ways and other water bodies to reduce sediment, organic materials and chemicals carried in runoff. Estimated Reference Cost = $0.10 per foot for Field Borders and $210 per acre for Filter Strips*

6. Grassed Waterways (NRCS code 422): *A channel, shaped or graded to required dimensions and established in suitable vegetation to convey runoff from terraces, diversion or other water concentration. Estimated Reference Cost = $1 per foot*

7. Heavy Use Area Protection (NRCS code 561): *Protecting areas by establishing vegetative cover. Estimated Reference Cost =$1 per acre*

8. Riparian Forest Buffer (NRCS code 391): *An area of trees, shrubs and other vegetation located adjacent to watercourses or water bodies. Estimated Reference Cost = $1 per acre*

9. Roof Runoff Management (NRCS code 558): *A facility for collecting, controlling and disposing of roof runoff water. Estimated Reference Cost =$75 each*

10. Sediment Basin (NRCS code 350): *A basin to collect and store debris or sediment (sand trap). Estimated Reference Cost = $4,100 for each basin*

11. Streambank and Shoreline Protection (NRCS code 580): *Use of vegetation or structures to stabilize and protect banks or streams and lakes against scouring and erosion. Estimated Reference Cost =$4,100/acre*

12. Watering Facility (NRCS code 614): *A trough or tank with needed devices for water control and waste disposal installed to provide drinking water for livestock. Estimated Reference Cost = $780 for each*

13. Waste Storage Facility (NRCS code 313): *An impoundment to temporarily store manure, wastewater and contaminated runoff. Estimated Reference Cost = $90,000 for each facility*

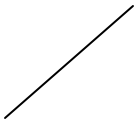
Incentive Payment BMPs

14. Residue Management or Conservation Tillage Practices (NRCS code 329A,B,C) : *A system designed to manage the amount, orientation and distribution of crop and other plant residues on the soil surface year round (such as No-till, Strip-till, Ridge-till and Mulch-till systems). Incentive payment =$10 - 15 per acre, 100 acre limit, 2-3 years.*

Have you adopted this BMP on your farm?

[ ] YES → **If YES, in which year? _____ If stopped, in what year_____?**
Total Incentive Payment received for this BMP $_____ per acre

[ ] NO → **If NO, would you adopt this BMP on your farm?**



[ ] YES
[ ] NO
[ ] Not suitable for my farm

If YES, what is the minimum additional incentive payment you need to receive to adopt this BMP?

[ ] 20% [ ] 40% [ ] 60% [ ] 80% [ ] 100%

15. Nutrient Management: *Management of the amount, form, placement and timing of application of plant nutrients (fertilizers) for optimum forage and crop yields. Also includes soil samples and comprehensive nutrient management plans. Incentive payment =$5 per acre, 50-100 acre limit, 1-2 years.*

16. Pest Management (NRCS code 595): *A pest control program consistent with crop production goals and environmental standards. Incentive payment = $5 per acre, 50-100 acre limit, 1- 2 years.*

17. Prescribed Grazing (NRCS code 528A): *Controlled harvest of vegetation with grazing animals. Incentive payment =$5 per acre, 50-100 acre limit, 1-2 years.*

18. Waste Utilization: *Use of agricultural wastes on land in an environmentally acceptable manner to fertilize crops and to improve/ maintain soils. Incentive payment =$10 per acre, 100 acre limit, 2-3 years.*