



Journal  
Of  
Extension

December 2008  
Volume 46 Number 6  
Article Number 6FEA3

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# Layered Community Support for Sustainable Dairy Farming

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**Abstract:** Environmental, community, and economic sustainability of dairy production has important support layers based on production system characteristics, farm size, locational variables, age, and grazing system amenities. Advanced pollution control technology is key to the sustainability of especially large confinement dairies. Grazing dairies are positively viewed, and nearly 70% of respondents are willing to pay a \$0.50 premium for milk from grazed cows. Study findings, based on analysis of 600 telephone survey responses from 28 Pennsylvania counties, indicate strong support for dairy farm sustainability, especially when compared with industrial development, which points to critical opportunities for future Extension education programming.

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## Introduction

Farm and community cooperation is an integral part of sustainable management decisions. Understanding the diversity of opinions about dairy industry growth within a particular area can encourage farm and community cooperation; improve local quality of life, including environmental amenities; and increase long term profitability of dairy farming (Hanson, 2000; Hanson, Parsons, Chess, & Balliet, 2002).

Earlier dairy sustainability surveys in the Northeast and Pennsylvania focused on characteristics associated with confinement versus intensive grazing management practices, farmer attitudes, farm growth, and location characteristics (Parsons, Luloff, & Hanson, 2004; Hanson, Cunningham, Morehart, & Parsons, 1998), and

the profitability of alternative feeding and grazing intensity systems (Parker, Muller, Fales, & McSweeney, 1993; Winsten, Parsons, & Hanson, 1999; Winsten, Parsons, & Hanson, 2000; Rotz, & Rodgers, 1994).

Relatively few surveys have focused on providing a better understanding of community attitudes toward the sustainability of a changing dairy industry. This is peculiar in that while the total numbers of dairy farms and dairy cows continue to decrease, there is a distinct trend toward larger farms, more cows per farm, and an accompanying greater reliance on mechanized, confinement feeding operations (Hallberg, 1993; Olsen, 2000; Parsons, Luloff, & Hanson, 2004). Attitudes of the local community regarding these trends are not well documented. Opportunities to enhance sustainability educational programming activities associated with dairy farming have increased (Parsons, Hanson, Luloff, & Winsten, 1998; Parsons, Luloff, & Hanson, 2004).

The study reported here had three primary objectives. First, it was undertaken to improve baseline understanding of public opinion in Pennsylvania about dairy industry sustainability. Second, the study was designed to determine if there were layered or textured respondent differences in opinion about dairy sustainability. Layered or textured differences refer to the differences with respect to income, level of education, gender, and other respondent sociodemographic characteristics. The final objective was to identify problem areas related to dairy sustainability that might provide future directions for planning needs and activities of local and state Cooperative Extension personnel.

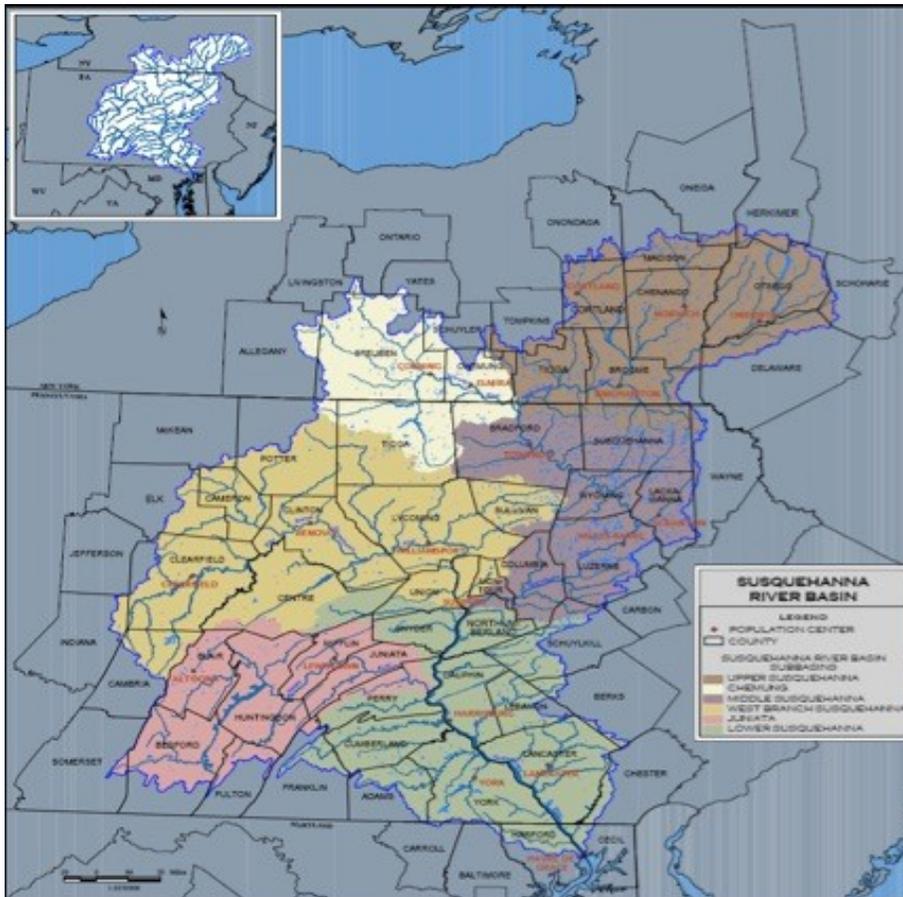
## Materials and Methods

Development of the survey instrument began with the conduct and analysis of four focus groups held in the Pennsylvania portion of the Susquehanna Watershed. Generally, focus groups are small in size, consisting of seven to 12 participants, who share an interest in the topic to be discussed. The group's moderator plays a critical role in creating an environment that enables all attendees to actively participate in the discussion (cf. Calder, 1977; Krueger, 1988; Templeton, 1994).

In our study, average focus group participation consisted of individuals representing conservation district managers, farmland trust program personnel, agricultural industry representatives, township supervisors, bankers, farmers, chairpersons of zoning hearing boards, Extension agents, economic development agents, and county commissioners. The average number of participants per focus group was 11 people.

We employed these focus groups to ensure that the survey questions used reflected and were responsive to issues voiced by community members. Because Pennsylvania is characterized by regional differences in population growth, development pressure, size of dairy herds, and environmental problems associated with dairy farming, the resultant 17-minute telephone survey was designed to specifically relate to characteristics of three regions: Northeast PA (Tioga, Bradford, Susquehanna, Sullivan, Wyoming, Lackawanna, Luzerne, Montour, and Northumberland Counties); Central PA (Potter, Clinton, Lycoming, Union, Snyder, Centre, Clearfield, Mifflin, Huntingdon, Blair, and Bedford); and Southeast PA (Juniata, Perry, Cumberland, Dauphin, Adams, York, Lebanon, and Lancaster) (Figure 1).

**Figure 1.**  
Map of the Study Region



The study counties had experienced both substantial population growth (reflecting a long-term trend of continued exurbanization) and population loss (reflecting the continued decline of traditional mining and manufacturing activities). The survey was also designed to assess differences associated with attitudes toward small versus fewer, large dairy farms. The northern counties of the study region are primarily rural and are predominantly characterized by stagnant population and economic conditions. Stagnant population and economic conditions refer to a very low population growth, relatively low wages, and few employment opportunities. In the Central and Northeast study regions, as well as in the more populous Southeast, knowledgeable focus group members reported that manure-handling from farming activities was becoming an important local issue.

The Southeastern study area contains some of the most heavily populated and fastest growing counties in Pennsylvania. Lancaster County, for instance, grew by 47,000 people between 1990 and 2000. This region also contains a high concentration of large-scale dairy farms and other livestock operations. Not surprisingly, because of the area's proximity to the Chesapeake Bay, dairy farming and other agricultural activities in Lancaster County became an important part of the debate over how to maintain an interlinked sustainable economy and environment (The Brookings Institution Center, 2003).

The telephone survey was developed to address a wide range of local community perspectives about sustainability issues. Given the inability of academicians to agree on a definition of sustainability (Hanson, 2000), we chose to elicit respondent opinions about issues related to sustainability as opposed to forcing respondents to use definitions or categories that we supplied.

A telephone survey was conducted in 2002. The study was designed to be representative of all households and occupations in the study region. Of the 5,428 telephone numbers identified for potential use, 4,029 were actually dialed. The 4,029 numbers included what are referred to as "live numbers" (no answer, phone busy, respondent not available, scheduled callback, answering machine, or incomplete callback); "dead numbers" (disconnected phone, business/government, initial refusal, computer tone, language problems, incomplete do not callback, or privacy manager); and completed interviews. The overall success rate (completed surveys divided by number of unique numbers dialed or 600/4,029) was 14.9%.

When adjustments are made for initial refusals (1,751), disconnected phones (399), computer tones (175), language problems (26), incomplete do not call backs (25), and privacy manager (25), a response rate of 18% was achieved (cf. Gripp, Luloff, & Yonkers, 1994; Groves, & Lyberg, 1988). Results of the study are based on 600 responses from 28 Pennsylvania counties. Because the survey was pre-tested, the relatively high proportion of respondents with less than a high school education, as well as the high proportion of female respondents, was not viewed as a problem.

## Results and Discussion

As shown below in Table 1, about 63% of all respondents were female, and 37% were male. The respondents' self-identified political scores indicated that they were roughly equally conservatives (43%) and moderates (42%); only 15% indicated they were liberals. Educational attainment among these respondents reflected state averages, with 45% with a high school education or less, about one in five (22%) having some college, a roughly equal number completing college (23%), and 11% with graduate training. Slightly more than half of the respondents reported household incomes between \$25,000 and \$75,000, with about one in 10 reporting more than \$100,000 and one in eight less than \$25,000.

**Table 1.**  
General Characteristics and Demographics of the Survey Respondents

<b>Gender</b>	<b>Frequency</b>	<b>Percent</b>
Male	223	37.2
Female	377	62.8
Total	600	100.0
<b>General Political Persuasion</b>		
Conservative	257	42.8
Liberal	88	14.7
Moderate	255	42.5
Total	600	100.0
<b>Educational Attainment</b>		
Not completed high school	39	6.5
High school	230	38.3
Some college	131	21.8

Completed college	135	22.5
Graduate training	65	10.8
Total	600	100.0
<b>Annual Income (\$)</b>		
Less than 25000	74	12.3
25001 to 49999	188	31.3
50000 to 74999	126	21.0
75000 to 99999	49	8.2
More than 100000	55	9.2
Refused	108	18.0
Total	600	100.0

## Attitudes Toward Dairy Farming

Generally, most respondents, regardless of age, gender, income, or educational attainment, found dairy farming to be a positive externality. Most enjoyed seeing cows along fence rows, the smell of freshly mowed fields, and landscapes with growing crops and generally felt positive about preserving open spaces in farmland (Table 2). These views have a mean score of more than 4 on a scale of 1 to 5, indicating strong agreement with each of the above statements. Also, respondents agreed that dairy farming and its profitability were important to the local economy.

Consistent with the general trend of declining employment in agriculture, respondents agreed that dairy farms did not create many jobs in their community. From this one can posit that although it is recognized that the role of dairy farming for local employment is likely to decline in the future, dairying will remain viewed as an importantly viewed activity with a positive externality for most Pennsylvania communities.

Dairy sustainability was viewed as important despite the fact that roughly 48% indicated that small dairy farms were not profitable, while only 28% thought small dairy farms were profitable (24% were uncertain).

**Table 2.**  
Average Scores Characterizing Attitudes Toward Dairy Farming

Attitude Category	Mean Score	Standard Deviation
Dairy farming is important to the local economy	4.40	0.73568513
Dairy farms do not create many jobs in my community	3.07	1.10040085
I enjoy seeing cows along fence rows	4.23	0.66621924
	2.22	1.04086775

Dairy farms do not improve the quality of life in my area		
I enjoy a landscape that has crops growing in the fields	4.28	0.72563176
Dairy farms are not important to our cultural heritage	1.74	0.83432051
It is not important to have profitable dairy farms	1.93	0.974688
It is important to preserve open spaces in farmland	4.27	0.75861038
I enjoy the smell of freshly mowed fields	4.08	0.86625991
Dairy farms strengthen our community's work ethic	3.93	0.86358179
Small dairy farms are often not profitable	3.22	1.01323463
I want Federal tax dollars to help support dairy farmers	3.76	0.93336712
Tax dollars should not help dairy farmers buy technology to reduce pollution	2.27	0.94045153
Score ranged from 1 (Strongly Disagree) to 5 (Strongly Agree)		

Survey results (not shown) also indicated that these residents felt pollution from dairy farming was an important issue. Further, there was some agreement that tax dollars should be provided to help dairy farmers buy technology to reduce pollution.

## Attitudes Toward Dairy Farming versus Other Types of Land Uses

Most respondents were not supportive of mixed residential/dairy development, especially developments with either small or large farms located next to housing developments, or the location of housing developments adjacent to small and large farms (Table 3). Each of these categories, on average, scored less than 3 points on a scale of 1-5).

Respondents clearly preferred having forestland, meadows, and pastures in their neighborhood. Unfarmed and farmed open fields between clusters of homes were preferred to housing developments among, or next to, small and large farms. This suggests that satisfaction with dairy farming dropped significantly as the concentration of dairy farms per unit of area reached some critical value or tipping point.

**Table 3.**  
Desirability of Various Types of Landscape

Desirability Score Category	Mean Score	Standard Deviation
Housing developments among small and large farms	2.56	1.149755
Housing developments next to small farms	2.54	1.08001525

Housing developments next to large farms	2.48	1.08096162
Towns surrounded by agricultural land	3.92	0.83552189
Towns surrounded by forest land	3.98	0.83227702
Towns surrounded by meadows and pastures	4.02	0.81155916
Farmed open fields between clusters of housing	3.41	1.09126011
Unfarmed open fields between clusters of housing	3.25	1.08022005
Score ranged from 1 (Very Undesirable) to 5 (Very Desirable)		

Preferences pertaining to landscape and other types of developments were further explored with a series of questions, shown in Table 4, regarding the most attractive type of future growth. Surprisingly, when asked about future residential growth, most respondents indicated preference for more dairy farms or a combination of dairy farms and residential development, 35% and 36%, respectively. This cumulative total (71%) suggested that the presence of local community dairy farms could be sustainable, regardless of whether the farm was perceived to be a direct neighbor.

**Table 4.**  
Desirability of Future Growth of Various Types of Developments

Desirability Category	Frequency	Percent
More dairy farms	211	35.2
More residential development	14	2.3
More commercial development	19	3.2
A combination of dairy farms and residential development	216	36.0
A combination of residential and commercial development	40	6.7
A combination of dairy farms and commercial development	53	8.8
Other	47	7.8
Total	600	100.0

Moreover, when asked if tax dollars should be used to preserve farmland, 86% agreed or strongly agreed with this statement (results not shown). Over 75% of respondents also supported spending tax dollars to preserve wildlife habitat and open space. About 61% of all respondents answered that their community would welcome as a neighbor a large, new dairy farm with 500 or more cows that used advanced technology to minimize manure runoff and animal odors. On the other hand, when the concentration of farms became too large, pollution and other factors emerged as issues. To investigate this further, the survey included a set of questions, shown in Table 5, about the use of zoning laws.

**Table 5.**  
Zoning Laws and Restriction of Pollution and Other Negative Externalities

<b>Score Category</b>	<b>Percent Agreed, Strongly Agreed</b>	<b>Percent Disagreed, Strongly Disagreed</b>	<b>Mean Score</b>	<b>Standard Deviation</b>
Zoning laws should restrict the location of farms that smell bad	52	32	3.21	1.18387891
Zoning laws should restrict the location of factories that smell bad	86	7	4.07	0.85976016
Zoning laws should restrict the location of farms that pollute	85	7	4.04	0.86846534
Zoning laws should restrict the location of factories that pollute	92	4.5	4.27	0.82447265
Zoning laws should restrict the location of small dairy farms	24	64	2.46	1.10931579
Zoning laws should restrict the location of contract farming where milk cows are owned by big corporations	57	24.5	3.41	1.10796052
Score ranged from 1 (Very Undesirable) to 5 (Very Desirable)				

These respondents were concerned about the location of factories and farms that polluted (Table 5). However, farms that smelled bad were more attractive than factories that smelled bad. Even though housing developments next to small farms was not very popular (with mean desirability score of 2.5), 64% of respondents did not agree that zoning laws should restrict the location of small dairy farms.

The latter somewhat surprising result probably reflects the generally good reputation small, local dairy farmers maintain with their neighbors and a general appreciation for their long hours of work. Because 57% of all respondents agreed or strongly agreed that zoning laws should restrict the location of contract farming where cows are owned by big corporations, clearly bigger operations did not share the same level of positive support as small farmers.

Additionally, the survey asked about various problems that sometimes affected communities, including pollution of streams and wells from various sources, traffic jams, odors, loss of wildlife, loss of wetlands, loss of scenic vistas, and noise (results not shown). Participants indicated that among these problems, wells and streams polluted by commercial development were the most serious problems, both obtaining a score of

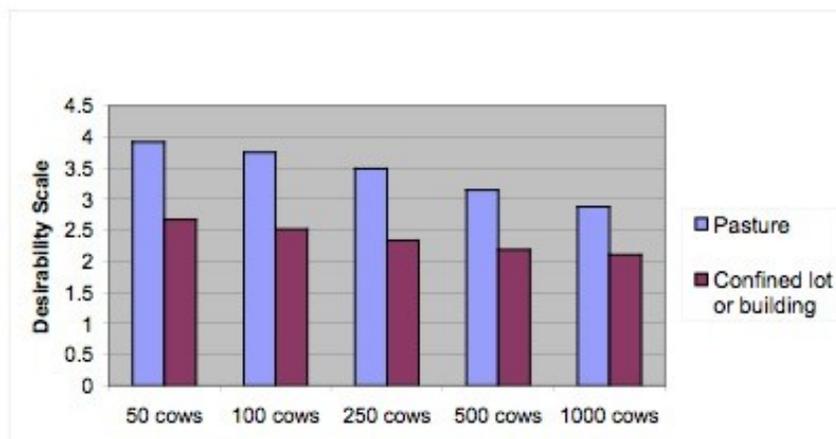
2.9 on a scale that ranged from 1 (not serious at all) to 4 (very serious). This concern was followed by loss of wildlife habitat from housing development (2.8) and loss of wildlife habitat from commercial development (2.7).

## Attitudes Toward Size and Farm Type

Cows can be fed in confined feedlots and buildings or be grazed on pastures. To explore attitudes toward farm type and farm size, the survey asked respondents to indicate which farm types they would like or dislike to have as neighbors using a scale of 5 (strongly like as neighbor) to 1 (strongly dislike as neighbor). The results, shown in Figure 2, indicate that for each size category, pasture farms were viewed as a more desirable neighbor than confined feedlots.

Desirability declined with larger farm sizes. Further, once farm size reached 250 cows, desirability declined faster with each additional cow for pasture farms than for confined feedlots. However, a pasture farm with 1,000 cows was still a slightly more desirable neighbor than a confined feedlot with 50 cows.

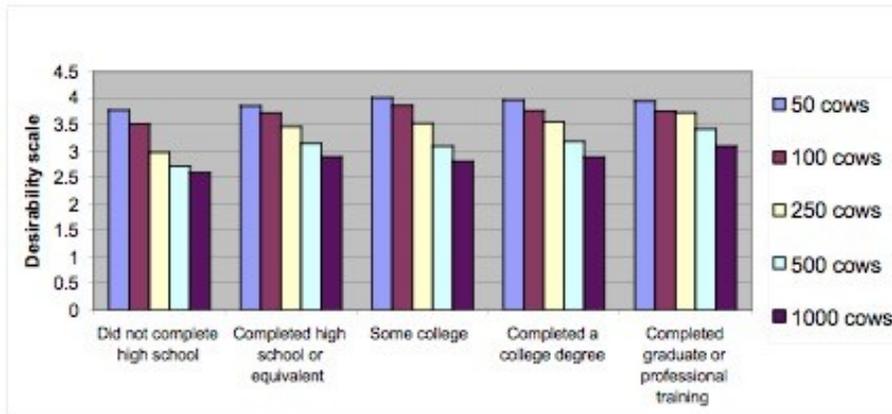
**Figure 2.**  
Attitudes Toward Farm Type and Size



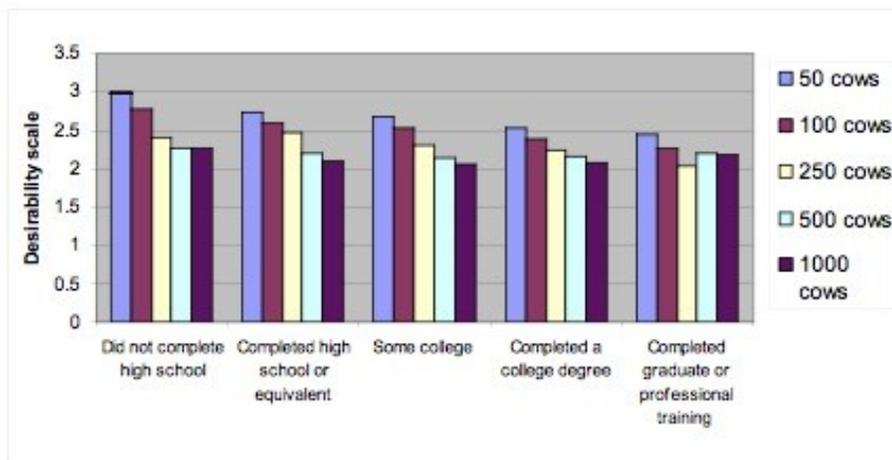
Within each education level, the attitude toward pasture dairy farms was less positive as number of cows increased; i.e., a 50-cow grazing farm was always viewed more positively than a 100-cow grazing farm, and a 100-cow grazing farm was always viewed more positively than a 250-cow grazing farm (Figure 3). With the exception of those with graduate training, the above statement also characterized attitudes toward confinement farms (Figure 4). Respondents with graduate training held a slightly less favorable view of smaller size of confinement farm than those who did not complete high school.

Attitudes characterizing confinement farms were more negative, as education level increased, than attitudes about pasture farms. The standard deviation was between 0.9 and 1.1 for the means presented in Figures 2,3 and 4. Therefore, the degree of separation for various educational groups should be treated with caution. There were no significant differences in these attitudes by gender. Thus, individual characteristics had some influence on attitudes toward size and type of farm, while pasture and small farms were generally preferred over confinement and large farms as neighbors.

**Figure 3.**  
Attitudes Toward Pasture Dairy Farms by Education Level



**Figure 4.**  
Attitudes Toward Confined Dairy Farms by Education Level



### Attitudes Toward Organic Farming and Organic Milk

Respondents were asked two separate questions. One stated that currently only farms with high quality soils can participate in the Agricultural Land Preservation Program. Then respondents were asked if they would favor expending agricultural preservation to include farms with poor quality soils that practice grazing or organic farming. In the second question respondents were asked how much more per gallon, zero, \$0.50 or \$1.00, would they be willing to pay for milk from cows grazed on pasture versus milk from cows fed in a confined lot or building.

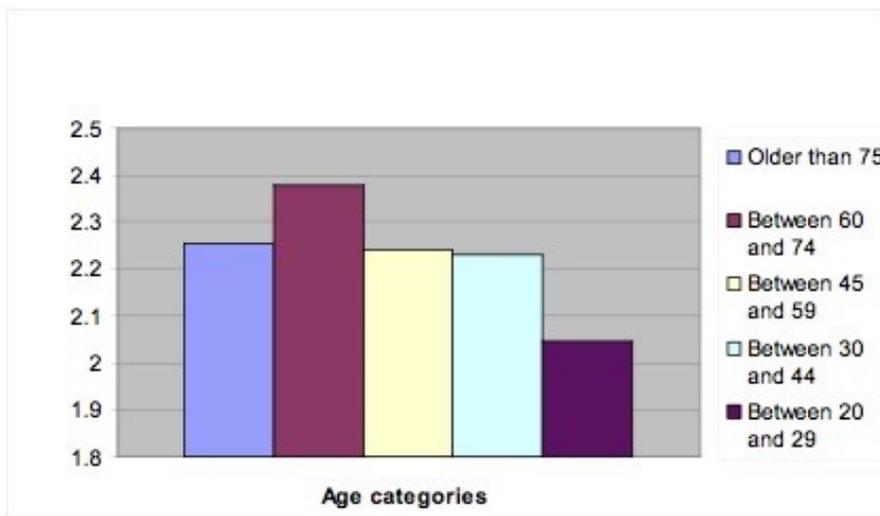
As shown in Table 6, about 80% of respondents supported extending agricultural preservation policies to include farms with poor quality soils that practiced grazing or organic farming. About 69% of respondents would also be willing to pay at least \$.50 more per gallon for milk from cows grazed on pasture.

**Table 6.**  
Attitudes Toward Organic Farming and Organic Milk

<b>Extending agricultural preservation to include farms with poor quality soils that practice grazing or organic farming.</b>		
Type of farm	Yes, %	No, %
Grazing	82	18
Organic farming	79	21
<b>How much more per gallon would you be willing to pay for milk from cows grazed on pasture</b>		
Zero	18%	
\$0.50/gallon	51.5%	
\$1.00/gallon	17.8%	
Refused to answer	12.7%	

These results did not significantly vary by educational attainment or income level. Survey results did show that respondents in their 60s and early 70s would be willing to pay the most for milk from cows grazed on pasture, and those between 20 and 29 years of age would be willing to pay the least for milk from pastured cows (Figure 5). Note that a score of 3.0 indicates a willingness to pay \$1 more per gallon, and a score of 1 indicates a willingness to pay zero dollars more per gallon in Figure 5. This finding suggests that a pasture milk marketing strategy targeting the 60-74 age groups may have more success than targeted marketing of pasture milk for 20-year-olds.

**Figure 5.**  
Willingness to Pay for Milk from Pasture Fed Cows Versus Confinement



## Implications for Cooperative Extension

This analysis can help Extension specialists, policy makers, and agribusinesses more fully understand the different attitudinal textures and layers of community support for dairying. In turn, this will help Extensionists better design and tailor future dairy sustainability education activities so that such programs more fully benefit farmers and local community residents. The following key findings can be useful to designing educational programs that would enhance dairy/community sustainability in Pennsylvania and similar states:

1. *There was overwhelming support for dairy farm sustainability in the study region.* Gender, age, income, and self-imposed political rating did not alter this outcome, particularly with respect to smaller dairy farms that utilized grazing. However, respondents with graduate training were more negative toward confinement dairies than those who did not complete high school.
2. *Dairy farming was seen as being highly important to local economies.* This finding, among the strongest in the study, was linked to the positive impact of dairying on employment needs of local dairy farms and the perceived benefit of dairying to the community work ethic. At the same time, low profits were recognized as a compelling issue mediating against small dairy farm survival.
3. *Vistas of cows grazing, crops growing, farm land, and freshly mowed fields were highly valued.* Such core visual values associated with the green and open spaces of productive dairy agriculture cannot be underestimated in the Susquehanna watershed region.
4. *Dairy farm amenities were particularly valued near housing developments.* A surprising 71% of respondents wanted to see more dairy farms and intermixed dairy farms with residential developments as a key to sustainable growth.
5. *The key to large dairy sustainability was advanced pollution control technology.* Three of five respondents would welcome a 500-cow dairy in their community if manure runoff and odors were well controlled.
6. *Zoning to restrict factories that polluted was far more critical to sustainability than zoning of dairy farms.* In fact, respondents were not notably concerned about the location of small dairy farms, but were much more sensitive to the location of corporate/contract dairy operations.
7. *Grazing dairies were far more positively viewed than large confinement farms.* Indeed, a 1,000-cow pasture farm was viewed to be a more desirable neighbor than a 50-cow confinement operation.
8. *Agricultural land preservation policies for poor quality soil farms practicing grazing or organic farming was supported by four of five respondents.* This is a key policy finding for the future evolution of land preservation activities in the study region.

9. Nearly 70% of respondents were willing to pay a \$0.50 premium for milk from grazed cows. This indicated that unique marketing opportunities existed for groups of grazing producers to address the perceived poor profitability of especially small dairy farms. In particular, targeting people 60-74 years of age rather than those 20-29-year-olds would make sense because this segment of the population was most receptive to paying the premium. Such differentiated milk product marketing may work particularly well in residential communities in rapidly growing areas such as those in Lancaster County, Pennsylvania.

The financial risks associated with farm modernization and/or expansion plans are large. Sustainability issues may suggest farmers more seriously consider the alternative of grazing production techniques, or state-of-the-art pollution controls to better enlist community support and acceptance. Producers mindful of the aesthetic value of visible grazing may be better credit candidates for community banks and at the same time enlist support for land preservation program subsidies.

Extension educators who use the finding that survey respondents in Pennsylvania were more concerned about commercial development influences (such as stream pollution and loss of wildlife habitat) than about similar effects caused by farm development may be better able to enlist fiscal support for county-based agricultural education programming to promote "the lesser of two evils." Finally, Extension outreach and community development programming will be more successful as the multiple and varied sustainability attitude "textures" are shared with both dairy producers and their residential neighbors.

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