THE CENTER FOR
Rural Pennsylvania
A Legislative Agency of the Pennsylvania General Assembly

Building on Our Strengths: Workforce Development for the Pennsylvania Dairy Industry

August 2004

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A report by
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This project was sponsored by a grant from the Center for Rural Pennsylvania, a legislative agency of the Pennsylvania General Assembly.

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I. Introduction

The dairy industry is a major employer in Pennsylvania's rural communities providing nearly 45,000 jobs to people in rural communities from both on-farm and service and supply sectors (Shields & Hyde, 2002). Processing of milk and dairy products further multiplies the total number of jobs within the overall dairy industry. Dairy represents nearly 40 percent of the state's agricultural revenue (NASS, 2001). Using the Community Impact Model – Penn State University (CIM-PSU), Shields and Hyde demonstrated that the impact of the dairy industry on the state economy in 1997 was nearly $950 billion when accounting for additional business activities that are supported by dairy farms (Shields & Hyde, 2002).

I-A. Project Need

The dairy industry is facing a shortage of qualified employees at all levels. For entry-level jobs, many dairy producers with farms of varying sizes are turning to migrant workers. While this is a solution for some, it is also fraught with risks related to immigration law, community acceptance, and the daily challenges associated with communication and cultural barriers. Research into the effects of increasing migrant labor use in dairy is certainly warranted, but it is beyond the scope of this project. The increasing presence of migrant workers on dairy farms may be viewed as an indication of a lack of available local labor.

For middle management level jobs the shortage of qualified candidates is especially severe. Graduates of institutions, such as Penn State and Delaware Valley College, with training in dairy management can immediately find good paying positions, but there are simply too few graduates to meet the demand, and dairy farm employers must directly compete for these individuals with other agribusiness companies, such as feed and pharmaceutical companies. Shields and Hyde estimate that there are about 14,598 non-family dairy employees in the state. In a typical dairy farm organization there will be at least one manager for every group of five employees, in other words, approximately 20 percent of the total workforce will be in managerial positions. If 20 percent of the 14,598 non-family dairy positions are management, then there are 2,992 *non-family* dairy management positions in the state. If managers working in their family owned farms are included, the number of dairy management positions is much higher.

The shortage of qualified dairy managers is exacerbated in Pennsylvania by the lack of any formal one- or two-year dairy educational opportunities. Other major dairy states such as New York and Wisconsin have technical dairy education programs available within the respective state that provide training to prepare dairy middle managers.

A career in the dairy industry, especially at the farm level, may not often be presented as an option to young people due to perceptions of "low pay and long hours." Research in New York (Fogleman et al., 1999) found that total compensation (wages plus benefits) of entry-level dairy positions were $25,143 and middle management dairy positions were $34,469 in 1998. Some anecdotal information about wages and total compensation for dairy jobs exists in Pennsylvania, but no formal data are available to help in recruiting applicants for dairy positions. Likewise the "awareness" of dairy industry opportunities among employment counselors and secondary education advisors is unknown.

The solution to the shortage of highly skilled dairy workers is twofold. First, ensure that educational programs available to the current and future dairy workforce are focused on competencies that are relevant for contemporary dairy jobs. Second, ensure that career service professionals and organizations such as local Workforce Investment Boards, secondary guidance counselors, and technical education providers are aware of the opportunities available for careers in the dairy industry.

I-B. Goals and Objectives

The first goal of this research project was to develop a comprehensive set of job competencies that are necessary for dairy production technicians, middle managers, and senior managers to be successful, and to assess the proficiency of the current workforce in these competencies in order to prioritize training needs.

Objectives:

- To develop comprehensive sets of job competencies for dairy production technicians, middle managers, and senior managers that are useful for developing and updating dairy education curricula
- To assess the current workforce for level of proficiency in each of the competencies in order to prioritize training needs

The second goal was to better understand the types of jobs performed on dairy farms, the relevant compensation rates, and future employment opportunities.

Objectives:

- To outline the jobs performed on dairy farms such that a general job description of each can be formed
- To assess the current compensation rates paid by type of position. Compensation includes all salary and wages in addition to other payments such as food and lodging
- To estimate the number of these positions expected to be open in the next ten years

The third goal was to assess the current knowledge of career counselors, job placement agencies, and economic development organizations about dairy job opportunities.

Objectives:

- To assess the current dairy industry knowledge of advisors who influence the career path of potential employees such as CareerLink Staff, secondary guidance counselors, and secondary agricultural teachers
- To assess the current dairy industry knowledge of economic development professionals

II. Research Methods and Results

II-A. Goal 1 Information

Goal 1*:* **The first goal of this research project was to develop a comprehensive set of job competencies that are necessary for dairy production technicians, middle managers, and senior managers to be successful, and to assess the proficiency of the current workforce in these competencies in order to prioritize training needs.**

II-A-1. *Research Methods*

To identify the job competencies of middle and senior dairy managers, focus groups consisting of some of the state's most successful dairy managers were convened. Focus group participants were selected by six local industry leaders with exceptional knowledge of the dairy workforce who nominated managers for the focus groups. These nominators represented many different segments of the dairy industry such as Extension educators, bankers, private consultants, feed industry consultants, pharmaceutical industry representatives, and veterinarians. Members of the focus groups participated in a structured process designed to identify job competencies that lead to success as senior or middle-level

dairy managers. Focus groups were conducted by a trained facilitator and participants entered data directly into a specialized computer software package.

The investigators also studied the competencies that are required for dairy production technicians (milkers, feeders, machine operators) to be successful. Focus groups of expert production technicians could not be assembled so an alternative technique was used. Six Penn State dairy educators and two dairy producers formed an expert panel. Each panel member had detailed knowledge of work activities required for dairy production. The panel created a list of competency areas and specific tasks that production technicians carry out in their daily operations. This list was then submitted to people who had previously participated in senior and middle manager focus groups for verification. Competency areas identified for production technicians were: feeding, animal health, reproduction, milking, barn and facilities maintenance, young stock raising, and basic work skills.

II-A-2. *Competency Gap Analysis*

The competency profiles of production technicians and senior and middle managers represent the ideal set of competencies that very successful people possess. Everyone working in these positions, of course, does not possess all of the competencies. It is necessary to ask a broader sample of people to rate their own ability in each of the competency areas to gain an understanding about strengths or weaknesses of the broader group in particular competency areas. Senior and middle managers from the Professional Dairy Managers of Pennsylvania (PDMP), an organization of dairy producers whose mission focuses on mutual education and promoting a favorable business climate for dairy, were asked to rate their production technicians and themselves in their respective competency areas.

PDMP defines themselves as a group of progressive dairy farmers and they do not necessarily represent the average dairy farm in Pennsylvania in terms of business characteristics, owner characteristics, nor in terms of the competency levels of their managers and employees. As industry leaders, PDMP members tend to be well above average along these dimensions. Thus the results of this competency gap analysis do not represent the average farms in Pennsylvania; it is likely that the state average will have a larger gap between the actual and the ideal. At the time of this research there were 86 member farms in PDMP, each farmer was sent a packet containing four surveys. The farmers were asked to complete one copy of the survey themselves and to distribute the other surveys to the other senior and middle managers in their organization. There were a total of 70 returned surveys. These returns came from 34 different farms. Therefore, the participation rate of the original 86 farms was 40 percent. Of the farms participating, 3 farms returned four surveys, 10 returned three surveys, 7 returned two surveys, and 14 returned one survey.

The respondents ranged from 23 to 68 years of age. Herd size ranged from 60 to 1,500 cows with an average of 535 cows (median of 520), this is significantly larger than average for all Pennsylvania dairy farms. The number of acres farmed ranged from 110 to 1900 with an average of 779.5 acres (median of 700).

All competencies were rated on this scale: 1 = very low, 2 = low, 3 = below average, 4 = average, 5 = above average, 6 = high, 7 = very high. Respondents could also opt out of answering a specific question by choosing 8 to represent not applicable.

II-A-2a. *Production Technician Competencies*

Production technician competencies were rated by both middle and senior managers. Figure 1-1 illustrates the percentage of production employees whose competencies were rated as average or lower by dairy managers. Special attention should be drawn to milking, barn and facilities maintenance, and basic work skills (i.e. communication, resolving conflict,

setting priorities, etc.) where one-fourth of more of production technicians were rated average or lower.

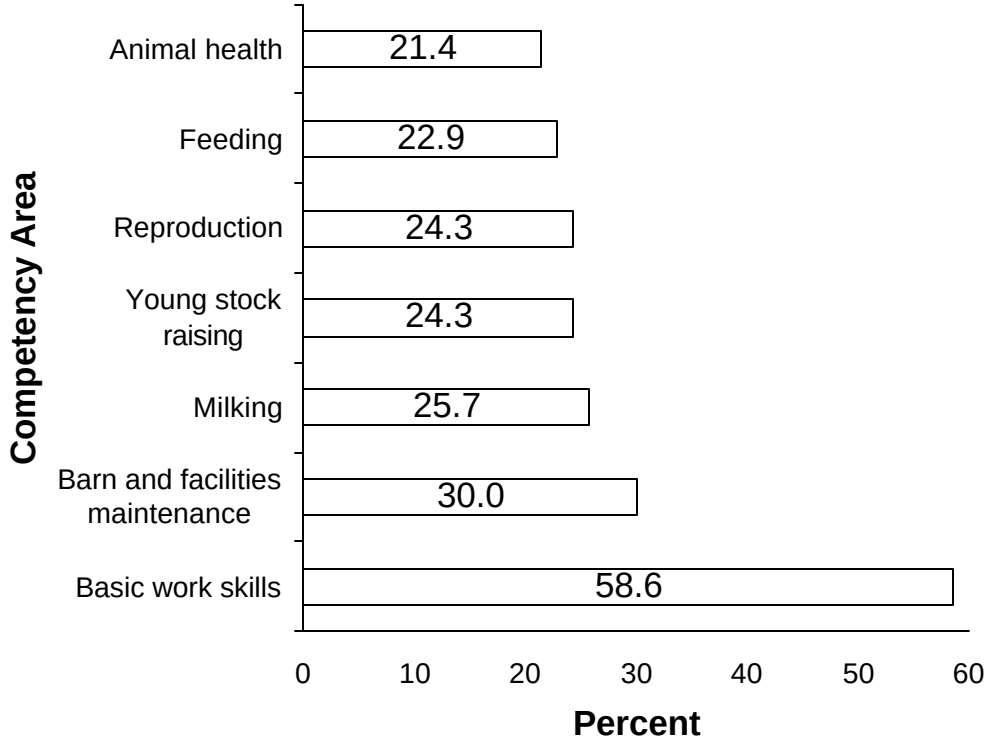

Figure 1-1. Percent of production technicians with competencies rated as average or lower (n = 70).

II-A-2b. *Competencies Specific to Middle Managers*

More than one-fourth of middle managers rated themselves as average or lower in most competency areas that are specific to them (Figure 1-2). This indicates that a great deal of development is

necessary to help middle managers feel more confident in their ability to perform at higher levels.

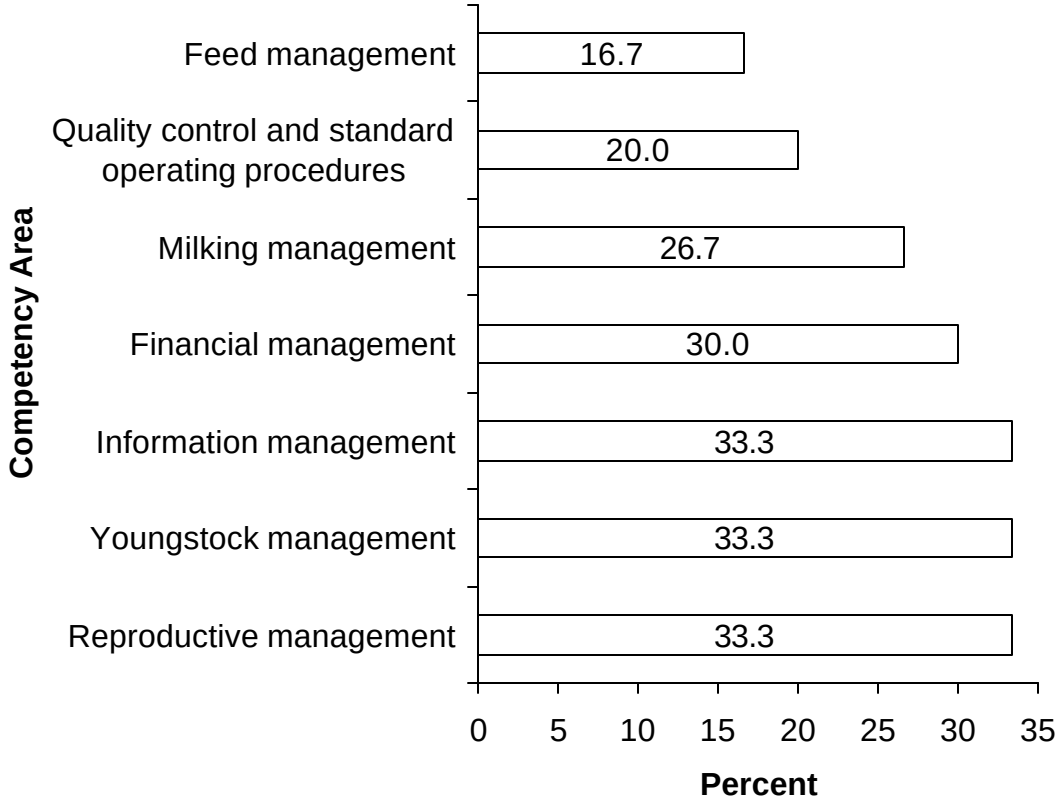

Figure 1-2. Percent of middle managers with competencies rated as average or lower (n = 30).

Milking, youngstock, and reproductive management skills are all traditional dairy production competencies in which educational opportunities have typically been available. In spite of this, these relatively poor competency self-assessments indicate that many middle managers still need development in these areas. Less surprising are middle managers' poor competency self-assessments in financial and information management. Although educational opportunities in business management are commonly available for farm owners, little attention has been paid to the needs of middle managers. In many cases these positions are responsible for the flow of large sums of money, yet they are largely unprepared to manage this aspect of their job. Information management relates to the integration of production information, technology, and decision-making processes. This is a critical competency area that requires attention.

II-A-2c. *Competencies Specific to Senior Managers*

Figure 1-3 indicates that senior managers who belong to PDMP rated themselves relatively strong in land management, defined as the ability to secure and control land for crops and nutrient management. They also were confident in their ability to manage growing crops, and in their ability to provide leadership to their businesses through strategic planning. Unfortunately, over 28 percent of senior managers felt that their competencies were average or lower when it came to financial planning. Nearly 33 percent also rated themselves poor in the critical area of purchasing, sales, and marketing.

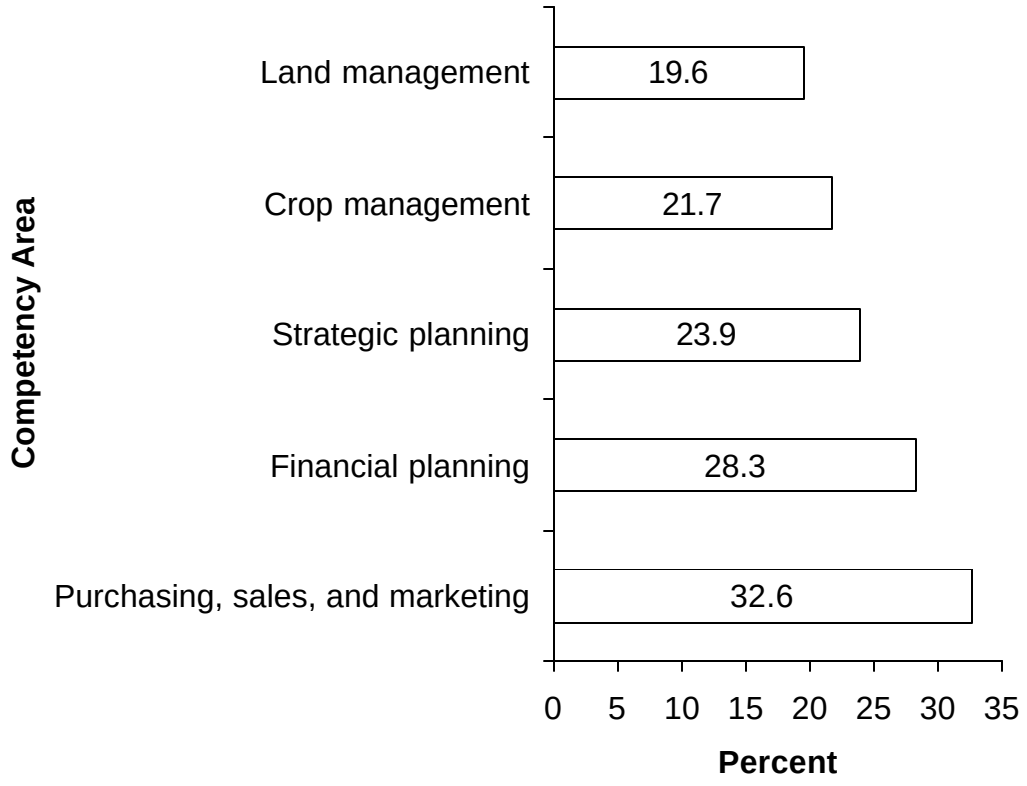

Figure 1-3. Percent of senior managers with competencies rated as average or lower (n = 46).

II-A-2d. *All Managers*

Some of the competency areas relate to both middle and senior managers. In only one of these areas did fewer than 25 percent of managers rate their own competency level as average or lower. Operations management, defined as scheduling and maintenance and facilities and equipment, and herd health management were somewhat challenging with 27 and 26 percent, respectively, of managers rating themselves poorly. Of more concern are manager's low competency in community service/public relations and human resource management. Over 35 percent rated their own competency as average or below in community service/public relations at a time when these abilities are dramatically increasing in importance. Nearly half of managers (44.3 percent) believe that their competency is average or below average in human resource management. This competency is important in the operation of most dairy businesses and it is critical to those that choose to expand.

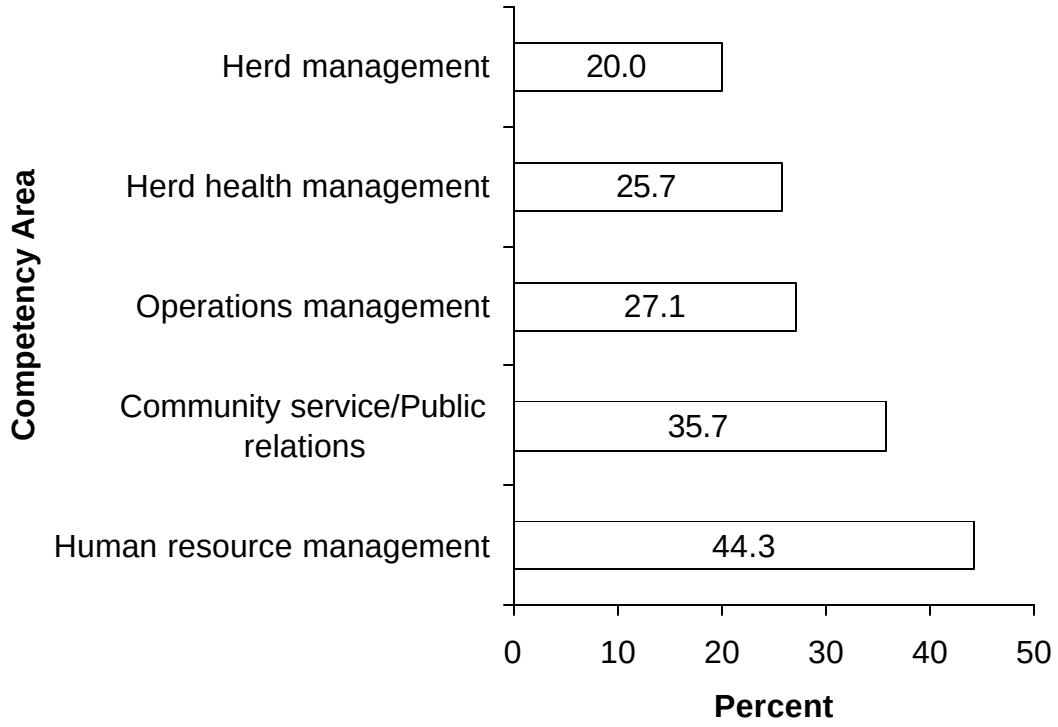

Figure 1-4. Percent of all managers with competencies rated as average or lower (n = 70).

II-B. Goal 2 Information:

Goal 2*:* The second goal was to better understand the types of jobs performed on dairy farms, the relevant compensation rates, and future employment opportunities.

II-B-1. *Research Methods*

A survey instrument was constructed during the summer and fall of 2003. Due to time constraints, we conducted a pre-test of the survey with only one dairy farmer. A small number of issues were raised and subsequently addressed before disseminating the surveys. The Survey Research Center at Penn State formatted and administered the survey over the months of September and October 2003. Returned surveys were scanned and the data electronically entered into a database, which was analyzed using SPSS.

Multiple mailings were sent to respondents in an attempt to increase response rates. The initial mailing, including the survey and a cover letter, was sent October 7th. This was followed 13 days later with a postcard reminder. Non-respondents were sent another copy of the survey on approximately November 3rd. The cut-off date for return of the surveys was December 23, 2003.

The sample was composed of farms from two separate lists. First, the Pennsylvania Department of Agriculture provided a listing of all dairies that ship milk in Pennsylvania that had a recorded herd size of 150 cows or more. The second list, from Dairy Business Communications, included producer subscribers to the Northeast Dairy Business publication who had herd size of 150 cows or greater. Duplicate entries were removed and the lists were merged, creating a list of 566 total dairy farms.

A total of 566 surveys were sent. Seven were undeliverable. Of the 132 surveys returned, 121 included valid data. Thus, the valid response rate was 23.6 percent (132/559). The low response rate can likely be attributed to several factors. The survey may have seemed prohibitively long to respondents upon first opening the envelope. Also, the timing of the

surveys was less than ideal, catching farmers just before or during harvest. We were unable to pre-test early because of the wet summer weather and the holidays and grant deadline in the fall/winter caused us to have a very small window for distributing the survey. Of the 121 useable surveys, 72 (59.5 percent) reported employing any workers during 2002.

II-B-2. *General Farm Characteristics*

In general, the farms we surveyed were significantly larger than the average dairy farm in Pennsylvania. It was necessary to select our sample in this fashion to target farms most likely to have hired farm labor. Figure 1 resents a summary of our survey farms relative to farms represented in the 1997 Census of Agriculture.

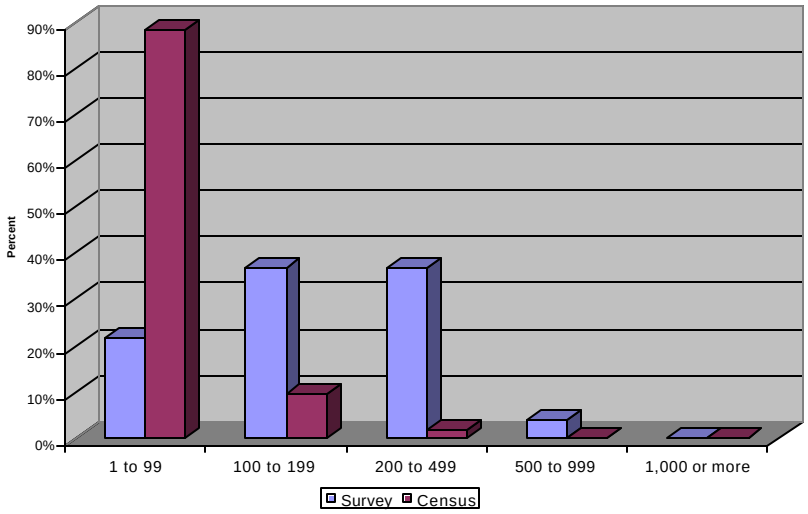

Figure 1. Distribution of farms by herd size - Survey farms versus 1997 census results

The mean milking herd size for all dairy farms in Pennsylvania in 1997 was 103. The mean milking herd size (not including dry cows or replacements) in our sample is 222 animals. The range of total dairy herd size in our sample was between 56 and 1,280 animals (including milking, dry, and replacement cows). The mean acreage operated in our sample is 596 acres (median of 500 acres), as compared to the 1997 Pennsylvania mean of 158 acres (median of 96 acres). The farms in our sample also tended to have higher farm receipts than is typical for Pennsylvania. As shown in Table 2-1, half our sample reported farm receipts between $250,000 and $750,000. About 20 percent of farms in our sample reported receipts over $1 million.

Table 2-1. Distribution of sample farms by level of total farm receipts

Total Farm Receipts	Percent of Farms
Under $100,000	0.00%
$100,000 to $249,999	16.44%
$250,000 to $499,999	31.51%
$500,000 to $749,999	20.55%
$750,000 to $999,999	10.96%
$1,000,000 to $1,999,999	12.23%
$2,000,000 to $2,449,999	6.85%
$3,000,000 or more	1.37%
Total	100.00%

Table 2-2. Number of farms with paid employees, by category

	Farms with at least one employee in 2002 (n=121)	Average employees per farm (among those with at least 1)
Herd managers & assistant herd managers	38 (31.4%)	1.45 (mean) 1.00 (median)
Calf managers	24 (19.8%)	1.04 1.00
Crop managers	20 (16.5%)	1.05 1.00
Heifer managers	11 (9.1%)	1.18 1.00
Milking managers	10 (8.3%)	1.00 1.00
Milkers	57 (47.1%)	2.88 3.00
Feeders	34 (28.1%)	1.09 1.00
Mechanics	18 (14.9%)	1.11 1.00
Machinery operators	31 (25.6%)	1.71 1.00

II-B-3. *Job Qualifications, Work Routines, Wages and Compensation Data*

During the process of survey development and pre-testing, nine general job titles to be used in the survey instrument were established. These are:

a. Herd manager and assistant herd manager
b. Calf manager
c. Crop manager
d. Heifer manager
e. Milking manager
f. Milker
g. Feeder
h. Mechanic
i. Machinery operator

For each job title, survey questions were related to the tasks performed on the farm, the amount of time worked each week and number of weeks worked each year, whether or not the position had supervisory responsibilities, the necessary qualifications, and the level and type of compensation and benefits offered for this position. Farmers were also asked whether or not they expected the number of employees with this job title to increase or decrease over the next five years on their farms.

A review of the raw data indicates that a small number of individuals are employed for less than 20 hours. Further investigation shows that including these positions presents a downward bias on the summary statistics related to hours worked and wages. This occurs because the individuals employed less than 20 hours are predominantly family members, potentially children or youth, who are not paid a market wage for their labor and management. Therefore, they are excluded from those analyses in the interest of providing a more accurate view of the opportunities available to potential employees. These positions are included in analyses of reported responsibilities and benefits offered by position.

The following sections report results by each of the nine positions identified. Each section contains position-specific results related to responsibilities; hours worked, expected qualifications, wages, benefits offered, and net growth of new positions. These sections are intended to provide a detailed report of results related to this particular goal. However, a concluding section provides a broader summary of the findings.

II-B-3a. *Herd manager and assistant herd manager*

The results show that the primary responsibilities associated with the title of "Herd Manager" center around reproduction and calf and heifer management, herd health, milking and production record keeping, and supervisory functions. Table 2-3 shows that there are several other tasks associated with this position, but these generalizations cover nine of the top 10 most reported responsibilities.

Table 2-4 indicates that the average herd manager works approximately 57 hours per week, with one or two weeks off each year. The results further show that these individuals report directly to either the farm manager or the farm owner. About half (52.6 percent) of the herd managers have supervisory responsibilities. The results indicate that these individuals supervise between one and six other people. The median number supervised is three. Note that where more than two herd managers were reported, we summarize only the responses for the first two reported. Given the low number of farms reporting more than two employees at any position, this has no effect on the conclusions that can be drawn from this research.

Table 2-3: Frequency of responses for each potential herd manager responsibility

Responsibility	Frequency
Heat detection	35
Monitor herd health	34
Keeping milk production records	27
Milking	26
Breeding	26
Pregnancy checks	23
Delegating work	21
Heifer management	18
Feeding	17
Training others	16
Facility management	16
Calf management	15
Scheduling	14
Operating machinery	13
Evaluating others work	12
Machinery repair and maintenance	10
Manure management & record keeping	9
Making employment & termination decisions	8
Silo management/forage testing	7
Purchasing seed and other crop related inputs	7
Formulating rations	6
Keeping crop production Records	6
Keeping financial records	6
Preparing financial statements	6
Purchasing equipment	5
Soil management	4
Chemical application	4

Table 2-4 - Summary of hours and weeks worked by herd managers

	First Listed Employee		Second Listed Employee	
	Hours per week	Weeks worked	Hours per week	Weeks worked
N=	35	34	11	11
Mean	57.11	49.99	55.27	49.45
Median	57	51	60	50
Max	99	56	70	52
Min	20	12.5	20	36

No farms in the sample require any formal education beyond a high school diploma for their herd managers (Table 2-5). However, 40 percent or more of the respondents indicated that they prefer individuals who have a higher level of educational attainment. On the other hand, several indicated that higher levels of education were neither required nor desired. This indicates that, in most cases, a herd manager is not expected to have any more than a high school education. Other types of training and attributes are very important, however. Many respondents indicated that training in AI (artificial insemination) is either desired or required. Still others indicate that supervisory, computer, and problem solving skills are important.

Table 2-5 - Qualifications necessary for herd managers and assistant herd managers

	Desire		Necessary		Neither	
	No. of farms	% (n=38)	No. of farms	% (n=38)	No. of farms	% (n=38)
HS diploma	14	36.8%	18	47.4%	0	0.0%
Associate degree	17	44.7%	0	0.0%	8	21.1%
Bachelors degree	15	39.5%	0	0.0%	12	31.6%
Masters degree	3	7.9%	0	0.0%	20	52.6%
Pesticide applicator training/certification	8	21.1%	6	15.8%	12	31.6%
AI training	11	28.9%	16	42.1%	5	13.2%
CDL license	8	21.1%	2	5.3%	16	42.1%
Other training	1	2.6%	2	5.3%	1	2.6%
Communication skills	7	18.4%	26	68.4%	0	0.0%
Supervision of other employees	12	31.6%	15	39.5%	4	10.5%
Problem-solving skills	9	23.7%	24	63.2%	1	2.6%
Computer skills	12	31.6%	17	44.7%	2	5.3%
Other skills (previous farm experience)	0	0.0%	2	5.3%	0	0.0%

The method of providing wage compensation differs by farm (Table 2-6). Most offer hourly or monthly payments. Those offering hourly wages pay a median of $10.00 per hour. Those offering wages on a monthly basis pay a median amount of about $2,200. Only four farms offer overtime pay to herd managers, all of these the equivalent of time and a half. All farms offer overtime pay after a fixed number of hours, ranging from 40 to 60. Three of these offer overtime for major holidays and one offers overtime pay after 6:00 PM. Three farms pay herd managers a higher wage when working evening/night shifts. The amount of the wage premium ranges from $1.00 to $2.50 per hour. Thirty of 38 farmers offer paid vacation leave to their herd managers. While the number of days offered varied from one to 21, the median amount was seven. Fifteen farms offer paid sick leave for their herd managers. The range of days offered is four to 12, while the median amount is four days. In addition to paid vacation and sick leave days, farms offered other types of benefits to their herd managers.

Table 2-6: Wages for herd managers and assistant herd managers

	$per hour	$per week	$per month
N=	12	3	15
Mean	$10.46	$466.67	$2,404.07
Median	$10.00	$500.00	$2,200.00
Max	$13.50	$700.00	$3,645.00
Min	$7.50	$200.00	$1,100.00

Table 2-7 provides a summary of the types of benefits offered and the frequency with which these are offered to herd managers. The most frequently offered benefits include

workers compensation, health insurance, social security, and access to a vehicle. The most commonly offered benefits are housing or a housing allowance and food and meals.

Table 2-7: Other benefits offered to herd managers:

	Number of farms	% of farms (n=38)
Social security	22	57.9%
Federal unemployment	8	21.1%
State unemployment	11	28.9%
Workers compensation	25	65.8%
Health insurance	22	57.9%
Dental insurance	2	5.3%
Vision insurance	2	5.3%
Life insurance	3	7.9%
Disability insurance	2	5.3%
Pension	8	21.1%
Profit Share	0	0.0%
Equity	8	21.1%
Vehicle Access	17	44.7%
Machinery Access	13	34.2%
On farm Housing	12	31.6%
Housing allowance	6	15.8%
Food and meals	14	36.8%

Forty-seven farms responded to a question about how the number of herd managers is expected to change over the next five years (Table 2-8). Of those, 30 indicated no change in the number of herd managers. Of those expecting a change, there is an expected net growth of nine new herd manager positions over the next five years.

Table 2-8: Expected change in the number of herd managers employed over the next five years

Planned change in employees	Number of farms
-1	5
0	30
1	10
2	2
Net change:	9

II-B-3b. *Calf Manager*

Calf managers tend to be specialized on calf management (Table 2-9). Other responsibilities include feeding, herd health, and miscellaneous supervisory tasks. The typical calf manager works approximately 50 hours per week (Table 2-10). The mean number of weeks worked per year is 51.27 and the median value is 52.

Calf managers typically report to the farm manager or farm owner. On only one farm did the calf manager report to a shift supervisor or area manager. This indicates that the calf manager position, where it exists, is a relatively high level position within the framework of the farm's organizational chart. Nine (37.5 percent) farms have calf managers who supervise other workers. Of those who supervise other workers, the number of workers he/she supervises ranges from one to four. The median number of workers supervised is two.

Table 2-9: Frequency of responses for each potential calf manager responsibility

Responsibility	Frequency
Calf management	22
Feeding	10
Keeping financial records	7
Delegating work	7
Evaluating others work	7
Monitor herd health	7
Heat detection	6
Facility management	5
Heifer management	4
Preparing financial statements	4
Training others	4
Milking	4
Keeping milk production records	3
Scheduling	3
Operating machinery	3
Breeding	3
Pregnancy checks	3
Manure management & record keeping	2
Making employment & termination decisions	2
Formulating rations	1
Keeping crop production records	1
Soil management	1
Purchasing equipment	1
Machinery repair and maintenance	1
Chemical application	1

Table 2-10: Summary of hours and weeks worked by calf managers

	Hours per week	Weeks work
N=	18	15
Mean	49.11	51.27
Median	50.00	52.00
Max	80	52
Min	25	49

The results suggest that it is not necessary to have attained a high level of education to be a calf manager (Table 2-11). Only one farm indicated that it is necessary to have any college-level education at all. Approximately 70 percent of farms who employed calf managers indicated that it was either necessary or desired that the calf manager have a high school diploma. A majority of these farms also indicated that it is necessary to have

communication and problem solving skills. Calf managers tend to be paid either by the hour or by the month (Table 2-12). The mean level of hourly wages is $9.16 while the mean level of monthly wages is $1,894. Three farms offer overtime pay to their calf managers. Two of these pay time-and-a-half. One offers overtime only after 40 hours in a week and the other after 40 hours and on holidays. No calf managers received a wage differential when working evening or night shifts.

Table 2-11: Qualifications necessary for calf managers

	Desire		Necessary		Neither	
	no. of farms	% (n=24)	no. of farms	% (n=24)	no. of farms	% (n=24)
HS diploma	8	33.3%	9	37.5%	2	8.3%
Associate degree	6	25.0%	1	4.2%	11	45.8%
Bachelors degree	6	25.0%	0	0.0%	11	45.8%
Masters degree	0	0.0%	0	0.0%	15	62.5%
Pesticide applicator training/certification	2	8.3%	1	4.2%	13	54.2%
AI training	5	20.8%	0	0.0%	11	45.8%
CDL license	3	12.5%	1	4.2%	10	41.7%
Communication skills	5	20.8%	14	58.3%	1	4.2%
Supervision of other employees	6	25.0%	7	29.2%	6	25.0%
Problem-solving skills	4	16.7%	14	58.3%	1	4.2%
Computer skills	8	33.3%	5	20.8%	7	29.2%
Other skills (dependability, experience)	0	0.0%	2	8.3%	2	8.3%

Table 2-12 - Wages for calf managers

	$ per hour	$ per month
N=	8	6
Mean	$9.16	$1,894.33
Median	$9.25	$2,003.06
Max	$10.00	$3,000.00
Min	$7.75	$1,000.00

Nine of 24 (37.5 percent) farms offer paid vacation leave to their calf managers. The median number of days offered is seven, but this ranges from four to 21 days. Four of 24 farms (16.6 percent) offer paid sick leave to their calf managers. The median number of days offered is seven while the range is from five to seven. In addition to paid vacation and sick days, farms offer other types of benefits to their calf managers.

Table 2-13:Other Benefits Offered to Calf Managers:

	Number of farms	% of farms (n=24)
Social security	12	50.0%
Federal unemployment	5	20.8%
State unemployment	6	25.0%
Workers compensation	12	50.0%
Health insurance	12	50.0%
Dental insurance	1	4.2%
Vision insurance	0	0.0%
Life insurance	1	4.2%
Disability insurance	2	8.3%
Pension	4	16.7%
Profit Share	0	0.0%
Equity	3	12.5%
Vehicle Access	11	45.8%
Machinery Access	8	33.3%
On farm Housing	8	33.3%
Housing allowance	2	8.3%
Food and meals	7	29.2%

Table 2-13 provides a summary of the types of benefits offered and the frequency with which these are offered to calf managers. The most frequently offered benefits are social security, workers compensation, health insurance, and access to a vehicle.

Thirty-five farms responded to a question about how the number of calf managers is expected to change over the next five years (Table 2-14). Of those, 28 indicated no change in the number of calf managers. Of those expecting a change, there is an expected net growth of one new calf manager position over the next five years.

Table 2-14 - Expected change in the number of calf managers employed over the next five years

Planned change in employees	Number of farms
-1	3
0	28
1	4
Net change	1

II-B-3c. *Crop Manager*

The primary responsibilities of crop managers on dairy farms revolve around the cropping enterprises, operating and maintaining machinery, and monitoring and managing the quantity and quality of forages, and supervisory tasks. Table 2-15 shows that there are many tasks associated with the position of crop manager. However, these generalized responsibilities cover nine of the top 11 most reported responsibilities. Table 2-16 indicates that the average crop manager works approximately 62 hours per week. The median number of weeks worked during the year is 50.

Table 2-15: Frequency of responses for each potential crop manager responsibility

Responsibility	Frequency
Keeping crop production records	13
Purchasing seed and other crop related inputs	13
Soil management	12
Operating machinery	12
Machinery repair and maintenance	11
Silo management/forage testing	10
Purchasing equipment	10
Chemical application	9
Manure management & record keeping	8
Delegating work	8
Facility management	8
Training others	6
Making employment & termination decisions	6
Evaluating others work	5
Scheduling	5
Feeding	5
Heat detection	3
Formulating rations	2
Keeping financial records	2
Milking	2
Monitor herd health	2
Heifer management	1
Preparing financial statements	1
Breeding	1
Pregnancy checks	1

Table 2-16: Summary of hours and weeks worked by crop managers

	Hours per week	Weeks work
N=	11	8
Mean	61.82	47.88
Median	60	50.5
Max	90	52
Min	20	27

As with the other management positions described thus far, crop managers report to either the farm manager or the farm owner. Of the 20 farms that reported employing a crop manager, 12 indicated that these individuals have supervisory authority over other workers. The range of workers supervised is between one and four, but the median number is two. Crop managers are not typically required to have attained a surveyed educational level, including high school (Table 2-17). However, respondents did indicate that they either desire or require that this person have a pesticide applicator training/certification. The results also suggest that communication and problem solving skills are typically required. Our results indicate that most crop managers are paid on a monthly basis (Table 2-17). The average crop manager is shown to make approximately $2,800 per month. Those paid by the hour receive $9.00 per hour (Table 2-18). Unlike other managerial positions reviewed to this point, no farms offered overtime pay to crop managers.

Table 2-17:Qualifications for crop managers

	Desire		Necessary		Neither	
	No. of farms	% (n=20)	No. of farms	% (n=20)	No. of farms	% (n=20)
HS diploma	6	30.0%	0	0.0%	0	0.0%
Associate degree	4	20.0%	1	5.0%	5	25.0%
Bachelors degree	5	25.0%	0	0.0%	6	30.0%
Masters degree	1	5.0%	0	0.0%	9	45.0%
Pesticide applicator training/certification	3	15.0%	10	50.0%	0	0.0%
AI training	1	5.0%	8	40.0%	0	0.0%
CDL license	6	30.0%	2	10.0%	3	15.0%
Communication skills	1	5.0%	12	60.0%	0	0.0%
Supervision of other employees	3	15.0%	8	40.0%	1	5.0%
Problem-solving skills	1	5.0%	13	65.0%	0	0.0%
Computer skills	7	35.0%	3	15.0%	2	10.0%

Table 2-18: Wages for crop managers

	$ per hour	$ per month
N=	2	7
Mean	$9.00	$2,790.43
Median	$9.00	$2,800.00
Max	$10.00	$4,000.00
Min	$8.00	$1,800.00

Nine of the 20 farms offer paid vacation leave for crop managers. The median number of days offered is 10. The range is from seven to 21. Six of the farms offer paid sick leave. The number of days ranges from three to 10 per year, while the median value is 5.5 days. In addition to paid vacation and sick leave days, farms offer other types of benefits to their crop managers (Table 2-19). The mostly commonly offered benefits are social security, health insurance, and vehicle access.

Table 2-19 - Other Benefits Offered to Crop Managers:

	Number of farms	% of farms (n=20)
Social security	9	45.0%
Federal unemployment	3	15.0%
State unemployment	3	15.0%
Workers compensation	7	35.0%
Health insurance	11	55.0%
Dental insurance	1	5.0%
Vision insurance	1	5.0%
Life insurance	2	10.0%
Disability insurance	0	0.0%
Pension	1	5.0%
Profit Share	1	5.0%
Equity	4	20.0%
Vehicle Access	8	40.0%
Machinery Access	7	35.0%
On farm Housing	2	10.0%
Housing allowance	2	10.0%
Food and meals	6	30.0%

Thirty-five farms responded to a question about how the number of crop managers is expected to change over the next five years (Table 2-20). Of those, 31 indicated no change in the number of crop managers. Of those expecting a change, there is an expected net increase of two new crop manager positions over the next five years.

Table 2-20: Expected change in the number of crop managers employed over the next five years

Planned change in employees	Number of Farms
-1	1
0	31
1	3
net change:	2

II-B-3d. *Heifer Manager*

The results indicate that the primary responsibilities associated with the title of "Heifer Manager" center around calf and heifer management, reproduction, herd health, and various supervisory tasks (Table 2-21). These generalized responsibilities cover ten of the top twelve most reported responsibilities associated with heifer managers.

Table 2-21: Frequency of responses for each potential heifer manager responsibility

Responsibility	Frequency
Calf management	9
Heifer management	8
Heat detection	6
Feeding	5
Milking	5
Breeding	5
Monitor herd health	5
Facility management	4
Delegating work	3
Training others	3
Operating machinery	3
Pregnancy checks	3
Keeping milk production Records	2
Manure management & record keeping	2
Formulating rations	2
Scheduling	2
Making employment & termination decisions	2
Machinery repair and maintenance	2
Keeping crop production Records	1
Soil management	1
Silo management/forage testing	1
Purchasing seed and other crop related inputs	1
Purchasing equipment	1
Evaluating others work	1
Chemical application	1

Heifer managers work 63 hours per week, on average (Table 2-22). They also work approximately 46-50 weeks each year. All but one heifer manager was shown to report directly to the farm owner. In that exception, the heifer manager reported to a herdsman. On four farms, the heifer managers supervised other employees. The median number of workers supervised is 2.5. The range is from two to four.

Table 2-22: Summary of hours and weeks worked by heifer managers

	Hours per week	Weeks work
N=	6	5
Mean	63.00	46.60
Median	64.00	50
Max	90	52
Min	35	32

Heifer managers are not generally required to have obtained any specific level of education (Table 2-23). These individuals are also not often expected to have any expertise in the surveyed areas. The primary exception is training in artificial insemination. Seven of the eleven respondents indicated that this was either a necessary or desired skill.

Table 2-23: Qualification necessary for heifer managers

	Desire		Necessary		Neither	
	No. of farms	% (n=11)	No. of farms	% (n=11)	No. of farms	% (n=11)
HS diploma	4	36.4%	2	18.2%	0	0.0%
Associate degree	0	0.0%	0	0.0%	5	45.5%
Bachelors degree	1	9.1%	0	0.0%	5	45.5%
Masters degree	0	0.0%	0	0.0%	5	45.5%
Pesticide applicator training/certification	0	0.0%	0	0.0%	4	36.4%
AI training	5	45.5%	2	18.2%	0	0.0%
CDL license	0	0.0%	0	0.0%	4	36.4%
Communication skills	1	9.1%	4	36.4%	0	0.0%
Supervision of other employees	2	18.2%	2	18.2%	1	9.1%
Problem-solving skills	1	9.1%	4	36.4%	0	0.0%
Computer skills	4	36.4%	0	0.0%	0	0.0%

The data are quite weak in providing a clear indication of compensation for heifer managers. The results are reported in Table 2-24, but do not provide any meaningful conclusions. One farm indicated that it paid overtime to a heifer manager. Overtime pay was described as being $11.00 per hour (in addition to a monthly salary). This is offered for work on holidays and/or work after 6:00 PM. Four farms offer paid vacation leave to their heifer managers. The number of days offered varied from five to 14. The median number is six. Only two farms provide paid sick leave to heifer managers. The median number of sick leave days offered is 3.5 while the range is three to four days.

Table 2-24: Wages for heifer managers

	$ per hour	$ per month
N=	2	3
Mean	$43.38	$2,900.00
Median	$43.38	$2,900.00
Max	$86.25	$3,100.00
Min	$0.50	$2,700.00

In addition to paid vacation and sick leave days, farms offered other types of benefits to their heifer managers. Table 2-25 provides a summary of the types of benefits offered and the frequency with which these are offered to heifer managers. The most frequently offered benefits include workers compensation, access to a vehicle and/or machinery, and food and meals.

Table 2-25: Other Benefits Offered to Heifer Managers

	Number of farms	% of farms (n=11)
Social security	2	18.2%
Federal unemployment	0	0.0%
State unemployment	0	0.0%
Workers compensation	4	36.4%
Health insurance	3	27.3%
Dental insurance	0	0.0%
Vision insurance	0	0.0%
Life insurance	0	0.0%
Disability insurance	0	0.0%
Pension	0	0.0%
Profit Share	0	0.0%
Equity	1	9.1%
Vehicle Access	6	54.5%
Machinery Access	5	45.5%
On farm Housing	2	18.2%
Housing allowance	2	18.2%
Food and meals	5	45.5%

Twenty-nine farms responded to a question about how the number of heifer managers is expected to change over the next five years (Table 2-26). Of those, 26 indicated no change in the number of heifer managers. Of those expecting a change, there is an expected net increase of one heifer manager over the next five years.

Table 2-26:Expected change in the number of heifer managers employed over the next five years

Planned change in employees	Number of Farms
-1	1
0	26
1	2
net change:	1

II-B-3e. *Milking Manager*

Results indicate that a milking manager's responsibilities are highly variable (Table 2-27). The primary responsibilities revolve around milking, reproduction, keeping production records, and various supervisory tasks. These generalized responsibilities cover all of the top ten most reported responsibilities. Milking managers work approximately 49 hours per week (using the reported median). Table 2-28 shows that these individuals also work 51 weeks per year. Most milking managers report directly to the farm owner. However, one farm did report that the milking manager reported to a herd manager. Of the ten farms that indicated employing a milking manager, seven also indicated that these individuals have supervisory authority over one or more other employees. The range of number of employees supervised is one to six, with a median value of three.

Table 2-27: Frequency of responses for each potential milking manager responsibility

Responsibility	Frequency
Training others	7
Milking	7
Heat detection	7
Evaluating others work	6
Scheduling	6
Making employment & termination decisions	6
Keeping milk production Records	5
Delegating work	5
Facility management	5
Breeding	4
Operating machinery	3
Machinery repair and maintenance	3
Pregnancy checks	3
Formulating rations	2
Heifer management	2
Manure management & record keeping	1
Calf management	1
Keeping crop production Records	1
Soil management	1
Silo management/forage testing	1
Purchasing seed and other crop related inputs	1
Keeping financial records	1
Purchasing equipment	1
Feeding	1
Chemical application	1

Table 2-28: Summary of hours and weeks worked by milking managers

	Hours per week	Weeks work
N=	8	7
Mean	59.88	51.00
Median	49	51
Max	90	52
Min	30	50

As with the other types of positions reviewed so far, few farmers require a specific level of educational attainment for their milking managers (Table 2-29). Only three of 10 farms indicated that a high school degree was necessary. However, farms do like to see their milking managers possess skills such as communication, supervision, problem solving, and computer competency.

Table 2-29: Qualifications necessary for milking managers

	Desire		Necessary		Neither	
	No. of farms	% (n=10)	No. of farms	% (n=10)	No. of farms	% (n=10)
HS diploma	5	50.0%	3	30.0%	0	0.0%
Associate degree	1	10.0%	0	0.0%	5	50.0%
Bachelors degree	1	10.0%	0	0.0%	5	50.0%
Masters degree	0	0.0%	0	0.0%	6	60.0%
Pesticide applicator training/certification	0	0.0%	0	0.0%	7	70.0%
AI training	3	30.0%	1	10.0%	3	30.0%
CDL license	0	0.0%	0	0.0%	7	70.0%
Communication skills	0	0.0%	7	70.0%	1	10.0%
Supervision of other employees	0	0.0%	6	60.0%	2	20.0%
Problem-solving skills	1	10.0%	6	60.0%	1	10.0%
Computer skills	5	50.0%	1	10.0%	1	10.0%

Because of few relevant responses, the data collected in this project provide a weak view of the wages paid to milking managers (Table 2-30). Those paid hourly receive $10.00 to $11.00 per hour. Those paid monthly receive between $1,500 and $3,300. The median and mean values are around $2,500 per month. Those farms responding indicated that no milking managers are offered overtime. However, two farms with milking managers offered higher wages for evening/night shifts. The wage differential ranged from $0.50 to $3.00 per hour. Six farms (60%) offer paid vacation leave to their milking managers. The number of days offered varied from five to 14 per year. The median number of days offered is 6.5. Three farms (30.0%) offer paid sick leave to their milking managers. The number of days offered varied from four to five per year. The median number of days offered is 4.5.

Table 2-30: Wages for milking managers

	$ per hour	$ per month
N=	3	4
Mean	$10.67	$2,475.00
Median	$11.00	$2,550.00
Max	$11.00	$3,300.00
Min	$10.00	$1,500.00

In addition to paid vacation and sick leave days, farms offer other types of benefits to their milking managers. Table 2-31 provides a summary of the types of benefits offered and the frequency with which these are offered to milking managers. The most frequently offered benefits include workers compensation, health insurance, vehicle access, and machinery access.

Table 2-31: Other Benefits Offered to Milking Managers:

	Number of farms	% of farms (n=10)
Social security	4	40.0%
Federal unemployment	1	10.0%
State unemployment	2	20.0%
Workers compensation	5	50.0%
Health insurance	6	60.0%
Dental insurance	0	0.0%
Vision insurance	1	10.0%
Life insurance	0	0.0%
Disability insurance	0	0.0%
Pension	2	20.0%
Profit Share	0	0.0%
Equity	1	10.0%
Vehicle Access	4	40.0%
Machinery Access	4	40.0%
On farm Housing	1	10.0%
Housing allowance	2	20.0%
Food and meals	3	30.0%

Twenty-six farms responded to a question about how the number of milking managers is expected to change over the next five years (Table 2-32). Of those, 20 indicated no change in the number of milking managers. Of those expecting a change, there is an expected net increase of four milking manager positions over the next five years.

Table 2-32:Expected change in the number of milking managers employed over the next five years

Planned change in employees	Number of Farms
-1	1
0	20
1	5
net change:	4

II-B-3f. *Milker*

Not surprisingly, the common set of tasks performed by milkers is much smaller compared to the managerial positions described above (Table 2-33). The top five most commonly provided responsibilities include milking, heat detection, monitoring herd health, operating machinery, and feeding. Many farms reported employing several milkers. For the sake of simplicity, results are reported for only the first two listed positions. It is not known how the respondents chose to order their responses and therefore inferences cannot be made about differences across milkers based solely on the ordering. Further, results do not differ when including these individuals. The first listed milker works an average of about 44 hours per week and about 50-51 weeks per year (Table 2-34). The second listed milker works about 41-42 hours per week and approximately 49-50 weeks per year.

Table 2-33: Frequency of responses for each potential milker responsibility

Responsibility	Frequency
Milking	52
Heat detection	29
Monitor herd health	14
Operating machinery	13
Feeding	12
Calf management	7
Facility management	6
Breeding	6
Keeping milk production Records	3
Training others	3
Machinery repair and maintenance	3
Heifer management	2
Keeping crop production Records	1
Delegating work	1
Scheduling	1

Table 2-34: Summary of hours and weeks worked by milkers

	First listed employee		Second listed employee	
	Hours per week	Weeks work	Hours per week	Weeks worked
N=	45	42	28	26
Mean	44.47	49.90	42.07	48.73
Median	40	51	41	50.5
Max	80	56	70	52
Min	20	24	20	24

In most cases, milkers report to the farm manager or the farm owner. However, milkers may report to shift or area supervisors or herd managers on some farms. On only three farms did milkers supervise other employees. In each case, they were shown to

supervise only one other person. Milkers are not generally required to have obtained any specific level of education (Table 2-35). However, about 82 percent of respondents indicated that they require or desire a high school diploma. Some farm owners either require or desire other types of skills, however. The most commonly reported are communication, problem-solving, computer skills, and training in AI.

Table 2-35: Qualification necessary for milkers

	Desire		Necessary		Neither	
	No. of farms	% (n=57)	No. of farms	% (n=57)	No. of farms	% (n=57)
HS diploma	41	71.9%	6	10.5%	9	15.8%
Associate degree	4	7.0%	0	0.0%	36	63.2%
Bachelors degree	1	1.8%	0	0.0%	38	66.7%
Masters degree	0	0.0%	0	0.0%	37	64.9%
Pesticide applicator training/certification	6	10.5%	0	0.0%	31	54.4%
AI training	19	33.3%	1	1.8%	19	33.3%
CDL license	2	3.5%	0	0.0%	33	57.9%
Other training (milking seminars)	0	0.0%	1	1.8%	0	0.0%
Communication skills	17	29.8%	26	45.6%	5	8.8%
Supervision of other employees	11	19.3%	3	5.3%	27	47.4%
Problem-solving skills	20	35.1%	21	36.8%	3	5.3%
Computer skills	19	33.3%	2	3.5%	18	31.6%
Other skills (dependability)	1	1.8%	0	0.0%	0	0.0%

The most common basis for paying wages to milkers is hourly (Table 2-36). The median hourly wage is $8.00 for both the first and second listed milker. The average weekly wage is $350-375 for the first listed milker and about $300 for the second listed milker. Monthly wages are low compared with the managerial positions discussed above. Only 12.3 percent of farms offer overtime pay to their milkers. Of these, four describe their overtime rate as time-and-a-half while the others indicate that they pay a higher hourly wage. About 16 percent of farms offer higher wages when working night/evening shifts. The differentials ranged from $.25 to $9.00 per hour, with one outlier reporting $73.00.

Table 2-36: Wages for milkers

	First listed milker			Second listed milker		
	$ per hour	$ per week	$ per month	$ per hour	$ per week	$ per month
N=	30	12	6	25	4	1.00
Mean	$8.39	$376.92	$1,963.17	$8.15	$312.50	$900.00
Median	$8.00	$352.50	$1,675.00	$8.00	$300.00	$900.00
Max	$12.00	$700.00	$3,100.00	$10.25	$500.00	$900.00
Min	$6.50	$125.00	$1,029	$5.50	$150.00	$900.00

Twenty-three farms (40.4 percent) offer paid vacation time to their milkers. The number of days offered ranges from five to 14, while the median amount is seven. Twelve farms (21.1 percent) offer paid sick leave to their milkers. The number of days offered ranges from two to 12 per year. The median number of days offered is 5.5.

In addition to paid vacation and sick leave days, farms offer other types of benefits to their milkers. Table 2-37 provides a summary of the benefits offered and the frequency with which these are offered to milkers. The most frequently offered benefits include workers compensation and social security. All others are offered at fewer than one-third of the farms.

Table 2-37: Other Benefits Offered to Milkers

	Number of farms	% of farms (n=57)
Social security	33	57.9%
Federal unemployment	14	24.6%
State unemployment	14	24.6%
Workers compensation	41	71.9%
Health insurance	16	28.1%
Dental insurance	3	5.3%
Vision insurance	3	5.3%
Life insurance	0	0.0%
Disability insurance	2	3.5%
Pension*	6	10.5%
Profit Share*	0	0.0%
Equity*	1	1.8%
Vehicle Access*	11	19.3%
Machinery Access*	7	12.3%
On farm Housing *	13	22.8%
Housing allowance*	2	3.5%
Food and meals *	10	17.5%

* The frequencies reported for these benefits represent the results for the first listed milker.

Fifty-three farms responded to a question about how the number of milkers is expected to change over the next five years (Table 2-38). Thirty-one indicated no changes. Of those expecting a change, there is an expected net increase of 22 milker positions over the next five years.

Table 2-38: Expected change in the number of milkers employed over the next five years

Planned change in employees	Number of Farms
-4	1
-3	1
-2	1
-1	2
0	31
1	6
2	6
3	5
Net change:	22

II-B-3g. *Feeder*

The common set of tasks performed by feeders is relatively small (Table 2-39). The five most commonly provided responsibilities include feeding, operating machinery, managing facilities, heat detection, and machinery repair and maintenance. Feeders work approximately 49-50 hours per week and about 49-51 weeks each year (Table 2-40). All feeders report directly to the farm manager or farm owner. Four (11.8 percent) farms have feeders who supervise others. Of those who supervise other employees, the number of workers supervised ranged from one to four, with a median of 1.5.

Table 2-39: Frequency of responses for each potential feeder responsibility

Responsibility	Frequency
Feeding	35
Operating machinery	25
Facility management	13
Heat detection	12
Machinery repair and maintenance	11
Milking	7
Monitor herd health	7
Heifer management	6
Silo management/forage testing	5
Manure management & record keeping	4
Delegating work	4
Formulating rations	3
Calf management	3
Keeping crop production Records	3
Training others	3
Breeding	3
Soil management	2
Purchasing seed and other crop related inputs	2
Keeping financial records	2
Preparing financial statements	2
Purchasing equipment	2
Scheduling	2
Making employment & termination decisions	2
Pregnancy checks	2

Table 2-40: Summary of hours and weeks worked by feeders

	Hours per week	Weeks work
N=	30	27
Mean	48.97	48.63
Median	50	51
Max	90	52
Min	20	5

Feeders are not generally required to have obtained any specific level of education above high school (Table 2-41). However, only three farms indicated that a high school diploma was neither required nor desired. The most commonly required/desired skills include communication, problem-solving, computer, and supervision.

Table 2-41:Qualifications necessary for feeders

	Desire		Necessary		Neither	
	No. of farms	% (n=34)	No. of farms	% (n=34)	No. of farms	% (n=34)
HS diploma	20	58.8%	11	32.4%	3	8.8%
Associate degree	8	23.5%	0	0.0%	17	50.0%
Bachelors degree	3	8.8%	0	0.0%	20	58.8%
Masters degree	1	2.9%	0	0.0%	22	64.7%
Pesticide applicator training/certification	4	11.8%	2	5.9%	15	44.1%
AI training	4	11.8%	0	0.0%	18	52.9%
CDL license	11	32.4%	0	0.0%	10	29.4%
Communication skills	11	32.4%	17	50.0%	3	8.8%
Supervision of other employees	11	32.4%	3	8.8%	9	26.5%
Problem-solving skills	12	35.3%	16	47.1%	2	5.9%
Computer skills	15	44.1%	2	5.9%	6	17.6%
Other skills (dry matter intake evaluation)	0	0.0%	1	2.9%	0	0.0%

The most common basis for paying wages to feeders is hourly (Table 2-42). The median hourly wage is $8.75. The average weekly wage is $550-575. Monthly wages average about $3,000. Only 8.8 percent of farms (three farms) offer overtime pay to their feeders. Of these, two describe their overtime rate as time-and-a-half while the other indicates that overtime pay is an extra $2.00 per hour. No farms offer higher wages when working night/evening shifts. Eighteen farms (52.9 percent) offer paid vacation leave to their feeders. The number of days offered varied from five to 21 per year. The median number of days offered is seven. Ten farms (29.4 percent) offer paid sick leave to their feeders. The number of days offered varied from two to seven per year. The median number of days offered is five.

Table 2-42: Wages for feeders

	$ per hour	$ per week	$ per month
N=	19	6	5
Mean	$8.99	$576.67	$2,973.10
Median	$8.75	$542.50	$3,100.00
Max	$13.00	$700.00	$4,000.00
Min	$6.00	$500.00	$1,800.00

In addition to paid vacation and sick leave days, farms offer other types of benefits to their feeders. Table 2-43 provides a summary of the types of benefits offered and the frequency with which these are offered to feeders. The most frequently offered benefits include workers compensation, social security, and health insurance. All others are offered on less than one-third of the farms.

Table 2-43: Other benefits offered to feeders:

	Number of farms	% of farms (n=34)
Social security	20	58.8%
Federal unemployment	11	32.4%
State unemployment	11	32.4%
Workers compensation	25	73.5%
Health insurance	17	50.0%
Dental insurance	1	2.9%
Vision insurance	1	2.9%
Life insurance	1	2.9%
Disability insurance	1	2.9%
Pension	4	11.8%
Profit Share	0	0.0%
Equity	3	8.8%
Vehicle Access	8	23.5%
Machinery Access	8	23.5%
On farm Housing	3	8.8%
Housing allowance	3	8.8%
Food and meals	7	20.6%

Thirty-four farms responded to a question about how the number of feeders is expected to change over the next five years (Table 2-44). Of those, 30 indicated no changes in the number of feeder positions. Of those expecting a change, there is an expected net increase of four feeder positions over the next five years.

Table 2-44: Expected change in the number of feeders employed over the next five years

Planned change in employees	Number of Farms
0	30
1	4
Net change:	4

II-B-3h. *Mechanic*

Mechanics on dairy farms appear to have two common responsibilities; machinery repair and maintenance and operating machinery (Table 2-45). This represents a very specialized type of position relative to the others reviewed so far. Mechanics work approximately 50 hours per week and about 50 weeks per year (Table 2-46). Of the 17 farms reporting information about direct supervision, 16 indicated that mechanics report directly to farm managers or farm owners. In one instance, a mechanic reports directly to a shift or area supervisor. Two farms (11.1 percent) indicated that their mechanics supervise other workers. On one farm, the mechanic supervised two other employees. On the other farm, the mechanic supervises three others.

Table 2-45: Frequency of responses for each potential mechanic responsibility

Responsibility	Frequency
Machinery repair and maintenance	17
Operating machinery	13
Keeping crop production Records	4
Training others	3
Feeding	3
Milking	3
Facility management	3
Soil management	2
Silo management/forage testing	2
Delegating work	2
Keeping milk production Records	1
Manure management & record keeping	1
Heifer management	1
Calf management	1
Purchasing seed and other crop related inputs	1
Purchasing equipment	1
Evaluating others work	1
Scheduling	1
Making employment & termination decisions	1
Chemical application	1
Heat detection	1
Monitor herd health	1

Table 2-46: Summary of hours and weeks worked by mechanics

	Hours per week	Weeks work
N=	12	9
Mean	49.92	50.44
Median	50	50
Max	80	52
Min	30	48

Mechanics are not generally required to have obtained any specific level of education above high school (Table 2-47). However, a high school diploma is necessary or desired on all but two farms. The most commonly required/desired skills include CDL license, communication, and problem-solving skills.

Table 2-47: Qualifications necessary for mechanics

	Desire		Necessary		Neither	
	No. of farms	% (n=18)	No. of farms	% (n=18)	No. of farms	% (n=18)
HS diploma	8	44.4%	8	44.4%	2	11.1%
Associate degree	2	11.1%	0	0.0%	12	66.7%
Bachelors degree	0	0.0%	0	0.0%	13	72.2%
Masters degree	0	0.0%	0	0.0%	13	72.2%
Pesticide applicator training/certification	3	16.7%	3	16.7%	5	27.8%
AI training	1	5.6%	1	5.6%	9	50.0%
CDL license	5	27.8%	5	27.8%	3	16.7%
Communication skills	4	22.2%	11	61.1%	1	5.6%
Supervision of other employees	4	22.2%	3	16.7%	5	27.8%
Problem-solving skills	2	11.1%	12	66.7%	2	11.1%
Computer skills	5	27.8%	1	5.6%	4	22.2%

The most common basis for paying wages to mechanics is hourly (Table 2-48). The median hourly wage is $10.00. The average weekly wage is $500. Monthly wages average about $1,500 to $1,900. Only one farm offered overtime pay to its mechanics. Overtime pay is time-and-a-half and this is offered for major holidays. No farms offer higher wages when working night/evening shifts. Six farms (33.3 percent) offer paid vacation leave to their mechanics. The number of days offered varied from five to eleven per year. The median number of days offered was seven. Two farms (11.1 percent) offer paid sick leave to their mechanics. The number of days offered for both farms was five.

Table 2-48: Wages for mechanics

	$ per hour	$ per week	$ per month
N=	6	3	5
Mean	$9.50	$500.00	$1,908.60
Median	$10.00	$500.00	$1,460.00
Max	$10.50	$500.00	$3,333.00
Min	$7.50	$500.00	$1,200.00

In addition to paid vacation and sick leave days, farms offer other types of benefits to their mechanics. Table 2-49 provides a summary of the types of benefits offered and the frequency with which these are offered to mechanics. The most frequently offered benefits include workers compensation, social security, and health insurance. All others are offered on less than one-third of the farms.

Table 2-49: Other Benefits Offered to Mechanics:

	Number of farms	% of farms (n=18)
Social security	10	55.6%
Federal unemployment	4	22.2%
State unemployment	5	27.8%
Workers compensation	12	66.7%
Health insurance	8	44.4%
Dental insurance	0	0.0%
Vision insurance	1	5.6%
Life insurance	0	0.0%
Disability insurance	2	11.1%
Pension	1	5.6%
Profit Share	0	0.0%
Equity	0	0.0%
Vehicle Access	5	27.8%
Machinery Access	5	27.8%
On farm Housing	1	5.6%
Housing allowance	1	5.6%
Food and meals	3	16.7%

Thirty-one farms responded to a question about how the number of mechanics is expected to change over the next five years (Table 2-50). Of those, 26 indicated no changes in the number of mechanic positions. Of those expecting a change, there is an expected net increase of four mechanic positions over the next five years.

Table 2-50: Expected change in the number of mechanics employed over the next five years

Planned change in employees	Number of Farms
-1	1
0	26
1	3
2	1
Net change:	4

II-B-3i. *Machinery operator*

The primary responsibilities of machinery operators are operating machinery and machinery repair and maintenance (Table 2-51). Results suggest that other tasks may be assigned to these individuals on a farm-by-farm basis. Machinery operators work approximately 45 hours per week and about 41-50 weeks per year (Table 2-52). All machinery operators report to either the farm manager or the farm owner. Of the 31 farms who employed machinery operators, only one indicated that the machinery operator supervises other individuals. In that case, the machinery operator supervised only one other person.

Table 2-51: Frequency of responses for each potential machinery operator responsibility

Responsibility	Frequency
Operating machinery	30
Machinery repair and maintenance	24
Feeding	9
Facility management	7
Milking	5
Heat detection	5
Chemical application	4
Heifer management	3
Calf management	2
Keeping crop production Records	2
Soil management	2
Silo management/forage testing	2
Purchasing seed and other crop related inputs	2
Monitor herd health	2
Keeping milk production Records	1
Manure management & record keeping	1
Formulating rations	1
Delegating work	1
Evaluating others work	1
Training others	1
Scheduling	1
Making employment & termination decisions	1
Breeding	1

Table 2-52: Summary of hours and weeks worked by machinery operators

	Hours per week	Weeks work
N=	30	23
Mean	45.30	40.91
Median	48	50
Max	95	51
Min	20	10

Machinery operators are not generally required to have obtained any specific level of education above high school (Table 2-53). However, a high school diploma is necessary or desired on all but two farms. The most commonly required/desired skills include communication, problem solving, and computer skills.

Table 2-53: Qualifications necessary for machinery operators

	Desire		Necessary		Neither	
	No. of farms	% (n=31)	No. of farms	% (n=31)	No. of farms	% (n=31)
HS diploma	21	67.7%	8	25.8%	2	6.5%
Associate degree	3	9.7%	0	0.0%	21	67.7%
Bachelors degree	0	0.0%	0	0.0%	23	74.2%
Masters degree	0	0.0%	0	0.0%	23	74.2%
Pesticide applicator training/certification	8	25.8%	4	12.9%	10	32.3%
AI training	3	9.7%	1	3.2%	17	54.8%
CDL license	9	29.0%	4	12.9%	10	32.3%
Other training (mechanical)	1	3.2%	0	0.0%	0	0.0%
Communication skills	11	35.5%	12	38.7%	3	9.7%
Supervision of other employees	5	16.1%	1	3.2%	15	48.4%
Problem-solving skills	4	12.9%	16	51.6%	4	12.9%
Computer skills	11	35.5%	1	3.2%	9	29.0%

The results show that most machinery operators are paid on an hourly basis (Table 2-54). The median hourly rate is $8.50. The average weekly rate is between $475 and $490 while the monthly rate is approximately $1,500 to $1,600. Only three farms offer overtime pay to machinery operators. One pays time-and-a-half. The other two pay higher hourly rates. Only one farm offers higher wages for evening/night shifts, at an additional rate of $2.00 per hour. Ten farms (32.3 percent) offer paid vacation leave to their machinery operators. The number of days offered varied from five to 21 per year. The median number of days offered is 8.5. Five farms (16.1 percent) offer paid sick leave to their machinery operators. The number of days offered varied from three to six per year. The median number of days offered is five.

Table 2-54: Wages for machinery operators

	$ per hour	$ per week	$ per month
N=	21	6	4
Average	$8.66	$489.17	$1,633.13
Median	$8.50	$475.00	$1,541.25
Max	$11.00	$1,000.00	$2,300.00
Min	$5.00	$200.00	$1,150.00

In addition to paid vacation and sick leave days, farms offered other types of benefits to their machinery operators. Table 2-55 provides a summary of the types of benefits offered and the frequency with which these are offered to machinery operators. The most frequently offered benefits include workers compensation and social security. All other benefits are offered on fewer than one-third of the respondents' farms.

Table 2-55: Other benefits offered to machinery operators:

	Number of farms	% of farms (n=31)
Social security	20	64.5%
Federal unemployment	7	22.6%
State unemployment	7	22.6%
Workers compensation	20	64.5%
Health insurance	7	22.6%
Dental insurance	0	0.0%
Vision insurance	0	0.0%
Life insurance	0	0.0%
Disability insurance	1	3.2%
Pension	4	12.9%
Profit Share	0	0.0%
Equity	2	6.5%
Vehicle Access	9	29.0%
Machinery Access	6	19.4%
On farm Housing	2	6.5%
Housing allowance	4	12.9%
Food and meals	5	16.1%

Thirty-seven farms responded to a question about how the number of machinery operators is expected to change over the next five years (Table 2-56). Of those, 31 indicated no change in the number of machinery operators. Of those expecting changes, there is an expected net increase of four machinery operators over the next five years.

Table 2-56: Expected change in the number of machinery operators over the next five years

Planned change in employees	Number of Farms
-2	1
-1	0
0	31
1	4
2	1
Net change:	4

II-C-Goal 3:

Goal 3: The third goal was to assess the current knowledge of career counselors, job placement agencies, and economic development organizations about dairy job opportunities.

II-C-1. *Research Methods*

The survey instrument was developed during the fall of 2003. The instrument was pretested with two graduate students and one question was added before mailing to the target audience. A small number of issues were raised and subsequently addressed before disseminating the surveys. A total of 260 surveys were sent statewide to agricultural education teachers, career counselors and economic development personnel. Mailing lists were obtained for high school agricultural teachers and career counselors from the Pennsylvania Department of Agriculture. A mailing list of economic development personnel was obtained from a regional economic development office.

In order to increase response rates, mailing of initial surveys was followed by a reminder postcard 10 days after the first mailing and a second copy of the survey 10 days after the postcard mailing. A final reminder postcard was sent within 14 days to attempt to increase response rate. The letter that accompanied the surveys offered a packet of dairy industry materials to those individuals who returned the survey as an incentive for participation.

II-C-2. *Survey Results*

A total of 260 surveys were distributed statewide. Of those, 15 were undeliverable. There were 91 completed surveys that were returned for a response rate of 37.1 percent (91/245). Considering the lack of prior contact of project leaders with this target audience, this was a very good response rate. Most surveys were fully completed. If some questions were left blank, the remaining data in the survey was utilized.

Responses to questions about the dairy industry in general showed that 78 percent correctly assessed that annual dairy receipts were greater than other agricultural commodities and 97 percent correctly assessed that the total number of dairies in the state was decreasing (Table 3-1). However, more than three-quarters of the responses indicated that dairy wages were less per hour than other industries in their communities. This high percentage of responses confirms the common perception, in this case even among agricultural educators, that the dairy industry is one of low wages. Results from goal two indicated that even entry level positions like milkers and feeders averaged more than $8.00 per hour in cash wages, not including compensation (Table 2-36 and Table 2-42). The average cash wages for cashiers according to department of labor statistics was less than $8.00 per hour.

Table 3-1. Respondents (n=91) answers about their general dairy industry knowledge.

Item			
Comparison of dairy receipts to other agricultural commodities	Smaller 11%	About the same 11%	Greater 78%
The number of dairy farms	Decreasing 97%	Staying the same 2%	Increasing 1%
Number of dairy jobs in past 10 years	Decreased 52%	About the same 30%	Increased 18%

When asked about the importance of formal education for dairy farm jobs, 72.5 percent of the respondents indicated a high school degree was "very important" while only 5.4 percent indicated that a college degree was "very important." (See Table 3-2) Additionally, 5.5 percent of the respondents indicated that a high school degree was "not important" and 21 percent indicated that a college degree was "not important." Respondents ranked the top three skills for dairy farm workers as: 1. ability to read and write (92.4 percent response), 2. ability to do simple math (91.2 percent response) and 3. ability to run machinery (83.5 percent response). Conversely, the skills that were ranked least important were: 1. foreign language skills, 2. ability to use a computer, and 3. personnel management skills. With trends for greater herd sizes, dairies are increasingly using Hispanic workers and more sophisticated data collection and management systems. Participants' assessment of less important skills is becoming increasingly important for successful careers in dairy management positions. This discrepancy between perception and actual needs represents a good opportunity to provide updated information about dairy workforce needs to career counselors, agricultural teachers and economic development personnel.

Table 3-2: Percentage of responses indicating that skills or abilities were Not Important, Somewhat Important or Very Important for dairy farm workers.

Item	Not Important	Somewhat Important	Very Important
High School Degree	5.5	22.0	72.5
College Degree	21	73.6	5.4
Strength, physical ability	0	31.9	68.1
Ability to read and write	1	6.6	92.4
Ability to do simple math	0	8.8	91.2
Ability to use a computer	2.2	48.5	49.5
Ability to run machinery	0	16.5	83.5
Ability to operate electronic equipment	3.3	25.3	71.4
Ability to work well with others	0	23.1	76.9
Foreign language skills	49.5	45	5.5
Personnel management skills	4.4	35.2	60.4

In Table 3-3, more than 65 percent of the survey respondents indicated that most dairy jobs were characterized by long hours (71.4 percent) and outdoor work (68.1 percent), and only 5 percent felt that most dairies had a clean work environment. When asked about rate of pay, 26 percent and 56 percent of respondents indicated that most and some dairies, respectively, had below average rates of pay. Coupled with this ranking of lower wages, many respondents indicated that

few dairies offered paid sick leave (52 percent), career advancement (42 percent), paid health insurance (42 percent) and paid vacation days (41 percent). A number of respondents, ranging from 5.6 percent to 12.1 percent, indicated that none of the dairies likely offered these benefits to workers. Opinions expressed by respondents in this survey validate the common misconception that dairy farms offer long hours, low pay and dirty work with little to no benefits.

Table 3-3: Characteristics that describe jobs on dairy farms.

Item	Most	Some	Few	None
Long hours	71.4	28.6	0	0
Flexible hours	16.5	58.2	25.3	0
Work outdoors	68.1	31.9	0	0
Clean work environment	5.5	64.8	30.7	0
Repetitive tasks	58.2	37.4	4.4	0
Varied work routine	14.3	64.8	19.8	1.1
Career advancement	3.3	51.7	42	3.3
Job training	26.4	52.7	20.8	1.1
Uniforms	1.1	34.1	53	12.1
Paid vacation days	7.7	42.9	41	8.3
Paid sick leave	4.4	33	52	11.7
Bonuses and incentives	3.3	53.9	36	6.6
Paid health insurance	5.6	46.7	42	5.6
Above average rate of pay	3.3	31.9	55	9.9
Below average rate of pay	26	56	13	5

Two final questions included in the survey asked about the importance of having a two-year dairy management program available in Pennsylvania to accommodate those individuals who wanted post high school training, but not a bachelor's degree. Respondents were asked to rank the importance of a two-year dairy management program on a scale of 1 to 7 where 1 is not important and 7 is very important. The average rating for respondents (n=86) was 5.82. Additionally, respondents were asked to estimate the number of students or clientele that would be expected to enroll from their geographic area if such a program were available. Of the respondents who answered this question (n=81), 78 percent indicated between one and 10 people would enroll.

III. Conclusions

III-A. Summary of Goal 1 Results

For the entry-level positions of production technicians, the greatest area of training need defined in the project was for basic work skills. This was followed by the technical areas of: (1) Barn and facilities maintenance, (2) Milking and (3) Reproduction. For middle managers, the top three areas for needed training were (1) Reproductive management, (2) Youngstock management and (3) Information management. For senior level managers and farm owners, the greatest areas of training needs were: (1) Purchasing, sales, and marketing, and (2) Financial planning. Overall, for all managers, the greatest area of training need was in human resource management.

III-B. Summary of Goal 2 Results

Estimates of compensation rates for the dairy industry are difficult due to the lack of job standardization and accounting practices as well as a tremendous amount of variation in benefits. Annual cash wages (not including any paid benefits) ranged from a low of $16,400 to a high of $34,800. When combined with various added benefits (paid vacation, sick leave,

health insurance, vehicle use, etc), it is estimated that total compensation packages would range from $21,300 to $45,400 for a variety of entry level and middle manager positions on dairy farms in Pennsylvania. Tables 4-1 through 4-3 report summarized hours and wages, benefits, and expected change in number of positions across the sample.

Table 4-1. Summary of hours and weeks worked across all positions

Position	Mean Hours Worked (n=)	Mean Weeks Worked (n=)	Mean Hourly Wage (n=)	Mean Weekly Wage (n=)	Mean Monthly Wage (n=)
Herd Manager	57.11 (35)	49.99 (34)	$10.46 (12)	$467 (3)	$2,404 (15)
Calf Manager	49.11 (18)	51.27 (15)	$9.16 (8)	NA	$1,894 (6)
Crop Manager	61.82 (11)	47.88 (8)	$9.00 (2)	NA	$2,790 (7)
Heifer Manager	63.00 (6)	46.60 (5)	NA	NA	$2,900 (3)
Milking Manager	59.88 (8)	51.00 (7)	$10.67 (3)	NA	$2,475 (4)
Milker	44.47 (45)	49.90 (42)	$8.39 (30)	$377 (12)	$1,963 (6)
Feeder	48.97 (30)	48.63 (27)	$8.99 (19)	$577 (6)	$2,973 (5)
Mechanic	49.92 (12)	50.44 (9)	$9.50 (6)	$500 (3)	$1,909 (5)
Machinery Operator	45.30 (30)	40.91 (23)	$8.66 (21)	$489 (6)	$1,633 (4)

Note: Figures reported here reflect only the first listed employee in cases where more than one employee was reported at each position.

Table 4-2. Summary of benefits offered across all positions

Benefit	Percentage of farms offering benefits by position								
	Herd Mgr.	Calf Mgr.	Crop Mgr.	Heifer Mgr.	Milking Mgr.	Milker	Feeder	Mechanic	Mach. Oper.
Social Sec.	58	50	45	18	40	58	59	56	65
Fed Unemp.	21	21	15	0	10	25	32	22	23
Stat Unemp.	29	25	15	0	20	25	32	28	23
Workers Comp.	66	50	35	36	50	72	74	67	65
Health Ins.	58	50	55	27	60	28	50	44	23
Dental Ins.	5	4	5	0	0	5	3	0	0
Vision Ins.	5	0	5	0	10	5	3	6	0
Life Ins.	8	4	10	0	0	0	3	0	0
Disability Ins.	5	8	0	0	0	4	3	11	3
Pension	21	17	5	0	20	11	12	6	13
Profit Share	0	0	5	0	0	0	0	0	0
Equity	21	13	20	9	10	2	9	0	7
Vehicle Access	45	46	40	55	40	19	24	28	29
Machinery Access	34	33	35	46	40	12	24	28	19
On-farm housing	32	33	10	18	10	23	9	6	7
Housing All.	16	8	10	18	20	4	9	6	13
Food/Meals	37	29	30	46	30	18	21	17	16

Table 4-3. Summary of net change in number of positions expected over next five years

Position	Expected Net Change
Herd manager	9
Calf Manager	1
Crop Manager	2
Heifer Manager	1
Milking Manager	4
Milker	22
Feeder	4
Mechanic	4
Machinery Operator	4
Total	51

III-C. Summary of Goal 3 Results

Most respondents had a good idea about the size and scope of the dairy industry and some awareness about career opportunities. Common beliefs about dairy farm jobs being less desirable (long hours, poor pay, few benefits) as well as an underestimation of skills needed for modern dairy farms (computer skills, foreign languages) represent an opportunity to provide up-to-date information to career counselors, agricultural teachers and economic development representatives. Timely and accurate information for those individuals who are in a career counseling role will help to create a larger pool of people interested in learning more about jobs in the dairy industry. More people interested in receiving specialized education or training to work in the dairy industry can help to alleviate the shortage of dairy workers in the future. Respondents also strongly indicated (5.82 on a 7 point scale) that having a two-year program for dairy management in Pennsylvania was important.

IV. Recommendations

This research project points out opportunities for improving the workforce development structure in Pennsylvania, clarifies the types of positions that are available in dairy businesses, and provides some preliminary information about perceptions of the dairy industry held by career influencers.

Based on information in this study, there will be approximately .4 (51 new jobs/126 usable response) new jobs per farm created due to growth. NASS data from the year 2000 indicates that there are approximately 1,200 farms with 100 or more cows in Pennsylvania. Multiplying .4 times 1,200 yields an estimate of 480, thus the total number of new jobs created through growth would be 480 in the next five years. It is important to note that this increase in jobs does not account for normal turnover of employees in positions, which will also add to demand for qualified employees. Also, with the trend for growth in the number of herds with 200 cows or more (NASS, 2004), actual demand for dairy jobs is likely to be higher. It is important to keep in mind the potential impact these positions have on related industries such as feed supply, veterinary, financial services, and milk processing.

This section of the report contains the researchers' recommendations for action. The overall recommendations are to improve and expand opportunities for workforce development,

promote public awareness of careers in dairy, and fund innovative local partnerships for dairy development.

Workforce Development

In Pennsylvania, the continued growth and development of the dairy industry depends on managers and employees who can help their organizations to be competitive on a national and international level. In return, a modern, growing dairy industry can provide high quality jobs and other economic benefits in rural communities. In order to adequately prepare Pennsylvania's workforce to meet the demand for new dairy positions as well as additional positions that are opened as a result of turnover, more specialized educational programs are needed at various levels.

The senior and middle dairy manager focus groups revealed competency areas that are not traditionally thought of as part of dairy production. These emerging competency areas such as human resource, information, purchasing, sales and marketing management, as well as public relations were all identified as major weaknesses, even among managers who belong to the Professional Dairy Managers of Pennsylvania. At the same time, traditional competencies such as youngstock, reproductive, milking, financial and herd health management remain problematic for large numbers of dairy managers. Existing programs meant to prepare dairy managers should be critically compared to the senior and middle manager competency profiles; where appropriate, changes should be made to curriculums that reflect the competencies needed by managers in modern dairy businesses.

Although advanced degrees (beyond high school) were not required for the types of dairy positions included in the survey, nearly 45 percent of the respondents surveyed indicated that they desire herd managers to have an associate's degree and nearly 40 percent indicated a desire to have herd managers have a bachelor's degree. Unfortunately, no two-year or associate degree level programs for dairy management exist within Pennsylvania. Survey respondents indicated 5.82 on a seven-point scale that having such a program is important in Pennsylvania. Additionally, 78 percent felt that from 1 to 10 people from their geographic area would enroll. Research with a larger sample size is needed to determine if a two-year program in dairy is warranted. If appropriate, the General Assembly could offer funding and support to start a two-year program for dairy managers.

Employment opportunities at the production technician level should not be overlooked. The classic entry-level dairy position of milker averages $8.39 per hour plus a variety of valuable benefits (Table 2 – 36), and averages about 45 hours per week. Other entry-level positions such as feeders, mechanics, and machinery operators are also available in dairy businesses. Wages in these positions are comparable to other rural industries and exceed wages typically offered in businesses, such as restaurants and retail sales (Pennsylvania Department of Labor and Industry, 2003).

Programs on the secondary level should prepare students to take jobs at the production technician level and hopefully to advance from there. Continuing education opportunities can help production technicians prepare for jobs in dairy management. An effort is currently underway at Penn State with support from the Pennsylvania Department of Agriculture to develop a certificate-level program in dairy production. The General Assembly could provide additional funding and other support to help this program.

Industry Promotion and Networking

Educational programs cannot effectively prepare potential employees if they are not aware of job opportunities in the industry. As a first step, the results of this study should be shared with secondary teachers and career counselors. Community job placement personnel should also be

made aware of the results. The Pennsylvania Department of Agriculture and the Department of Community and Economic Development could develop a statewide program to promote employment opportunities in dairy farm businesses, this would help residents of rural communities become aware of and find good positions in the dairy industry.

Another effort of a "PA Dairy Jobs" promotion could be to provide up-to-date information about the dairy industry to teachers, career counselors and economic development groups. This could include opportunities for visiting modern dairy farms that would help to broaden these professionals' view of available jobs.

Innovative Dairy Partnerships Grant

The dairy industry is native to rural Pennsylvania and it can serve as an important source of jobs in the future. The General Assembly could provide a fund to support local partnerships that are specifically designed to bring local employees, dairy businesses, and the larger community together for mutual economic growth and benefit. Some examples of projects that would qualify for these funds include:

- Secondary agriculture education or community college programs that partner with Cooperative Extension, producer groups, and agribusiness organizations to improve development and delivery of dairy production programs.

- Summer camps or similar programs designed to get youth exposed to the modern dairy industry. These could be promoted in more urban areas as well to attract people who might become interested in the applied animal sciences.

- Local opportunities for career counselors and economic development professionals to network with key dairy groups and individual producers. This would introduce these important influencers to potential opportunities in the modern dairy industry.

In summary, it is important to note that the dairy industry has a very strong history of providing jobs and other economic contributions to local rural communities. Pennsylvania's natural environment is conducive to dairying and its rural communities are supportive. This study points out that the dairy industry provides quality jobs, but not everyone is aware of them. Finally, there is a need for improvement and expansion of the dairy workforce development structure to meet the needs of a rapidly changing industry.

V. References

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VI. Appendix

Table 1-A

Customized Occupational Profile of Senior Dairy Managers

COMPETENCY AREAS	TASKS											
A. RESPONSIBILITY: STRATEGIC PLANNING												
	A-1 Establish and advise a board of directors Develop mission statement and philosophy	**A-2** Develop and implement long-term strategy for business	**A-3** Develop marketing and sales plan	**A-4** Develop financial plan and budgets	**A-5** Develop human resource plan including succession plan	**A-6** Develop a herd management plan	**A-7** Develop a land management program	**A-8** Develop a Crop management plan	**A-9** Develop an Operations management plan	**A-10** Develop information management plan	**A-11** Develop a risk management and exit plan	**A-12** Negotiate legal issues
B. RESPONSIBILITY: PURCHASING, SALES AND MARKETING												
	B-1 Develop marketing plan	**B-2** Identify customers and quality and quantity expectations	**B-3** Identify vendors and suppliers and quality and quantity expectations	**B-4** Check and compare commodity prices, milk, corn, SBM etc.	**B-5** Negotiate sales contracts	**B-6** Negotiate purchase contracts	**B-7** Market and sell excess cows and crops	**B-8** Market TMR's	**B-9** Investigate other sources of income			
C. RESPONSIBILITY: FINANCIAL PLANNING												
	C-1 Select and meet with accountant	**C-2** Set up and review financial plan and budgets	**C-3** Make purchase, lease and investment decisions	**C-4** Develop tax strategies	**C-5** Purchase and track inventory and supplies	**C-6** Evaluate financial performance	**C-7** Develop strategies to improve financial performance	**C-8** Oversee financial record keeping	**C-9** Maintain financial relationships	**C-10** Review insurance needs and costs	**C-11** Compile and review monthly and quarterly reports	**C-12** Compare performance to peer benchmarks
		C-2-a Review cash flow, income, expenses, payroll with accountant	**C-2-b** Project costs and income	**C-2-c** Manage cash flow (accounts payable and accounts receivable)	**C-2-d** Manage financing		**C-7-a** Explore opportunities for excess assets	**C-7-b** Explore opportunities to cut costs	**C-7-c** Explore opportunities to improve efficiency	**C-7-**d Explore opportunities to refinance loans	**C-7-e** Identify and maximize limiting resource	
D. RESPONSIBILITY: HUMAN RESOURCE MANAGEMENT												

COMPETENCY AREAS	TASKS											
	D-1 Develop human resource plan, staffing plan and position descriptions	**D-2** Recruit and staff operations	**D-3** Administer fulltime and custom employee contracts	**D-4** Administer employee compensation and benefits packages	**D-5** Coordinate actions of management team	**D-6** Supervise middle managers/assistants	**D-7** Train, educate and develop employees	**D-8** Establish employee schedules	**D-9** Build employee trust, confidence and morale	**D-10** Develop communications with and between managers and employees	**D-11** Evaluate employee performance	**D-12** Develop protocols and employee manual
									D-9-a Celebrate successes	**D-9-b** Walk around or be around	D-9-c Set up and attend manager and employee meetings	**D-9-d** Assist employees
E. RESPONSIBILITY: HERD MANAGEMENT												
	E-1 Select and meet with veterinarian	**E-2** Establish and maintain milking program	**E-3** Maintain purebred registration certificates	**E-4** Manage breeding program	**E-5** Coordinate feed needs with crop production	**E-6** Monitor milk production and quality records	**E-7** Develop and manage nutrition program					
				E-4-a Track herd inventory	**E-4-b** Monitor reproductive health and status	**E-4-c** Review culling recommendations	**E-4-d** Select replacement sires	**E-4-e** Schedule reproductive tasks	**E-4-**f Deliver calves	**E-4-**g Manage youngstock program and examine fresh cows	**E-4-h** Raise replacements	**E-4-i** Review progress with heifer grower
F. RESPONSIBILITY: HERD HEALTH MANAGEMENT												
	F-1 Select and meet with veterinarian	**F-2** Develop and manage mastitis control program	**F-3** Develop and manage vaccination program	**F-4** Develop and manage hoof care program	**F-5** Maintain health certifications	**F-6** Maintain hospital pen						
G. RESPONSIBILITY: LAND MANAGEMENT												

COMPETENCY AREAS	TASKS											
	G-1 Develop land management plan	**G-2** Select and meet with agronomist and crop advisor	**GI-3** Determine land need and inventory land	**G-4** Secure acreage for crops. Make real estate purchase/sale decisions	**G-5** Review and update leases with landlords	**GI-6** Manage marginal areas and identify and evaluate other uses of land	**G-7** Make improvements to real estate	G-**8** Maintain and review records	**G-9** Develop water run off control plan	**G-10** Develop soil erosion control plan	**G-11** Control air quality and maintain records	**G-12** Control water quality and maintain records
H. RESPONSIBILITY: CROP MANAGEMENT												
	H-1 Develop crop management plan	**H-2** Establish crop rotation plan and schedule	**H-3** Develop pesticide program	**H-4** Select and purchase crop seeds and supplies	**H-5** Plan, schedule and plant crops	**H-6** Schedule field operations	**H-7** Test forage quality	**H-8** Schedule and harvest crops	**H-9** Maintain and review records	**H-10** Explore alternatives to conventional cropping systems		**H-12** Find replacement feed for drought emergency
I. RESPONSIBILITY: OPERATIONS MANAGEMENT												
	I-1 Develop operations plan	**I-2** Conduct regulatory inspections and file required reports	**I-3** Monitor and control inventories	**I-4** Schedule field and farm equipment inspection and maintenance	**I-5** Schedule parlor and herd equipment inspection and maintenance	**I-6** Schedule property, buildings, and roadway inspection and maintenance	**I-7** Transport crops and milk sold and feed and supplies purchased	**I-8** Schedule contract services	**I-9** Develop emergency response procedures	**I-10** Network all areas of the business	**I-11**	**I-12**
J. RESPONSIBILITY: COMMUNITY SERVICE/PUBLIC RELATIONS												
	J-1 Serve on local, regional, and state cooperative boards	**J-2** Serve on local, regional and state dairy industry boards and organizations	**J-3** Serve on local, regional and state farm industry boards and organizations	**J-4** Work with local, regional and state legislature	**J-5** Support local organizations (youth, schools, civic, fire, government, etc.)	**J-6** Support local, regional, state environmental actions	**J-7** Improve communications between farmers and consumers	**J-8** Maintain good Public relations	**J-9** Manage conflict resolution between business and public	**J-10** Improve communications between farmers and non-farmers	**J-11**	**J-12**
								J-8-a Keep neighbors informed	**J-8-b** Present you farm to the public	**J-8-c** Have a farm public relations web site	**J-8-d** Publish a newsletter	**J-8-e** Act as a resource for reporters

Table 1-B

Customized Occupational Profile of Middle Dairy Managers

COMPETENCY AREAS	TASKS											
A. RESPONSIBILITY: HUMAN RESOURCE MANAGEMENT												
	A-1 Interview applicants and make hiring recommendations	**A-2** Administer employee benefits	**A-3** Schedule employees, work and tasks	**A-4** Communicate to and with employees	**A-5** Assist with personal problems of employees	**A-6** Monitor and track employee performance	**A-7** Evaluate employee performance and recommend for raise or incentive	**A-8** Manage conflict	**A-9** Communicate with and for Hispanic employees	**A-10** Schedule sub-contractor labor	**A-11** Plan and coordinate summer intern program	**A-12** Attend and conduct meetings with employees
	A-13 Manage incentive program	**A-14** Inspire and motivate employees	**A-15** Discipline and terminate employees	**A-16** Develop systems for employee input								
B. RESPONSIBILITY: EMPLOYEE DEVELOPMENT												
	B-1 Interact with employees on a regular basis	**B-2** Communicate company mission, vision, core values to employees	**B-3** Provide training/education opportunities for employees	**B-4** Train new and current employees	**B-5** Challenge employees about their technical proficiencies	**B-6** Develop systems for employee feedback	**B-7** Train employees to set goals and create plans to achieve them	**B-8** Build a culture of discipline - focused, goal-driven action by all employees				
C. RESPONSIBILITY: QUALITY CONTROL AND STANDARD OPERATING PROCEDURES (SOP)												
	C-1 Identify and communicate problems to senior management	**C-2** Work with advisors and employees to implement SOP's and protocols	**C-3** Monitor milk quality	**C-4** Insure correct operation of equipment	**C-5** Identify problems and recommend improvements and new procedures	**C-6** Test for antibiotics before the milk leaves the farm	**C-7** Inspect and change milk trailers	**C-8** Work with inspectors and resolve issues				
D. RESPONSIBILITY: REPRODUCTIVE MANAGEMENT												
	D-1 Setup breeding program	**D-2** Record and observe cows for heats	**D-3** Breed heifers and cows	**D-4** Manage semen inventory	**D-5** Artificially inseminate cows and heifers	**D-6** Administer hormone breeding program	**D-7** Administer pregnancy checks	**D-8** Evaluate reproductive performance	**D-9** Prepare weekly herd check list			
E. RESPONSIBILITY: YOUNGSTOCK MANAGEMENT												

COMPETENCY AREAS	TASKS											
	E-1 Consult with veterinarian as needed	**E-2** Monitor health and growth of new calves	**E-3** Interact with calf grower	**E-4** Identify, move, group and treat heifers	**E-5** Feed and care for new calves including all prescribed health procedures	**E-6** Measure growth and maintain records	**E-7** Dehorn calves	**E-8** Wean calves	**E-9** Consult with nutritionist if needed			
F. RESPONSIBILITY: HERD MANAGEMENT												
	F-1 Collect and maintain data on cows	**F-2** Walk through the barns observing cows and facilities	**F-3** Find, evaluate, and purchase heifers and cows	**F-4** Recommend culling decisions	**F-5** Move cows from far away dry pen to close-up dry pen weekly	**F-6** Schedule bedding	**F-7** Setup milk pickup with milk hauler	**F-8** Coordinate cattle handling and movement	**F-9** Observe close-up cows and assist with calf delivery as needed	**F-10** Evaluate emergencies and call veterinarian as needed		
G. RESPONSIBILITY: HERD HEALTH MANAGEMENT												
	G-1 Consult with veterinarian	**G-2** Observe cows for health problems and provide treatment	**G-3** Record cow treatments and health records	**G-4** Administer vaccination program	**G-5** Administer mastitis program	**G-6** Administer hoof trimming program	**G-7** Administer foot bath program	**G-8** Monitor and adjust feeding program	**G-9** Dry off cows weekly	**G-10** Complete postpartum health check daily of fresh cows	**G-11** Supplement BST injections and exclusions	
H. RESPONSIBILITY: FEED MANAGEMENT												
	H-1 Consult nutritionist	**H-2** Project current and future needs and develop feed plan	**H-3** Coordinate feed needs and order feed	**H-4** Inspect and maintain feed and feed inventories	**H-5** Develop feeding schedule and feed cows	**H-6** Monitor feed intake and maintain records	**H-7** Communicate feed changes to feed technicians	**H-8** Test forages	**H-9** Evaluate particle length	**H-10** Analyze manure samples	**H-11** Consult with herd health manager	**H-12**
I. RESPONSIBILITY: MILKING MANAGEMENT												
	I-1 Develop standard operating procedures for milking	**I-2** Develop milking schedule	**I-3** Maintain and monitor milk production records	**I-4** Check milk pad after milking	**I-5** Check parlor supplies	**I-6** Clean and maintain parlor	**I-7** Provide proper identification of cows in parlor	**I-8** Monitor herd somatic cell count	**I-9** Monitor herd fat and protein levels	**I-10** Consult with herd health manager	**I-11**	**I-12**
J. RESPONSIBILITY: INFORMATION MANAGEMENT												

COMPETENCY AREAS	TASKS										
	J-1 Maintain computers, office network and information systems	**J-2** Develop records and data systems (entry, collection, forms, reports, analysis, etc)	**J-3** Collect daily, weekly, monthly information on production, reproduction, culling, feed data, etc.	**J-4** Maintain records for all herd and business needs	**J-5** Analyze data for information and to support decision making	**J-6** Send collected information to employer, veterinarians and consultants	**J-7** Access and report financial and operational information requested by management					
K. RESPONSIBILITY: OPERATIONS MANAGEMENT												
	K-1 Provide on call support for operation	**K-2** Maintain cleanliness of facilities - inside and out	**K-3** Develop equipment maintenance plan and schedule	**K-4** Contract for maintenance services	**K-5** Plan and coordinate maintenance service for equipment	**K-6** Keep service records on equipment	**K-7** Prepare maintenance reports	**K-8** Monitor and adjust environment for cow comfort	**K-9** Monitor manure removal system	**K-10** Control pests	**K-11** Identify and evaluate areas that need to be upgraded	**K-12** Provide information to management, employees, and resource people
					K-5-a Monitor and maintain automatic take-off performance	**K-5-b** Monitor and maintain bulk tank and cooling system performance	**K-5-c** Monitor and maintain air compressor performance	**K-5-d** Monitor and maintain driveways and access lanes	**K-5-e** Monitor and maintain feeding equipment	**K-5-f** Monitor and maintain parlor equipment	**K-5-g** Monitor and maintain barn equipment	**K-5-h** Monitor and maintain waterers
L. RESPONSIBILITY: FINANCIAL MANAGEMENT												
	L-1 Meet with accountant as needed	**L-2** Develop and monitor financial budgets	**L-3** Prepare financial reports	**L-4** Prioritize spending decisions	**L-5** Purchase and track inventory and supplies	**L-6** Present cost analysis on equipment	**L-7** Evaluate and purchase insurance	**L-8** Evaluate risk management opportunities	**L-9** Evaluate return on investment for new products and opportunities	**L-10** Inventory and order feed, herd and farm supplies, services, and medications	**L-11** Develop vendor relationships	**L-12** Explore ways to increase purchasing power, buying group, combining purchases etc
		L-2-a Review cash flow, income, expenses, payroll	**L-2-b** Review bills and payments for accuracy (internal audits)	**L-2-c** Manage cash flow (accounts payable and accounts receivable)								
M. RESPONSIBILITY: PROFESSIONAL DEVELOPMENT												

COMPETENCY AREAS	TASKS											
	M-1 Read industry trade journals	**M-2** Stay informed on dairy market information	**M-3** Stay current on technology, research, etc (continuing education)	**M-4** Interact with the larger industry (professionals, consultants, advisors, contacts, etc)	**M-5** Learn Spanish	**M-6** Participate in industry conferences, seminars, other events	**M-7** Participate in dairy industry organizations (PDMP, etc)					
N. RESPONSIBILITY: COMMUNITY SERVICE/PUBLIC RELATIONS												
	N-1 Support local organizations (youth, schools, civic, fire, government, etc.)	**N-2** Create a good public image	**N-3** Improve communications between farmers and consumers	**N-4** Keep neighbors informed	**N-5** Present positive picture of milk quality being produced	**N-6** Create a positive image for agriculture in general and dairy in particular and our farm specifically	**N-7** Instruct employees how to interact with the community (catch-phrases, expected activity, etc)	**N-8** Schedule manure hauling with respect to neighbors and local activities				
		N-2-a Maintain a clean, attractive facility	**N-2-b** Create "good neighbor" opportunities (ex. plowing snow, providing tillage, etc.)	**N-2-c** Present farm to the public	**N-2-e** Give farm tours							

Table 1-C

Occupational Profile of Dairy Production Technicians

COMPETENCY AREAS	TASKS											
A. RESPONSIBILITY: CALF AND HEIFER CARE												
	A-1 Feed colostrum to newborn calves within four hours of birth	**A-2** Feed individual and groups of calves the correct quantity and type of feeds	**A-3** Follow colostrum handling and storage procedures to maintain quality	**A-4** Follow farm weaning procedures	**A-5** Use and esophageal feeder	**A-6** Identify signs of common diseases in calves (scours, respiratory problems, dehydration)	**A-7** Identify significant changes in feed intake from day to day	**A-8** Administer treatments to sick calves and heifers	**A-9** Administer vaccinations and parasite control	**A-10** Dehorn calves	**A-11** Keep health records	**A-12** Should handle calves in a calm, professional manner
B. RESPONSIBILITY: REPRODUCTION TASKS												
	B-1 Record cow identification and heat sign(s) displayed	**B-2** Identify primary and secondary signs of cows in heat	**B-3** Apply and interpret heat detection aids (tail chalk, Kamar)	**B-4** Record important breading information	**B-5** Evaluate reproductive records	**B-6** Recognize obvious reproductive disorders	**B-7** Administer hormones for reproductive (Ov-synch) programs	**B-8** Assist in herd checks	**B-9** Prepare frozen semen for insemination	**B-10** breed/inseminate cows	**B-11** Handle and store semen	
C. RESPONSIBILITY: FEEDING TASKS												
	C-1 Accurately weigh feed ingredients for a TMR	**C-2** Follow procedures for TMR mixing time and order of ingredients	**C-3** Operate feeding equipment properly and safely	**C-4** Maintain a clean feedbunk	**C-5** Weigh feed refusals	**C-6** Examine feed for contamination (mold, spoilage, unusual ingredients)	**C-7** Identify common grains, concentrates, minerals, vitamins, and additives	**C-8** Inspect waterers for cleanliness and proper function	**C-9** Take representative forage samples	**C-10** Check water sources (troughs, cups) to ensure adequate supply and cleanliness	**C-11** Evaluate forage quality by sight and smell	**C-12** Monitor feed inventory
	C-13 Communicate with nutritionist about feed-related issues											
D. RESPONSIBILITY: MILKING TASKS												

COMPETENCY AREAS	TASKS											
	D-1 Behave in a calm manner that minimizes stress on cows	**D-2** Adequately stimulate teats to encourage milk letdown	**D-3** Prep and attach milking units in a timely manner that encourages milk letdown and cow flow	**D-4** Practice good milking hygiene (clean teats, milking units, and hands)	**D-5** Correctly identify when milking unit re-attachment is necessary	**D-6** Identify an inflamed (hot/swollen) udder	**D-7** Change inflations/airtubes	**D-8** Recognize when equipment is malfunctioning	**D-9** Follow equipment cleaning procedures	**D-10** Safely use cleaning chemicals	**D-11** Identify abnormal milk	**D-12** Use milk tests (such as Delvo) to check milk for antibiotics
	D-13 Access and enter information in record systems (computer or paper)	**D-14** Administer dry cow treatments	**D-15** Perform a California Mastitis Test (CMT) test	**D-16** Collect aseptic milk samples for culture	**D-17** Clip or flame udders to remove hair	**D-18** Identify edema in cows after freshening	**D-19** Make recommendations on cull candidates (clinical mastitis, slow milker, kicker, etc.)					
E. RESPONSIBILITY: ANIMAL HEALTH												
	E-1 Read and follow directions on drug and vaccine labels	**E-2** Read and follow directions from a veterinarian	**E-3** Administer injections to cows	**E-4** Administer oral treatments (drench, bolus)	**E-5** Provide assistance to animals in labor	**E-6** Safely restrain (lock up) a cow	**E-7** Administer IV (intravenous) treatments such as calcium, fluids, etc	**E-8** Visually observe changes in individual animal health status	**E-9** Identify an abnormal (sick) cow in a group of normal cows	**E-10** Recognize when a cow is in the beginning stages of labor	**E-11** Decide in a timely manner when to contact a veterinarian or other assistance	**E-12** conduct a basic health examination (check temperature, listen to heart/ lungs, check for DA/twisted stomach)
	E-13 Revive a newborn calf	**E-14** Collect urine samples to measure pH, ketones, etc	**E-15** Draw blood samples	**E-16** Body condition score cows	**E-17** Use a locomotion scoring system to identify foot and leg problems	**E-18** Toggle cows in Da's						
F. RESPONSIBILITY: BARN ENVIRONMENT TASKS												
	F-1 clean barns and other facilities as appropriate (stalls, alleys, parlor, storage, feed areas, etc.)	**F-2** Check gates and doors to ensure they properly latch	**F-3** Maintain bedding/resting areas	**F-4** Adjust ventilation systems as necessary	**F-5** Recognize ventilation problems	**F-6** Should understand manure removal equipment and me able to repair minor equipment problems						
G. RESPONSIBILITY: BASIC WORK SKILLS												

COMPETENCY AREAS	TASKS											
	G-1 Interact with animals calmly and without unnecessary disturbance	**G-2** Follow accepted safety practices when working with animals	**G-3** Practice self management (is on-time, works at a reasonable pace, maintains internal motivation)	**G-4** Communicate work-related information with appropriate farm personnel	**G-5** Recognize the difference between work that is well done and work that is poorly done	**G-6** Work as a team member to solve problems and improve work processes	**G-7** Make basic work-related decisions	**G-8** Calculate basic arithmetic functions	**G-9** Read with understanding	**G-10** Identify opportunities for improving work processes	**G-11** Resolve conflicts with other farm personnel	**G-12** Understand dairy farming is a 365 day/year job

Table 1-D

Detailed Competency Assessments of Managers and Employees

Table 1-1

Range, Mean, and Standard Deviation of Production Employee Competencies as Assessed by Dairy Managers

Competency Area	n	Min	Max	Mean	SD
Feeding	63	2	7	5.48	1.26
Animal health	61	2	7	5.43	1.23
Reproduction	62	1	7	5.34	1.38
Milking	64	3	7	5.27	1.00
Barn and facilities maintenance	65	4	7	5.25	1.00
Young stock raising	54	1	7	5.22	1.31
Basic work skills	65	3	7	4.49	1.12

Scale: 1=Very low, 2=Low, 3=Below average, 4=Average, 5=Above average, 6=High, 7=Very high

Table 1-2

Range, Mean, and Standard Deviation of Self Assessed Competency Levels of All Dairy Managers

Competency Area	n	Min	Max	Mean	SD
Herd management	62	3	7	5.29	1.08
Herd health management	63	3	7	5.25	1.09
Operations management	64	3	7	5.20	1.10
Community service/Public relations	62	2	7	4.98	1.15
Human resource management	64	2	7	4.73	1.25

Scale: 1=Very low, 2=Low, 3=Below average, 4=Average, 5=Above average, 6=High, 7=Very high

Table 1-3

Range, Mean, and Standard Deviation of Self Assessed Competency Levels of Middle Managers

Competency Area	n	Min	Max	Mean	SD
Feed management	21	3	7	5.71	1.23
Milking management	26	4	7	5.38	1.10
Quality control and standard operating procedures	28	4	7	5.32	0.86
Information management	27	3	7	5.26	1.32
Reproductive management	26	3	7	5.00	1.41
Youngstock management	23	3	7	4.96	1.22
Financial management	23	1	7	4.91	1.53

Scale: 1=Very low, 2=Low, 3=Below average, 4=Average, 5=Above average, 6=High, 7=Very high

Table 1-4

Range, Mean, and Standard Deviation of Self Assessed Competency Levels of Senior Managers

Competency Area	n	Min	Max	Mean	SD
Strategic planning	44	3	7	5.16	0.89
Purchasing, sales, and marketing	42	4	7	5.14	0.98
Financial planning	43	3	7	5.00	1.09
Land management	41	2	7	5.32	1.11
Crop management	41	1	7	5.29	1.23

Scale: 1=Very low, 2=Low, 3=Below average, 4=Average, 5=Above average, 6=High, 7=Very high

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