Economic Costs and Labor Efficiencies Associated with Raising Dairy Herd Replacements on Wisconsin Dairy Farms and Custom Heifer Raising Operations

2007

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INTRODUCTION

The cost of raising dairy calves and replacement heifers is very significant on Wisconsin dairy farms. Calculating the costs associated with raising dairy calves and heifers is an essential part of dairy business management. To augment individual dairy calf and heifer cost of production analysis, the dairy industry also requires a set of benchmark cost of production data in which individual business costs and labor and management efficiencies can be compared. The objective of this project was to evaluate the economic costs and labor efficiencies associated with raising dairy herd replacements on Wisconsin dairy farms and custom calf and heifer raising operations.

METHODS

A computer model, Intuitive Cost of Production Analysis, **(ICPA)** was written in 1997 and formally published in 2003 (MPS, 2003). A beta test of the ICPA model was conducted in 1998 and reported (Hoffman, et al., 1999) the costs of raising dairy herd replacements. Due to inflation and changing economic dynamics in the dairy industry, the cost of raising dairy calves and heifers published in 1999 has become obsolete. As a result, a new ICPA field project was initiated in 2007 which evaluated the cost of production of dairy calf (n=40) and dairy heifer (n=44) enterprises on commercial dairy and custom heifer raising operations. Operations were divided into two dairy operation categories, (tie-stall dairy, free-stall dairy) and one custom calf and heifer grower category in an attempt to represent a broad spectrum of the Wisconsin calf and heifer industry. The two dairy operation categories were selected solely on the basis of how lactating cows were milked on the operation. The ICPA evaluation field input data were collected by 21-county based University of Wisconsin-Extension Agriculture Agents. Data were edited for practical errors and entered into the ICPA model by a single technician to avoid errors. Calf and heifer enterprise summary statistics, including comparisons to the 1998 ICPA data, were developed for the entire data set (49 operations total) and for each operational category. Tables 1-4 summarize calf information. Tables 5-9 summarize heifer information. Table 10 describes the total costs associated with raising a dairy replacement from birth to freshening.

To avoid variation in calf and heifer raising cost calculations solely due to price and values of some common inputs, prices of some values were pre-assigned. Pre-assigned values used in the ICPA model to calculate variable and opportunity cost for calf and heifer rearing enterprises are listed below. All other values used to calculate variable costs were operation-specific.

Key Assumptions Used in Costs Associated with Raising Calves and Heifers		
Item	**Unit**	**Assigned Values**
Calf Enterprise		
Calf	An animal raised from birth until she is moved to group housing.	
Calf Value	$ per calf	$500.00
Labor (paid and unpaid)	$ per hour	$12.00
Management (paid and unpaid)	$ per hour	$20.00
Interest Rate	%	8.0%
Waste Milk	$ per hundred weight	$3.00
Heifer Enterprise		
Heifer	An animal raised in a group setting until she freshened, or in the case of the custom grower until she was returned to the producer.	
Legume Silage, 100% Dry Matter (DM)	$ per ton	$100.00
Corn Silage, 100% DM	$ per ton	$85.00
Corn, 100% DM	$ per ton	$116.00
Cow waste, 100% DM	$ per ton	$100.00
Soybean Meal, 100% DM	$ per ton	$200.00
Labor	$ per hour	$12.00
Management	$ per hour	$20.00
Interest Rate	%	8.0%

Because of large variations in the age, design, and condition of buildings and equipment on survey operations, no single method of determining fixed costs adequately fits all situations. In an effort to standardize fixed costs of facilities for each operation, a replacement value for calf and heifer facilities was assigned using the following guidelines.

Valuation of Calf and Heifer Facilities (Replacement Value)		
Item	**Unit**	**Replacement Value**
Homemade Calf Hutch	$ per hutch	$200.00
Purchased Calf Hutch	$ per hutch	$300.00
Self-Cleaning Floor Barn	$ per square foot	$15.00
Greenhouse Barn	$ per square foot	$10.00
Post-Frame Calf Barn	$ per square foot	$12.00
Bedded Pack Barn	$ per square foot	$15.00
Freestall Barn	$ per square foot	$20.00
Mound System	$ per square foot	$0.09
Concrete Lot	$ per square foot	$3.00
Dirt Lot	$ per square foot	$0.09

Most operations had used facilities and equipment that were not fully depreciated and were considered to have a practical alternative use. The following is a description of how the fixed costs were determined for these circumstances.

Determining Annual Fixed Costs for Facilities (most common situation)

Step 1: Facilities were inventoried on participating farms and were assigned a current replacement value using the cost estimates above minus a 5 percent salvage value. These values were used in Tables 1, 2, 3, 5, 6, and 7 for the Alternative Total Fixed Cost (All New Facilities and Equipment) line.

Step 2: The current un-depreciated value of facilities was calculated, considering the age of the facilities and using a 30-year useful life straight-line depreciation if facilities were more than 30 years of age, 5 percent of the replacement value was used as current value.

Step 3: Annual fixed cost of facilities were established using 15 percent of current value to account for the annual costs of depreciation, interest, repairs, taxes, and insurance. These were the values primarily used in the tables.

Determining Annual Fixed Costs for Equipment

Step 1: Equipment was inventoried on participating farms and the replacement value of all equipment was directly estimated by the owners. The estimated replacement value less ten percent salvage value became the replacement value. These values were used in Tables 1, 2, 3, 5, 6, and 7 for the Alternative Total Fixed Cost (All New Facilities and Equipment) line.

Step 2: The current un-depreciated value of equipment was calculated considering the age of the equipment and using straight line depreciation with a useful life of 20 years for non-motorized equipment and 10 years for motorized equipment. Ten percent of the estimated replacement value was used as the current value for non-motorized equipment older than 20 years and for motorized equipment older than 10 years.

Step 3: Annual fixed cost of equipment was established using 15 percent of current value to account for the annual costs of depreciation, interest, repairs, taxes, and insurance. These were the values primarily used in the tables.

Determining Alternate Fixed Costs (All New Facilities and Equipment)

Although few in number, dairy and custom heifer operations planning to acquire all new facilities and equipment for raising dairy heifers or who will pay new price for existing facilities would have significantly higher future annual fixed costs of facilities and equipment.

In selected tables accompanying this report, the high extreme of annual fixed cost is shown in the average column and described as Alternate Fixed Costs (All New Facilities and Equipment). It was estimated by multiplying the full replacement value minus salvage value times the percentage described above to represent the annual costs of depreciation, interest, repairs, taxes, and insurance for all new facilities and equipment.

Determining Alternate Fixed Cost (Fully Depreciated Facilities and Equipment)

Likewise, while few in number, there may be dairy or heifer raising operations that may operate facilities and equipment that are fully depreciated. These facilities may be functional, but have no practical alternative use. This scenario represents the low extreme of annual fixed costs of facilities and equipment. In such a case, fixed cost would not include depreciation and interest with cost being primarily repairs, taxes, and insurance. In selected tables accompanying this report, the low extreme of annual fixed cost is shown and described as Alternate Fixed Costs (Fully Depreciated Facilities and Equipment). Fixed cost for fully depreciated facilities and equipment was estimated to be 10 percent of the alternate total fixed cost for that operation calculated for all new facilities and equipment.

RESULTS

Comparison of the Costs Associated With of Raising Dairy Herd Replacements from 1998 to 2007 (see Tables 4 and 8).

The cost of raising dairy replacements has increased from 1999 to 2007, but comparisons should be interpreted with some caution. While the effort to estimate these costs was similar between both years, there are some important differences. First the assigned opportunity cost of the calf was $100 in 1998 and $500 in 2007. Secondly, the assigned labor and management rates were $12.00 and $20.00 per hour respectively, in 2007 compared to $7.00 and $12.00 per hour respectively, in 1998. These costs were raised to reflect the increase in the value of female dairy calves, and labor and management costs. Of the nearly $788 increase in cost of raising a dairy replacements from birth to freshening, about $148 resulted from the increase in assigned labor and management value and another $400 was from an increase in the value assigned to the calf, for a total of $548.

Comparing the Cost of Raising Dairy Herd Replacements by Custom vs. Non-Custom Growers in the Data (see Tables 2, 3, 6 and 7).

Tables 2, 3, 6 and 7 show noticeable differences between dairy producers and custom calf-heifer growers in the cost required to raise dairy calves or heifers. This project was not designed to determine the reasons for these cost differences. It is reasonable and informative to describe some differences in management practices between dairy and custom calf-heifer operations that have been observed to reduce costs. This may aid readers in evaluating the reasons for cost differences.

There are some notable differences in common management practices between custom calf-heifer growers and dairy operations in raising dairy calves and heifers. First, dairy operations rely mainly on lactating cattle for income. As a result they tend to focus much of their management efforts on the lactating cattle which may subsidize calf and heifer raising enterprises.

In contrast, custom calf-heifer growers raising dairy calves and heifers for their livelihood often do not have another like enterprise to subsidize their custom raising business. Thus the

motivation of calf-heifer growers to maximize efficiency and minimize operation cost is inherent to the operation of such a business.

Second, as milk prices decrease or costs (feed, energy, etc.) increase, dairy operations offset some profit margin erosion by increased productivity from genetic progress. Custom calf-heifer growers typically do not benefit from genetic progress because genetic selection for milk production does not result in improved calf and or heifer feed efficiency. In fact some research data would suggest genetic selection for improved milk production results in a negative effect on heifer feed efficiency. Consequently, as costs in general increase, custom calf-heifer growers have one less management option in coping with profit margin erosion. The three most obvious management options for custom calf-heifer growers to maintain profit margins are:

1. Reduce costs as much as possible by increasing labor efficiency, using less expensive feeds, etc.
2. To increase their operation and capture efficiencies due to size and scale.
3. Increase the price charged for raising replacements.

Reviewing data collected in this project, it appears custom calf-heifer growers have been effective in reducing some costs as compared to the dairy operations surveyed. Some management practices that may have helped custom calf –heifer growers reduce costs were noted by the authors:

1. Almost all large custom calf raisers used pasteurized waste milk. They bought waste milk from local farms for $2.00-3.00/per hundred weight instead of using commercial milk replacer. Liquid feeding costs for calves were reduced 50-70 percent.

2. Labor efficiencies were higher for custom calf and heifer growers because custom growers generally handled higher numbers of calves and heifers than dairy operations.

3. Custom heifer growers used more unique feed ingredients as compared to dairy operations suggesting more management detail was paid to reduce feed cost.

Given the reasons listed above, it is logical that calf and heifer cost of production differences should exist between custom calf-heifer growers and dairy operations. However, each business situation is different and readers of this report are encouraged to use the report to help them understand their own cost structure and make better informed calf and heifer management decisions.

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Calf Enterprise Analysis Summaries
Costs associated with raising dairy replacement animals from birth to when they are moved to group housing.
Tables 1-4

Table 1. The average cost (including variation) to raise one calf on Wisconsin dairy and custom calf operations (n=40). [1]

Cost	Unit	Average	SD[3]	Operation[2] Low	Operation[2] High
Variable Cost					
Liquid Feed	$/calf	87.84	43.58	26.88	234.08
Calf Starter	$/calf	23.42	14.14	9.82	11.86
Forage	$/calf	0.96	2.09	0.00	0.00
Bedding	$/calf	6.80	7.77	1.44	0.63
Veterinary	$/calf	17.26	15.28	1.00	40.00
Death Loss	$/calf	14.66	12.10	15.65	42.76
Interest	$/calf	10.25	5.00	3.40	15.52
Paid Labor	$/calf	80.86	98.10	0.00	308.55
Paid Management	$/calf	4.19	6.89	0.00	26.00
Total Variable Cost	**$/calf**	**246.24**	**129.38**	**58.19**	**679.40**
Fixed Cost					
Calf Housing	$/calf	10.00	14.42	4.86	6.00
Calf Equipment	$/calf	2.05	2.91	0.19	0.28
Total Fixed Cost	**$/calf**	**12.05**	**9.78**	**5.05**	**6.28**
Allocated Cost (Variable Cost + Fixed Cost)	**$/calf**	**258.29**	**129.06**	**63.24**	**685.68**
Opportunity Cost of Unpaid Labor & Management	$/calf	67.79	105.56	13.15	0.00
Allocated Cost + Opportunity Cost of Unpaid Labor & Management	**$/calf**	**326.08**	**134.59**	**76.39**	**685.68**
Opportunity Cost of Calf	$/calf	500.00	N/A	500.00	500.00
Allocated Cost + Opportunity Cost of Unpaid Labor & Management, and Calf	**$/calf**	**826.08**	**134.59**	**576.39**	**1185.68**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/calf	29.18	N/A	N/A	N/A
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/calf	2.92	N/A	N/A	N/A
Summary					
Feed Cost	$/calf	112.31	46.83	36.70	245.94
Other Variable Cost (excluding Labor & Management)	$/calf	48.97	21.65	21.50	98.92
Labor & Management Cost (paid and unpaid)	$/calf	153.00	105.37	13.16	334.55
Total Fixed Cost	$/calf	12.05	9.78	5.05	6.28
Feed Cost	%	34.4	12.7	48.0	35.9
Other Variable Cost	%	15.0	7.1	28.1	14.4
Labor & Management Cost (paid and unpaid)	%	46.9	16.2	17.2	48.8
Total Fixed Cost	%	3.7	5.0	6.6	0.9
Labor & Management Required	days/year	249.7	626.8	28.2	135.1
Labor & Management Required	hours/calf	12.3	8.6	1.0	27.0
Labor Efficiency	calves/hour	7.9	5.6	26.8	2.3
Labor Efficiency	calves/day	62.8	44.9	214.6	18.7
Weaning Age	weeks	7.0	1.8	4.0	8.0
Days on Feed	days	61.4	17.3	28.0	63.0

[1]In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.
[2]Survey operations that had the lowest and highest allocated cost to raise calves.
[3]SD is the acronym for standard deviation. See glossary.

Table 2. Economic cost and labor required to raise one calf by operation type (n=40).[1]

Cost	Unit	Operation Type		
		Tie-stall	Free-stall	Calf grower
Number of Operations	n	15	21	4
Variable Cost				
Liquid Feed	$/calf	89.23	93.81	49.82
Calf Starter	$/calf	21.38	23.88	28.49
Forage	$/calf	1.15	1.01	0.00
Bedding	$/calf	8.51	5.97	4.97
Veterinary	$/calf	19.08	17.85	7.23
Death Loss	$/calf	14.79	15.53	9.35
Interest	$/calf	12.69	10.11	1.87
Paid Labor	$/calf	48.88	108.76	47.32
Paid Management	$/calf	3.19	5.28	1.93
Total Variable Cost	**$/calf**	**218.88**	**282.21**	**150.98**
Fixed Cost				
Calf Housing	$/calf	11.04	7.51	19.77
Calf Equipment	$/calf	1.53	2.27	2.81
Total Fixed Cost	**$/calf**	**12.57**	**9.78**	**22.58**
Allocated Cost (Variable Cost + Fixed Cost)	**$/calf**	**231.44**	**291.99**	**173.55**
Opportunity Cost of Unpaid Labor & Management	$/calf	149.94	23.03	5.80
Allocated Cost + Opportunity Cost of Unpaid Labor & Management[2]	**$/calf**	**381.38**	**315.03**	**179.35**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/calf	45.55	17.58	31.64
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/calf	4.55	1.76	3.16
Summary				
Feed Cost	$/calf	111.75	118.70	78.31
Other Variable Cost (excluding Labor & Management)	$/calf	55.06	49.47	23.41
Labor & Management Cost (paid and unpaid)	$/calf	202.00	137.08	55.05
Total Fixed Cost	$/calf	12.57	9.78	22.58
Feed Cost	%	29.30	37.68	43.66
Other Variable Cost	%	14.44	15.70	13.05
Labor & Management Cost (paid and unpaid)	%	52.97	43.51	30.69
Total Fixed Cost	%	3.30	3.10	12.59
Labor & Management Required	days/year	71.31	209.97	1136.91
Labor & Management Required	hours/calf	16.04	11.10	4.58
Labor Efficiency	calves/hour	6.20	7.96	13.44
Labor Efficiency	calves/day	49.63	63.67	107.53
Weaning Age	weeks	7.54	6.83	6.38
Days on Feed	days	66.59	58.61	56.88

[1]In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.

[2]The typical custom calf grower in Wisconsin doesn't acquire ownership of the dairy replacement animal, while the other two operations do. Adding the opportunity cost of the calf to two systems and not to the third would distort comparison results provided by this table.

Table 3. Comparing the daily per calf raising cost by operation type (n=40).[1]

Cost	Unit	Operation Type			
		Tie-stall	Free-stall	Calf grower	All herds
Number of Operations	n	15	21	4	40
Variable Cost					
Liquid Feed	$/calf	1.44	1.63	0.88	1.49
Calf Starter	$/calf	0.33	0.40	0.51	0.39
Forage	$/calf	0.02	0.02	0.00	0.01
Bedding	$/calf	0.14	0.10	0.08	0.11
Veterinary	$/calf	0.35	0.32	0.13	0.31
Death Loss	$/calf	0.22	0.26	0.17	0.24
Interest	$/calf	0.18	0.17	0.03	0.16
Paid Labor	$/calf	0.70	2.01	0.81	1.41
Paid Management	$/calf	0.08	0.09	0.03	0.08
Total Variable Cost	**$/calf**	**3.45**	**5.01**	**2.63**	**4.20**
Fixed Cost					
Calf Housing	$/calf	0.16	0.13	0.37	0.16
Calf Equipment	$/calf	0.03	0.04	0.05	0.04
Total Fixed Cost	**$/calf**	**0.19**	**0.17**	**0.41**	**0.20**
Allocated Cost (Variable Cost + Fixed Cost)	**$/calf**	**3.63**	**5.18**	**3.05**	**4.40**
Opportunity Cost of Unpaid Labor & Management	$/calf	2.15	0.41	0.11	1.02
Allocated Cost + Opportunity Cost of Unpaid Labor & Management[2]	**$/calf**	**5.78**	**5.59**	**3.16**	**5.42**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/calf	0.73	0.31	0.58	0.49
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/calf	0.07	0.03	0.06	0.05

[1]In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of labels and terms used in this table.

[2]The typical custom calf grower in Wisconsin doesn't acquire ownership of the dairy replacement animal, while the other two operations do. Adding the opportunity cost of the calf to two systems and not to the third would distort comparison results provided by this table.

Table 4. Comparing the change in calf raising costs between 1998 and 2007.[1,2]

Item	Unit	Cost/calf 1998	Cost/calf 2007	% Change	% Change per year[3]
Variable Cost					
Liquid Feed	$/calf	35.51	87.84	147.4	16.4
Calf Starter	$/calf	21.00	23.42	11.5	1.3
Forage	$/calf	1.97	0.96	-51.2	-5.7
Bedding	$/calf	5.57	6.80	22.1	2.5
Veterinary	$/calf	8.43	17.26	104.8	11.6
Death Loss	$/calf	4.54	14.66	222.8	24.8
Interest	$/calf	3.40	10.25	201.5	22.4
Labor (Paid and Unpaid)[4]	$/calf	60.38	138.54	129.5	14.4
Management (Paid and Unpaid)[4]	$/calf	7.04	14.29	102.9	11.4
Total Variable Cost + Opportunity Cost of Unpaid Labor & Management	**$/calf**	**147.84**	**314.02**	**112.4**	**12.5**
Fixed Cost					
Calf Housing	$/calf	11.23	10.00	-11.0	-1.2
Calf Equipment	$/calf	1.19	2.05	72.4	8.0
Total Fixed Cost	**$/calf**	**12.42**	**12.05**	**-3.0**	**-0.3**
Allocated Cost (Variable Cost + Opportunity Cost of Unpaid Labor & Management + Fixed Cost)	**$/calf**	**160.26**	**326.07**	**103.5**	**11.5**
Opportunity Cost of Calf	$/calf	100.00	500.00	400.0	44.4
Allocated Cost + Opportunity Cost of Calf	**$/calf**	**260.24**	**826.07**	**217.4**	**24.2**
Summary					
Labor & Management Required	hours/calf	9.2	12.3	33.4	3.7
Labor Efficiency	calves/hour	9.1	7.9	-13.7	-1.5
Labor Efficiency	calves/day	72.6	62.8	-13.5	-1.5
Weaning Age	weeks	7.4	7.0	-4.8	-0.5
Days on Feed	days	59.7	61.4	2.8	0.3

[1]In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.

[2] This table is a comparison of the 2007 data with less comprehensive 1998 data; therefore, only data available for both years is shown.

[3]The percent change per year is the percent change divided by nine years.

[4]Values for labor and management in 1998 were $7 and $12 per hour, respectively, and in 2007 were $12 and $20 per hour, respectively.

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Heifer Enterprise Analysis Summaries

Dairy replacement animals from the time they are moved to group housing to the time they freshen, or in the case of a custom grower, are returned to the dairy producer.

Tables 5-9

Table 5. The average cost (including variation) to raise one heifer on Wisconsin dairy and custom heifer operations (n=44).[1]

Cost	Unit	Average	SD[3]	Operation[2] Low	Operation[2] High
Variable Cost					
Feed	$/heifer	683.66	167.08	512.05	1251.29
Bedding	$/heifer	49.07	87.85	8.28	111.58
Veterinary	$/heifer	32.68	30.79	16.56	23.91
Breeding[4]	$/heifer	48.48	46.24	19.32	15.94
Electrical and Fuel	$/heifer	33.66	3.42	37.27	39.85
Interest	$/heifer	66.93	14.80	47.62	111.58
Death Loss	$/heifer	2.57	4.47	8.28	0.00
Paid Labor	$/heifer	127.45	112.41	151.13	0.00
Paid Management	$/heifer	10.33	14.46	2.76	0.00
Total Variable Cost	**$/heifer**	**1054.83**	**243.71**	**803.28**	**1554.15**
Fixed Cost					
Manure Storage	$/heifer	19.72	18.66	0.69	3.19
Housing	$/heifer	129.32	123.62	42.10	103.61
Equipment	$/heifer	12.70	29.85	4.83	0.00
Total Fixed Cost	**$/heifer**	**161.73**	**126.27**	**47.62**	**106.80**
Allocated Cost (Variable Cost + Fixed Cost)	**$/heifer**	**1216.56**	**189.06**	**850.89**	**1660.95**
Opportunity Cost of Unpaid Labor & Management	$/heifer	106.15	123.25	0.00	239.10
Allocated Cost + Opportunity Cost of Unpaid Labor & Management	**$/heifer**	**1322.71**	**294.41**	**850.89**	**1900.05**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/heifer	469.84	N/A	N/A	N/A
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/heifer	46.98	N/A	N/A	N/A
Summary					
Feed Cost	$/heifer	683.66	167.08	512.05	1251.29
Other Variable Cost (excluding Labor & Management)	$/heifer	233.38	79.57	137.33	302.86
Labor & Management Cost (paid and unpaid)	$/heifer	243.93	89.18	153.89	239.10
Total Fixed Cost	$/heifer	161.73	126.27	47.62	106.80
Feed Cost	%	51.7	8.6	60.2	65.9
Other Variable Cost (excluding Labor & Management)	%	17.6	4.8	16.1	15.9
Labor & Management Cost (paid and unpaid)	%	18.4	6.6	18.1	12.6
Total Fixed Cost	%	12.2	8.6	5.6	5.6
Labor & Management Required	days/year	228.3	204.8	275.6	26.0
Labor & Management Required	hours/heifer	9.0	4.3	5.2	7.7
Labor Efficiency	heifers/hour	50.1	24.0	69.7	47.3
Labor Efficiency	heifers/day	401.6	192.1	557.6	378.6
Calving Age	months	23.9	1.2	24.5	25.0
Days on Feed	days	648.3	63.3	690.1	797.0

[1]In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.
[2]Survey operations that had the lowest and highest allocated cost to raise heifers.
[3]SD is the acronym for standard deviation. See glossary.
[4]Five custom heifer grower operations reported no breeding expenses.

Table 6. Economic cost and labor required to raise one heifer by operation type (n=44).[1]

Cost	Unit	Operation		
		Tie-stall	Free-stall	Heifer grower
Number of Operations	n	14	20	10
Variable Cost				
Feed	$/heifer	719.33	736.17	528.71
Bedding	$/heifer	46.92	60.71	28.80
Veterinary	$/heifer	25.48	36.96	34.21
Breeding[2]	$/heifer	64.46	44.57	33.92
Electrical and Fuel	$/heifer	34.44	34.74	30.41
Interest	$/heifer	71.16	71.05	52.76
Death Loss	$/heifer	2.05	3.12	2.18
Paid Labor	$/heifer	100.92	129.67	160.14
Paid Management	$/heifer	4.07	14.24	11.28
Total Variable Cost	**$/heifer**	**1068.84**	**1131.22**	**882.43**
Fixed Cost				
Manure Storage	$/heifer	23.20	17.56	19.15
Housing	$/heifer	109.61	155.79	103.96
Equipment	$/heifer	16.53	9.14	14.44
Total Fixed Cost	$/heifer	**149.33**	**182.49**	**137.55**
Allocated Cost (Variable Cost + Fixed Cost)	**$/heifer**	**1218.17**	**1313.71**	**1019.99**
Opportunity Cost of Unpaid Labor & Management	$/heifer	198.16	47.85	93.92
Allocated Cost + Opportunity Cost of Unpaid Labor & Management	**$/heifer**	**1416.33**	**1361.57**	**1113.90**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/heifer	478.11	536.86	331.57
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/heifer	14.93	18.25	13.76
Summary				
Feed Cost	$/heifer	719.33	736.17	528.71
Other Variable Cost (excluding Labor & Management)	$/heifer	244.51	251.14	182.29
Labor & Management Cost (paid and unpaid)	$/heifer	303.15	191.76	265.34
Total Fixed Cost	$/heifer	149.33	182.49	137.55
Feed Cost	%	50.8	54.1	47.5
Other Variable Cost	%	17.3	18.4	16.4
Labor & Management Cost (paid and unpaid)	%	21.4	14.1	23.8
Total Fixed Cost	%	10.5	13.4	12.3
Labor & Management Required	days/year	83.9	179.5	528.1
Labor & Management Required	hours/heifer	11.7	6.6	9.9
Labor Efficiency	heifers/hour	35.9	61.6	47.3
Labor Efficiency	heifers/day	287.0	492.5	380.4
Calving Age	months	24.1	24.1	22.9
Days on Feed	days	667.0	671.1	576.7

[1] In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of labels and terms used in this table.
[2]Five custom heifer growers reported no breeding expenses.

Table 7. Comparing the daily per heifer raising cost by operation type (n=44).[1]

Cost	Unit	Operation			
		Tie-stall	Free-stall	Heifer grower	All herds
Number of Operations	n	14	20	10	44
Variable Cost					
Feed	$/day	1.07	1.10	0.92	1.05
Bedding	$/day	0.07	0.09	0.05	0.07
Veterinary	$/day	0.04	0.05	0.06	0.05
Breeding[2]	$/day	0.10	0.07	0.06	0.08
Electrical and Fuel	$/day	0.05	0.05	0.05	0.05
Interest	$/day	0.11	0.11	0.09	0.10
Death Loss	$/day	0.00	0.00	0.00	0.00
Paid Labor	$/day	0.15	0.20	0.26	0.20
Paid Management	$/day	0.01	0.02	0.02	0.02
Total Variable Cost	$/day	**1.60**	**1.69**	**1.52**	**1.63**
Fixed Cost					
Manure Storage	$/day	0.04	0.03	0.03	0.03
Housing	$/day	0.16	0.23	0.19	0.20
Equipment	$/day	0.03	0.01	0.02	0.02
Total Fixed Cost	$/day	**0.23**	**0.27**	**0.24**	**0.25**
Allocated Cost (Variable Cost + Fixed Cost)	$/day	**1.82**	**1.97**	**1.77**	**1.88**
Opportunity Cost of Unpaid Labor & Management	$/day	0.30	0.07	0.17	0.17
Allocated Cost + Opportunity Cost of Unpaid Labor & Management	$/day	**2.12**	**2.04**	**1.93**	**2.05**
Alternate Total Fixed Cost - (All New Facilities and Equipment)	$/day	0.72	0.80	0.57	0.72
Alternate Total Fixed Cost - (Fully Depreciated Facilities and Equipment)	$/day	0.02	0.03	0.02	0.03

[1] In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.

[2] Five custom heifer growers reported no breeding expenses.

Table 8. Comparing the change in the per heifer raising cost between 1998 and 2007. [1,2]

Item	Unit	Cost/heifer 1999	Cost/heifer 2007	% Change	% Change per year[3]
Variable Cost					
Feed	$/heifer	647.15	683.66	5.6	0.6
Bedding	$/heifer	29.07	49.07	68.8	7.6
Veterinary	$/heifer	37.66	32.68	-13.2	-1.5
Breeding	$/heifer	26.07	48.48	85.9	9.5
Electrical and Fuel	$/heifer	34.74	33.66	-3.1	-0.3
Interest	$/heifer	32.92	66.93	103.3	11.5
Death Loss	$/heifer	6.33	2.57	-59.4	-6.6
Labor (Paid and Unpaid)[4]	$/heifer	128.40	216.40	68.5	7.6
Management (Paid and Unpaid)[4]	$/heifer	15.96	27.53	72.5	8.1
Total Variable Cost + Opportunity Cost of Unpaid Labor & Management	$/heifer	**958.30**	**1,160.98**	**25.1**	**2.8**
Fixed Cost					
Manure Storage	$/heifer	22.44	19.72	-12.1	-1.3
Housing	$/heifer	93.09	129.32	38.9	4.3
Equipment	$/heifer	24.79	12.70	-48.8	-5.4
Total Fixed Cost	**$/heifer**	**140.32**	**161.73**	**15.3**	**1.7**
Allocated Cost (Variable Cost + Opportunity Cost of Unpaid Labor & Management + Fixed Cost)	**$/heifer**	**1099.12**	**1322.70**	**20.3**	**2.3**
Summary					
Labor & Management Required	hours/heifer	9.0	9.0	-0.4	0.0
Labor Efficiency	heifers/hour	53.7	50.1	-6.6	-0.7
Labor Efficiency	heifers/day	429.0	401.6	-6.4	-0.7
Calving Age	months	24.6	23.9	-3.0	-0.3
Days on Feed	days	683.0	648.3	-5.1	-0.6

[1] In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.

[2] This table is a comparison of the 2007 data with less comprehensive 1998 data; therefore, only data available for both years is shown.

[3]The percent change per year is the percent change divided by nine years.

[4]Values for labor and management in 1998 were $7 and $12 per hour, respectively, and in 2007 were $12 and $20 per hour, respectively.

Table 9. The effect of body weight and age on variable, fixed and allocated costs associated with raising one heifer on Wisconsin dairy and custom heifer operations (n=44).[1,2,3]

Approximate		Variable Cost ($/head/day)											Fixed Cost ($/head/day)			Allocated Cost
Weight (lbs)	Age (mo)	Feed	Bedding	Vet & Med	Breeding	Electric & Fuel	Paid Labor	Unpaid Labor	Paid Mgt	Unpaid Mgt	Interest	Death	Equip	Buildings	Manure	($/head/ day)[4]
215	2.5	0.90	0.11	0.08	0.00	0.01	0.19	0.08	0.02	0.01	0.09	0.002	0.01	0.23	0.01	1.75
309	4.0	0.83	0.10	0.08	0.00	0.02	0.20	0.09	0.02	0.03	0.08	0.003	0.02	0.17	0.02	1.66
398	5.5	0.81	0.09	0.06	0.00	0.03	0.16	0.11	0.04	0.03	0.08	0.004	0.02	0.24	0.03	1.71
514	8.0	0.86	0.05	0.05	0.00	0.04	0.19	0.11	0.01	0.03	0.08	0.005	0.03	0.14	0.02	1.62
618	10.0	0.92	0.04	0.05	0.03	0.04	0.20	0.07	0.02	0.02	0.09	0.002	0.01	0.20	0.05	1.75
705	11.5	0.97	0.06	0.05	0.05	0.05	0.15	0.16	0.01	0.03	0.09	0.006	0.02	0.21	0.03	1.88
815	13.5	1.00	0.05	0.05	0.30	0.06	0.23	0.22	0.02	0.02	0.12	0.007	0.01	0.21	0.03	2.33
896	15.0	1.07	0.04	0.06	0.16	0.06	0.33	0.21	0.06	0.03	0.11	0.004	0.02	0.20	0.10	2.46
1016	18.0	1.18	0.03	0.03	0.27	0.07	0.16	0.24	0.01	0.04	0.13	0.005	0.01	0.17	0.03	2.38
1114	19.5	1.17	0.07	0.05	0.08	0.08	0.23	0.10	0.05	0.02	0.12	0.003	0.03	0.23	0.05	2.26
1209	21.5	1.58	0.08	0.05	0.00	0.08	0.15	0.10	0.02	0.02	0.14	0.002	0.02	0.24	0.12	2.60

[1] In this analysis, a dairy replacement animal was considered to be a calf until moved into a group whereupon the dairy replacement animal was considered to be a heifer. Please see glossary for explanation of terms used in this table.

[2]Unpaid labor and management are listed as variable costs in this table. In contrast, unpaid labor and management are categorized as opportunity costs in the previous tables. For some operations that have no unpaid labor and management, the unpaid and paid labor and management costs should be combined.

[3]The costs listed in the rows are the daily costs of a heifer at a specific weight and age. For example, a 215 pound, 2.5 month old heifer would have a total daily cost of $1.75. This is not the average daily cost from birth to 215 pounds and 2.5 months of age.

[4]Allocated cost in this table includes all costs excluding the opportunity cost of the calf ($500).

2007

Dairy Replacement Analysis Summary

Costs associated with raising dairy replacement animals from birth to freshening, or in the case of a custom grower, are returned to the dairy producer.

Table 10

Table 10. Total cost of raising a dairy replacement from birth to freshening, or in the case of custom heifer growers, when they are returned to the producer (n=49).

The average cost (including variation) to raise one dairy replacement animal on Wisconsin dairy operations.

Cost	Unit	Average	SD[2]	Operation[1] Low	Operation[1] High
Heifer Allocated Cost + Opportunity Cost of Unpaid Labor & Management (Table 5)	$/heifer	1322.71	294.41	850.89	1900.05
Calf Allocated Cost + Opportunity Cost of Unpaid Labor & Management (Table 1)	$/heifer	326.08	134.59	244.21	535.08
Opportunity Cost of Calf	$/heifer	500.00	N/A	500.00	500.00
Allocated cost to raise a dairy replacement from birth to freshening, or in the case of a custom heifer grower when the heifer is returned to the dairy	**$/heifer**	**2148.79**	**344.64**	**1595.10**	**2935.13**

Economic cost and labor required to raise one dairy replacement animal by operation type[3].

Cost	Unit	Operation Tie-stall	Operation Free-stall	Operation Custom grower
Heifer Allocated Cost + Opportunity Cost of Unpaid Labor & Management (Table 6)	$/heifer	1416.33	1361.57	1113.90
Calf Allocated Cost + Opportunity Cost of Unpaid Labor & Management (Table 2)	$/heifer	381.38	315.03	179.35
Allocated cost to raise a dairy replacement from birth to freshening	**$/heifer**	**1797.71**	**1676.60**	**1293.25**

Comparison of the total costs associated with raising dairy replacements between 1998 and 2007[4].

Cost	Unit	Cost/heifer 1998	Cost/heifer 2007	% Change	% Change per year[5]
Heifer Allocated Cost + Opportunity Cost of Unpaid Labor & Management[6]	$/heifer	1099.12	1322.70	20.3	2.3
Calf Allocated Cost + Opportunity Cost of Unpaid Labor & Management[6]	$/heifer	161.62	326.08	101.8	11.3
Opportunity Cost of Calf	$/heifer	100.00	500.00	400.0	44.4
Allocated cost to raise a dairy replacement from birth to freshening	**$/heifer**	**1360.74**	**2148.78**	**57.9**	**6.4**

[1]Survey operations that had the lowest and highest allocated cost to raise heifers.
[2]SD is the acronym for standard deviation. See glossary.
[3]The typical custom calf grower in Wisconsin doesn't acquire ownership of the dairy replacement animal, while the other two operations do. Adding the opportunity cost of the calf to two systems and not to the third would distort comparison results provided by this table.
[4]This table is a comparison of the 2007 data with less comprehensive 1998 data; therefore, only data available for both years is shown.
[5]The percent change per year is the percent change divided by nine years.
[6]Values for labor and management in 1998 were $7 and $12 per hour, respectively, and in 2007 were $12 and $20 per hour, respectively.

Appreciation is expressed to the following cooperating farms

Farm	City
Allen Rippchen	Richland Center, WI
Angie Metcalf	Stetsonville, WI
Betzoldvale Farms	Amery, WI
Bill & Nancy Hillmann	Reedsville, WI
Bomaz Farms	Hammond, WI
Brander Dairy	Medford, WI
Cloveredge Farms	Manitowoc, WI
Cory Ott	Brillion, WI
Craig Droppers	Ootsburg, WI
Durst/Larse Farms	Richland Center, WI
French Creek Farms	Whitelaw, WI
Gary & Helen Lisowe	Gillett, WI
Gary & Laurie Wehling	Chippewa Falls, WI
Grass Ridge Farm, LLC	Pittsville, WI
Hall's Calf Ranch	Kewaunee, WI
Hanke Farms, Inc.	Sheboygan Falls, WI
Hillan Farm	Ladysmith, WI
Hillside Heifers	Glenbeulah, WI
Horse Creek Holsteins	Star Prairie, WI
Jack Banker	Black Creek, WI
James "Rick" Wegner	Marion, WI
Jason Hauser & Joe Gerke	Bangor, WI
Jason Kjos	River Falls, WI
Jeff & Connie Horsens	Cecil, WI
Jeff Smidel	Luxemburg, WI
Jim Volbrecht	Eau Claire, WI
Ken Fochs	Hilbert, WI
Larry & Deb Pollack	Ripon, WI
Mel Pittman	Plum City, WI
Neighborhood Dairy	Kaukauna, WI
Pat Pernsteiner	Medford, WI
Paul & Sara Fisher	Owen, WI
Prairie Dairy, Inc.	Oakfield, WI
Randy & Lorie Larson	Plum City, WI
R-Green Acres	Pepin, WI
Rhine Boarder Custom Heifer Raiser	Elkhart Lake, WI
Rick Fischer	Seymour, WI
Ron Brooks	Waupaca, WI
Schomburg Farms	Bangor, WI
Steeglitz Dairy	Greenwood, WI
Steve & Joe Holle	Baldwin, WI
Steve & Mary Leitner	Reedsville, WI
The Park Farm	Kiel, WI
Tim Krueger	Brillion, WI
Tom & Stacie Novak	Highland, WI
Tony Kostuch	Amherst Junction, WI
Wanish Heifers	Phillips, WI
Warren Wunsch & Nate Calkins	Sheboygan, WI
Wes & Craig Hedrich	Brillion, WI
Willis Breska	Arcadia, WI

GLOSSARY OF TERMS

Allocated Cost - All costs (variable + fixed cost), except the opportunity costs. Opportunity costs include cost of unpaid labor, management and calf value.

Allocated Cost + Opportunity Cost of Unpaid Labor & Management - The sum of total allocated costs (variable cost + fixed cost) plus the opportunity cost of unpaid labor and management.

Allocated Cost + Opportunity Cost of Unpaid Labor & Management, and Calf - The sum of allocated cost (variable cost + fixed cost) plus the opportunity cost of unpaid labor and management plus the calf value. This term is used in heifer cost estimates only when combining calf and heifer costs to avoid double accounting for the value of the calf.

Alternate Total Fixed Cost – (All New Facilities and Equipment) - Dairy and custom heifer operations planning to acquire all new facilities and equipment for raising dairy heifers or who will pay new price for existing facilities would have significantly higher future annual fixed costs of facilities and equipment. Alternate Fixed Costs (All New Facilities and Equipment) was estimated by multiplying the full replacement value minus salvage value by the percentage described above to represent the annual costs of depreciation, interest, repairs, taxes and insurance for all new facilities and equipment.

Alternate Total Fixed Cost – (Fully Depreciated Facilities and Equipment) - Dairy or heifer rearing operations that may be operating facilities and equipment that are fully depreciated. These facilities may be functional, but have no practical alternative use. This scenario represents the low extreme of annual fixed costs of facilities and equipment. In such a case, fixed cost would not include depreciation and interest with cost being primarily repairs, taxes and insurance. Alternate Fixed Costs (Fully Depreciated Facilities and Equipment) was estimated to be 10 percent of the original calculated fixed cost for that operation.

Bedding – Bedding materials, such as sand, sawdust, straw, or corn stalks which are used to bed calves or replacement heifers. The cost of bedding for operations using mattresses without bedding was zero cost but the mattress was reflected in the fixed cost of the operation.

Breeding - Semen cost associated with breeding heifers multiplied by the number of services per conception. Semen cost was estimated to be $15.00 per service when natural service sires were used. Breeding costs were assigned to the appropriate age and weight of the heifers when bred. Related breeding cost such as hormones, heat detection, and pregnancy checks were assigned as veterinary, or labor cost.

Calf - Young stock on liquid feed prior to moving to group housing.

Calf Starter - Purchased calf starter or formulated grain mixes fed to calves.

Calving Age - The average age (in months) at first freshening.

Days on Feed (days) - The average number of days the calf or heifer was on feed. The number of days on feed is a separate value for calves and heifers.

Death Loss - For calves and heifers, the cost of death loss was estimated as the percent death loss multiplied by the calf value plus expenses that accumulated to the age of death. Death loss percent estimates were collected separately for calves and heifers.

Electric and Fuel - Cost associated with electricity and fuel to operate the heifer facilities and equipment. These costs were estimated as an energy cost factor multiplied by body weight and are estimates because electric and fuel charges could not be reasonably separated from other farm enterprises.

Feed Cost (%) - Feed cost expressed as a percent of total allocated cost plus unpaid labor and management.

Feed Cost ($/calf) - The sum of all feed cost for feeding a calf.

Feed Cost ($/heifer) - The sum of all feed cost for feeding a heifer not including the calf portion of feed costs**.**

Fixed Cost (%) - Total fixed cost as a percent of total allocated cost plus unpaid labor and management.

Fixed Cost ($/calf) - See total fixed cost, not including heifer portion.

Fixed Cost ($/heifer) - See total fixed cost, not including calf portion.

Heifer -Weaned calf, moved to group housing.

Interest - An interest cost (8 percent annual) was calculated for other variable costs for the duration of the calf or heifer raising period to estimate the value of capital throughout the raising period.

Labor Efficiency (calves per day) - The number of calves that can be handled (labor and management) by one person working an 8 hour day.

Labor Efficiency (heifers per day) - The number of heifers that can be handled (labor and management) by one person working an 8 hour day.

Labor Efficiency (calves per hour) - The number of calves that can be handled (labor and management) by one person in one hour.

Labor Efficiency (heifers per hour) - The number of heifers that can be handled (labor and management) by one person in one hour.

Labor & Management Cost (%) - Paid and unpaid labor and management expressed as a percent of total allocated cost plus unpaid labor and management.

Labor & Management Cost ($/calf) - The total value of both paid and unpaid labor associated with raising a calf.

Labor & Management Cost ($/heifer) - The total value of both paid and unpaid labor associated with raising a heifer.

Labor & Management Required (days per heifer) - The number of days per year required to raise one heifer.

Labor & Management Required (hours per calf) - The number of hours required to raise one calf.

Liquid Feed - Whole milk, pasteurized waste milk, milk replacer or combinations used to feed calves. Waste milk had an assigned value of $3.00 per hundredweight.

Manure Storage – That portion of the total manure storage structure determined to be associated with the heifer enterprise.

Opportunity Cost of Calf - For operations raising their own calves, the estimated market price of the calf is considered an opportunity cost because there was the opportunity to sell the calf instead of raising it. In other words, in deciding to raise the calf, the owner gave up income from selling the calf--income that could later be used to offset costs of buying another calf. A calf opportunity cost of $500 was assigned in this project because $500/calf was a fairly typical sale price of female calves sold shortly after birth at the time of the survey. For operations raising bull calves, the day old sale price of a bull calf would be the opportunity cost. Operations raising purchased calves should use the actual purchase price. Custom raisers who do not acquire ownership of the calves should not include calf value or opportunity cost as a cost of raising calves or heifers. Finally, in estimating the total cost of raising heifers from birth to first calving, make sure the calf value is not included twice. An economically successful business should be able to pay for all costs including realistic opportunity costs.

Opportunity Cost of Unpaid Labor & Management - Considered an opportunity cost because this labor or management time has earning potential if used in a different way such as milking more cows or performing another job. If calf and heifer labor or management is not hired or partially hired, the unpaid portion of labor and management is considered an opportunity cost. The value of unpaid labor and management was calculated by multiplying the estimated unpaid labor hours by $12.00 and the estimated unpaid management hours by $20.00. If all calf and or heifer labor and management are hired, calf and heifer labor and management are a paid cost. In this analysis, paid labor and management costs are assumed to be variable costs. An economically successful business should be able to pay for all costs including realistic opportunity costs. In the 1999 study, the assigned opportunity cost of a calf was $100 compared to $500 in the 2007 study. Be aware of this difference when interpreting tables 4 and 8.

Other Variable Cost (%) - Total variable cost minus feed, labor and management costs expressed as a percent of total allocated cost plus unpaid labor and management.

Other Variable Cost ($/calf) - Total variable costs minus feed, labor and management costs for a calf.

Other Variable Cost ($/heifer) - Total variable costs minus feed, labor, and management costs for a heifer.

Paid Labor - The cost of paid labor as estimated for labor hours per calf and/or heifer multiplied by $12.00 per hour.

Paid Management - The cost of paid management as estimated for labor hours per calf and/or heifer multiplied by $20.00 per hour.

Standard Deviation - The most widely used measure of the spread in a data set [how much variation there is from the "average" (mean)]. A large standard deviation indicates that the data points are far from the "average" and a small standard deviation indicates that they are clustered closely around the mean.

For example, the data sets {49, 51} and {1, 99} each have a mean of 50. Their standard deviations are 1, and 49, respectively. The first set has a much smaller standard deviation than the other one because its values are all close to 50. In a loose sense, the standard deviation tells us how far from the average the data points tend to be.

Total Fixed Cost - The sum of facility and equipment fixed costs based on current un-depreciated values of assets to reflect a fairly common situation. For heifers, the fixed cost of manure storage and equipment prorated to its use by the heifer enterprise is also included in total fixed cost. See methods for more information about calculation methodology. In the short run, all costs are fixed and in the long run, all costs are variable. Consequently, in any analysis, judgment must be used to determine which costs are considered fixed and which variable. In this project we exercised that judgment and handled depreciation, interest, repairs, taxes and insurance associated with structures and equipment as fixed, because that represents the most common time frame of most people interested in the project results. All other costs excluding opportunity (unpaid labor and management, calf value) costs were handled as variable costs.

Total Variable Cost - The sum of all variable costs. In the long run, all costs are variable. In the short run, all costs are fixed. Consequently, in any analysis, judgment must be used to determine which costs are considered fixed, and which variable. In this project we exercised that judgment and handled depreciation, interest, repairs, taxes and insurance associated with structures and equipment as fixed, because that represents the most common time frame of most people interested in the project results. All other costs excluding opportunity (unpaid labor and management, calf value) costs were handled as variable costs.

Veterinary - Veterinary services, drugs, vaccinations, pregnancy checks and other veterinary expenses associated with the cost of raising calves or heifers. Veterinary expenses were assigned to the age and weight classes of heifers in which they occurred.

Weaning Age (weeks) - The average age of a calf when they stop receiving liquid feed.

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