

Research Report

Economic Cost and Labor Efficiencies Associated with Rearing Dairy Herd Replacements on Wisconsin Dairy Farms¹

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Introduction

Wisconsin dairy producers are rapidly modernizing lactating cow production systems. Examples of modernization include adoption of large herd management practices, streamlining existing systems, building efficient milking centers, and adoption of managed grazing systems, etc. Modernization of lactating cow production systems, however, forces secondary business decisions concerning the herd replacement enterprise. Producers undergoing business modernization commonly ask these questions about the replacement heifer enterprise: Should herd replacements be purchased? Modernize and/or invest in the current herd replacement management systems? Custom hire the rearing of herd replacements?

To make these decisions, dairy producers and heifer growers require economic and management information specific to their operation. Generic replacement heifer budgets or industry averages fail to provide information that is producer specific. To resolve this problem, University of Wisconsin dairy scientist and county based University of Wisconsin-Extension Agents developed a multi-dimensional computer model entitled **Intuitive Cost of Production Analysis (ICPA)**. The ICPA model uses Excel97 software and a practical data entry system. The model calculates, estimates, or prorates herd replacement rearing cost and labor efficiencies. The ICPA model conducts an independent analysis of calf and heifer rearing enterprises. The ICPA model also provides an efficient mechanism to uncouple herd replacement enterprise cost from lactating cow cost, resulting in information that is specific for a producer and his or her herd replacement enterprise.

ICPA Project Goals

1. Develop an efficient analysis system that calculates producer-specific rearing cost and labor efficiencies of rearing dairy herd replacements.
2. Develop economic and labor efficiency benchmarks for dairy herd replacements.
3. Make the ICPA model available to dairy producers and dairy professionals in Wisconsin.

ICPA Field Study

The ICPA model was written in 1997 and was field tested on eight commercial dairies, facilitated by seven county based University of Wisconsin-Extension Agents. After field testing, the original model was expanded to facilitate evaluation of a broad array of dairy herd replacement rearing systems (e.g., confinement, pasture, hybrid confinement/pasture). The new ICPA model was beta tested in 1998 on 78 commercial dairy or custom heifer rearing operations. Dairy herds were stratified into three categories: 1) < 75 cows, 2) 75 to 150 cows, and 3) > 150 cows, with 20, 23, and 19 herds in each category, respectively. Sixteen custom heifer rearing operations were also evaluated. The ICPA evaluations were facilitated by 17 county based University of Wisconsin-Extension Agents. Data were edited for practical errors and 16 re-runs were conducted. Calf and heifer enterprise summary statistics were developed for the entire data set (62 herds) and for each herd size category. The effect of herd size on calf and heifer rearing cost and labor efficiencies were tested using Fishers LSD test. Correlations were also made between itemized cost or labor efficiency parameters and total calf or heifer rearing cost. Calf and heifer enterprise data from the 16 custom heifer rearing operations was not included in data summaries. Upon careful examination, it was determined that inclusion of custom heifer rearing

operation data may lead to erroneous and misleading information. The ICPA analysis of custom heifer rearing operations yielded incomplete calf and heifer rearing cost and labor efficiency information. Practically, this resulted from numerous custom heifer rearing operations operating businesses under a joint arrangement with their clients (dairies). Frequently, veterinary, forage, milk replacer, breeding fees, starter, vaccinations, etc., were provided by the dairy and not the custom heifer rearing operation. The ICPA model analyzed aspects of these arrangements, but publishing these costs as "true" custom heifer rearing operation costs, etc., would be misleading, therefore custom heifer rearing data is not included in this report.

ICPA Field Study Results

Results from the ICPA field study are presented in Tables 1 to 16. The tables are intended to serve as comparative or benchmark data associated with calf and heifer rearing cost and labor efficiencies of dairy herd replacement enterprises. The reader is cautioned that minimum and maximum values presented in this report do not represent a specific individual calf or heifer enterprise, rather represent minimum or maximum values found for respective categories among all (N = 62) of the calf and heifer enterprises evaluated. Because use of these data will be broad among dairy producers, custom heifer rearing operators, consultants, and educators, etc., the authors have chosen not to offer a detailed discussion of the summaries.

Table 1. Assumptions used in the ICPA model to calculate cost and labor efficiencies for calf and heifer rearing enterprises.

Item	Assumption
Calf Enterprise	
Calf value	\$100.00/calf
Calf age definition	Age moved to group housing or heifer housing unit
Liquid feed	Milk, waste milk, milk replacer or combinations
Milk	\$13.00/cwt
Waste milk	\$0.00/cwt or purchase price
Labor	\$7.00/hr
Management	\$12.00/hr
Fixed cost	15.0 % capital recovery charge
Interest rate	8.5%
Heifer Enterprise	
Calf cost	Calf ICPA cost
Calving age	Farm actual
Calving weight	Farm actual
Legume hay	\$100.00/ton
Legume silage, 40% DM	\$40.00/ton
Corn silage, 35% DM	\$18.00/ton
Cow waste, 50%DM	\$50.00/ton
Misc forages, 40% DM	\$30.00/ton
Labor	\$7.00/hr
Management	\$12.00/hr
Interest rate	8.5%/hr
Fixed cost	15.0% capital recovery charge

ICPA Calf Enterprise Analysis Summaries

Table 2. Economic cost and labor required to rear calves on Wisconsin dairy farms.

Item	Unit	All Herds (n=62)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Liquid Feed	\$\$/calf	\$ 35.51	\$ 3.57	\$ 105.70	\$ 15.72
Calf Starter	\$\$/calf	\$ 21.00	\$ 3.78	\$ 90.65	\$ 13.96
Forage	\$\$/calf	\$ 1.97	\$ 0.00	\$ 16.66	\$ 3.55
Bedding	\$\$/calf	\$ 5.57	\$ 0.00	\$ 27.38	\$ 5.75
Veterinary	\$\$/calf	\$ 8.43	\$ 0.50	\$ 27.58	\$ 5.23
Death Loss	\$\$/calf	\$ 4.54	\$ 0.00	\$ 12.97	\$ 2.98
Interest	\$\$/calf	\$ 3.40	\$ 1.47	\$ 9.37	\$ 1.42
Labor	\$\$/calf	\$ 60.38	\$ 14.00	\$ 149.38	\$ 37.20
Management	\$\$/calf	\$ 7.04	\$ 0.00	\$ 33.78	\$ 7.48
Calf Housing	\$\$/calf	\$ 11.23	\$ 0.10	\$ 41.67	\$ 10.67
Calf Equipment	\$\$/calf	\$ 1.19	\$ 0.00	\$ 22.50	\$ 2.99
Total Cost (without calf)	\$\$/calf	\$ 160.24	\$ 84.72	\$ 334.52	\$ 55.54
Calf Value	\$\$/calf	\$ 100.00	\$ 100.00	\$ 100.00	NA
Total Cost (with calf)	\$\$/calf	\$ 260.24	\$ 184.72	\$ 434.52	\$ 55.54
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/calf	\$ 58.48	\$ 23.86	\$ 137.64	\$ 23.07
Other Variable Cost	\$\$/calf	\$ 21.93	\$ 4.02	\$ 47.16	\$ 8.14
Labor/Mgt Cost	\$\$/calf	\$ 67.41	\$ 15.57	\$ 181.95	\$ 41.44
Fixed Cost	\$\$/calf	\$ 12.42	\$ 0.89	\$ 60.00	\$ 11.81
Feed Cost	% of total cost	38.1%	11.2%	63.6%	12.3%
Other Variable Cost	% of total cost	14.6%	4.0%	29.9%	5.9%
Labor/Mgt Cost	% of total cost	39.9%	16.1%	79.4%	14.3%
Fixed Cost	% of total cost	7.4%	0.3%	31.6%	5.8%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	74.3	3.3	465.0	78.4
Labor/Mgt Required	hrs/calf	9.2	2.2	24.1	5.7
Labor Efficiency	calves/hr	9.1	1.9	25.7	5.8
Labor Efficiency	calves/man/day	72.6	15.2	205.9	46.2
Other					
Weaning Age	weeks	7.4	3.0	12.0	1.6
Days on Feed	days	59.7	35.0	140.0	17.0

Table 3. Economic cost and labor required to rear calves on Wisconsin dairy farms with less than 75 cows.

Item	Unit	Herds (n=20)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Liquid Feed	\$\$/calf	\$ 36.99	\$ 3.57	\$ 83.65	\$ 16.50
Calf Starter	\$\$/calf	\$ 22.94	\$ 7.00	\$ 49.70	\$ 13.44
Forage	\$\$/calf	\$ 2.50	\$ 0.00	\$ 12.60	\$ 3.80
Bedding	\$\$/calf	\$ 5.25	\$ 0.00	\$ 19.50	\$ 4.97
Veterinary	\$\$/calf	\$ 6.88	\$ 0.50	\$ 20.00	\$ 4.60
Death Loss	\$\$/calf	\$ 5.04	\$ 0.00	\$ 12.97	\$ 3.36
Interest	\$\$/calf	\$ 3.60	\$ 1.91	\$ 6.12	\$ 1.24
Labor	\$\$/calf	\$ 85.19	\$ 14.74	\$ 149.38	\$ 45.85
Management	\$\$/calf	\$ 8.60	\$ 0.71	\$ 32.57	\$ 9.12
Calf Housing	\$\$/calf	\$ 10.90	\$ 0.10	\$ 37.50	\$ 10.00
Calf Equipment	\$\$/calf	\$ 1.78	\$ 0.06	\$ 22.50	\$ 4.90
Total Cost (without calf)	\$\$/calf	\$ 189.67	\$ 84.72	\$ 334.52	\$ 69.35
Calf Value	\$\$/calf	\$ 100.00	\$ 100.00	\$ 100.00	NA
Total Cost (with calf)	\$\$/calf	\$ 289.67	\$ 184.72	\$ 434.52	\$ 69.35
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/calf	\$ 62.43	\$ 25.62	\$ 137.64	\$ 27.98
Other Variable Cost	\$\$/calf	\$ 20.77	\$ 4.02	\$ 45.59	\$ 9.40
Labor/Mgt Cost	\$\$/calf	\$ 93.79	\$ 15.57	\$ 181.95	\$ 51.65
Fixed Cost	\$\$/calf	\$ 12.69	\$ 0.89	\$ 60.00	\$ 13.69
Feed Cost	% of total cost	35.1%	11.2%	63.6%	14.6%
Other Variable Cost	% of total cost	11.6%	4.0%	29.9%	5.8%
Labor/Mgt Cost	% of total cost	46.9%	18.4%	79.4%	17.4%
Fixed Cost	% of total cost	6.4%	0.3%	18.2%	4.9%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	43.5	3.3	84.2	23.0
Labor/Mgt Required	hrs/calf	12.9	2.2	24.1	7.0
Labor Efficiency	calves/hr	6.9	1.9	25.7	6.0
Labor Efficiency	calves/man/day	55.4	15.2	205.9	47.9
Other					
Weaning Age	weeks	7.1	5.5	10.0	1.3
Days on Feed	days	56.9	42.0	84.0	12.0

Table 4. Economic cost and labor required to rear calves on Wisconsin dairy farms with 75-150 cows.

Item	Unit	Herds (n=23)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Liquid Feed	\$\$/calf	\$ 35.00	\$ 19.02	\$ 58.79	\$ 10.81
Calf Starter	\$\$/calf	\$ 19.45	\$ 3.78	\$ 90.65	\$ 17.22
Forage	\$\$/calf	\$ 2.57	\$ 0.00	\$ 16.66	\$ 4.39
Bedding	\$\$/calf	\$ 5.63	\$ 0.10	\$ 27.38	\$ 6.34
Veterinary	\$\$/calf	\$ 7.73	\$ 0.60	\$ 18.00	\$ 4.41
Death Loss	\$\$/calf	\$ 4.15	\$ 0.00	\$ 10.75	\$ 2.57
Interest	\$\$/calf	\$ 3.33	\$ 1.47	\$ 9.37	\$ 1.80
Labor	\$\$/calf	\$ 45.60	\$ 15.68	\$ 95.12	\$ 20.79
Management	\$\$/calf	\$ 5.74	\$ 0.76	\$ 20.27	\$ 5.02
Calf Housing	\$\$/calf	\$ 12.34	\$ 0.80	\$ 41.67	\$ 12.83
Calf Equipment	\$\$/calf	\$ 0.60	\$ 0.00	\$ 3.00	\$ 0.67
Total Cost (without calf)	\$\$/calf	\$ 142.14	\$ 91.22	\$ 232.86	\$ 38.97
Calf Value	\$\$/calf	\$ 100.00	\$ 100.00	\$ 100.00	NA
Total Cost (with calf)	\$\$/calf	\$ 242.14	\$ 191.22	\$ 332.86	\$ 38.97
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/calf	\$ 57.02	\$ 24.52	\$ 127.46	\$ 21.50
Other Variable Cost	\$\$/calf	\$ 20.84	\$ 6.42	\$ 47.16	\$ 8.42
Labor/Mgt Cost	\$\$/calf	\$ 51.34	\$ 16.44	\$ 115.34	\$ 22.48
Fixed Cost	\$\$/calf	\$ 12.94	\$ 0.99	\$ 42.05	\$ 12.89
Feed Cost	% of total cost	40.5%	24.4%	60.8%	11.2%
Other Variable Cost	% of total cost	15.1%	6.6%	26.9%	5.8%
Labor/Mgt Cost	% of total cost	36.0%	17.4%	55.4%	11.4%
Fixed Cost	% of total cost	8.0%	1.0%	31.6%	7.7%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	45.6	6.3	99.4	24.7
Labor/Mgt Required	hrs/calf	7.0	2.3	15.3	3.1
Labor Efficiency	calves/hr	10.5	3.7	25.3	5.6
Labor Efficiency	calves/man/day	83.6	29.5	194.5	43.7
Other					
Weaning Age	weeks	7.3	3.0	10.0	1.8
Days on Feed	days	62.2	35.0	140.0	23.6

Table 5. Economic cost and labor required to rear calves on Wisconsin dairy farms with more than 150 cows.

Item	Unit	Herds (n=19)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Liquid Feed	\$\$/calf	\$ 34.58	\$ 11.13	\$ 105.70	\$ 20.10
Calf Starter	\$\$/calf	\$ 20.82	\$ 6.72	\$ 39.80	\$ 10.00
Forage	\$\$/calf	\$ 0.70	\$ 0.00	\$ 3.92	\$ 1.21
Bedding	\$\$/calf	\$ 5.85	\$ 0.06	\$ 23.23	\$ 6.04
Veterinary	\$\$/calf	\$ 10.89	\$ 2.00	\$ 27.58	\$ 6.07
Death Loss	\$\$/calf	\$ 4.48	\$ 0.00	\$ 11.61	\$ 3.10
Interest	\$\$/calf	\$ 3.27	\$ 2.03	\$ 6.11	\$ 1.07
Labor	\$\$/calf	\$ 52.15	\$ 14.00	\$ 121.08	\$ 30.25
Management	\$\$/calf	\$ 6.95	\$ 0.00	\$ 33.78	\$ 8.10
Calf Housing	\$\$/calf	\$ 10.22	\$ 1.64	\$ 40.54	\$ 8.70
Calf Equipment	\$\$/calf	\$ 1.29	\$ 0.03	\$ 7.60	\$ 1.00
Total Cost (without calf)	\$\$/calf	\$ 151.18	\$ 87.55	\$ 264.27	\$ 45.30
Calf Value	\$\$/calf	\$ 100.00	\$ 100.00	\$ 100.00	NA
Total Cost (with calf)	\$\$/calf	\$ 251.18	\$ 187.55	\$ 364.27	\$ 45.30
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/calf	\$ 56.10	\$ 23.86	\$ 120.85	\$ 19.63
Other Variable Cost	\$\$/calf	\$ 24.48	\$ 15.82	\$ 36.64	\$ 5.89
Labor/Mgt Cost	\$\$/calf	\$ 59.09	\$ 17.04	\$ 154.86	\$ 34.46
Fixed Cost	\$\$/calf	\$ 11.50	\$ 2.15	\$ 41.07	\$ 8.40
Feed Cost	% of total cost	38.3%	17.2%	58.8%	10.7%
Other Variable Cost	% of total cost	17.0%	8.7%	29.5%	5.1%
Labor/Mgt Cost	% of total cost	37.2%	16.1%	58.6%	11.7%
Fixed Cost	% of total cost	7.5%	1.1%	15.5%	3.6%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	141.6	28.1	465.0	112.4
Labor/Mgt Required	hrs/calf	8.0	2.3	20.1	4.7
Labor Efficiency	calves/hr	9.7	2.8	23.9	5.6
Labor Efficiency	calves/man/day	77.3	22.8	191.5	44.4
Other					
Weaning Age	weeks	7.8	4.0	12.0	1.8
Days on Feed	days	59.5	42.0	84.0	11.5

Table 6. Summary statistics by herd size of daily calf rearing cost on Wisconsin dairy farms.

		< 75 Cows (20 herds)			75-150 Cows (23 herds)			> 150 Cows (19 herds)			All Herds (62 herds)		
Item	Unit	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum
Economic Cost by Category													
Liquid Feed	\$/day	\$ 0.66	\$ 0.07	\$ 1.20	\$ 0.60	\$ 0.15	\$ 1.05	\$ 0.58	\$ 0.13	\$ 1.26	\$ 0.61	\$ 0.07	\$ 1.26
Calf Starter	\$/day	\$ 0.40	\$ 0.13	\$ 1.12	\$ 0.30	\$ 0.07	\$ 0.65	\$ 0.36	\$ 0.12	\$ 0.91	\$ 0.35	\$ 0.07	\$ 1.12
Forage	\$/day	\$ 0.04	\$ 0.00	\$ 0.26	\$ 0.03	\$ 0.00	\$ 0.13	\$ 0.01	\$ 0.00	\$ 0.05	\$ 0.03	\$ 0.00	\$ 0.26
Bedding	\$/day	\$ 0.10	\$ 0.00	\$ 0.40	\$ 0.09	\$ 0.00	\$ 0.33	\$ 0.10	\$ 0.00	\$ 0.41	\$ 0.10	\$ 0.00	\$ 0.41
Veterinary	\$/day	\$ 0.13	\$ 0.01	\$ 0.41	\$ 0.14	\$ 0.01	\$ 0.29	\$ 0.20	\$ 0.04	\$ 0.56	\$ 0.15	\$ 0.01	\$ 0.56
Death Loss	\$/day	\$ 0.09	\$ 0.00	\$ 0.23	\$ 0.07	\$ 0.00	\$ 0.19	\$ 0.08	\$ 0.00	\$ 0.24	\$ 0.08	\$ 0.00	\$ 0.24
Interest	\$/day	\$ 0.06	\$ 0.04	\$ 0.09	\$ 0.05	\$ 0.04	\$ 0.07	\$ 0.05	\$ 0.04	\$ 0.07	\$ 0.06	\$ 0.04	\$ 0.09
Labor	\$/day	\$ 1.56	\$ 0.26	\$ 3.46	\$ 0.79	\$ 0.28	\$ 1.89	\$ 0.90	\$ 0.25	\$ 2.34	\$ 1.07	\$ 0.25	\$ 3.46
Management	\$/day	\$ 0.16	\$ 0.01	\$ 0.66	\$ 0.09	\$ 0.01	\$ 0.32	\$ 0.11	\$ 0.00	\$ 0.40	\$ 0.12	\$ 0.00	\$ 0.66
Calf Housing	\$/day	\$ 0.19	\$ 0.00	\$ 0.61	\$ 0.21	\$ 0.01	\$ 0.85	\$ 0.17	\$ 0.02	\$ 0.48	\$ 0.19	\$ 0.00	\$ 0.85
Calf Equipment	\$/day	\$ 0.03	\$ 0.00	\$ 0.32	\$ 0.01	\$ 0.00	\$ 0.03	\$ 0.02	\$ 0.00	\$ 0.16	\$ 0.02	\$ 0.00	\$ 0.32
Total Cost *	\$/day	\$ 3.41	\$ 1.51	\$ 6.75	\$ 2.39	\$ 1.66	\$ 3.69	\$ 2.57	\$ 1.56	\$ 4.60	\$ 2.78	\$ 1.51	\$ 6.75
Feed, Variable, Labor and Fixed Costs													
Feed Cost	\$/day	\$ 1.10	\$ 0.52	\$ 2.12	\$ 0.93	\$ 0.58	\$ 1.40	\$ 0.95	\$ 0.43	\$ 1.44	\$ 0.99	\$ 0.43	\$ 2.18
Other Variable Cost	\$/day	\$ 0.38	\$ 0.10	\$ 0.93	\$ 0.35	\$ 0.11	\$ 0.60	\$ 0.43	\$ 0.26	\$ 0.66	\$ 0.39	\$ 0.10	\$ 0.93
Labor/Mgt Cost	\$/day	\$ 1.72	\$ 0.27	\$ 3.85	\$ 0.89	\$ 0.29	\$ 1.91	\$ 1.00	\$ 0.31	\$ 2.55	\$ 1.19	\$ 0.27	\$ 3.85
Fixed Cost	\$/day	\$ 0.22	\$ 0.02	\$ 0.86	\$ 0.21	\$ 0.01	\$ 0.86	\$ 0.19	\$ 0.03	\$ 0.49	\$ 0.21	\$ 0.01	\$ 0.86

* Does not include calf value

Feed blue
Variable green
Fixed orange
Labor pink

Table 7. The influence of herd size on daily cost and labor required to rear calves on Wisconsin dairy farms.

Item	Unit	Herd Size (number of cows)			Statistics *		LSD		
		<75	75-150	>150	Pr > F				
Economic Cost by Category									
Liquid Feed	\$\$/day	\$	0.66	\$	0.60	\$	0.58	0.577	NS
Calf Starter	\$\$/day	\$	0.40	\$	0.30	\$	0.36	0.259	NS
Forage	\$\$/day	\$	0.04	\$	0.03	\$	0.01	0.135	NS
Bedding	\$\$/day	\$	0.10	\$	0.09	\$	0.10	0.949	NS
Veterinary	\$\$/day	\$	0.13	\$	0.14	\$	0.20	0.069	0.06
Death Loss	\$\$/day	\$	0.09	\$	0.07	\$	0.08	0.433	NS
Interest	\$\$/day	\$	0.06	\$	0.05	\$	0.05	0.006	0.01
Labor	\$\$/day	\$	1.56	\$	0.79	\$	0.90	0.001	0.41
Management	\$\$/day	\$	0.16	\$	0.09	\$	0.11	0.223	NS
Calf Housing	\$\$/day	\$	0.19	\$	0.21	\$	0.17	0.817	NS
Calf Equipment	\$\$/day	\$	0.03	\$	0.01	\$	0.02	0.398	NS
Total Cost **	\$\$/day	\$	3.41	\$	2.39	\$	2.57	0.001	0.57
Feed, Variable, Labor and Fixed Cost									
Feed Cost	\$\$/day	\$	1.10	\$	0.93	\$	0.95	0.196	NS
Other Variable Cost	\$\$/day	\$	0.38	\$	0.35	\$	0.43	0.332	NS
Labor/Mgt Cost	\$\$/day	\$	1.72	\$	0.89	\$	1.00	0.001	0.45
Fixed Cost	\$\$/day	\$	0.22	\$	0.21	\$	0.19	0.912	NS
Labor and Management Efficiency									
Labor/Mgt Required	days/year		43.5		45.6		141.6	0.001	40.7
Labor/Mgt Required	hrs/calf		12.9		7.0		8.0	0.001	3.2
Labor Efficiency	calves/hr		6.9		10.5		9.7	0.117	NS
Labor Efficiency	calves/man/day		55.4		83.6		77.3	0.118	NS
Other									
Weaning Age	weeks		7.1		7.3		7.8	0.417	NS
Days on Feed	days		56.9		62.2		59.5	0.596	NS

* LSD = least significant difference, NS = not significant

** Does not include calf value

Table 8. Correlation of individual rearing cost or labor efficiency parameters versus total calf rearing cost on Wisconsin dairy farms.

Item	Unit	vs Total Cost	
		Correlation (r)	P > r
Economic Cost by Category			
Liquid Feed	\$\$/day	0.194	0.130
Calf Starter	\$\$/day	0.467	0.001
Forage	\$\$/day	0.300	0.018
Bedding	\$\$/day	0.281	0.027
Veterinary	\$\$/day	0.221	0.084
Death Loss	\$\$/day	0.166	0.197
Interest	\$\$/day	0.752	0.001
Labor	\$\$/day	0.898	0.001
Management	\$\$/day	0.549	0.001
Calf Housing	\$\$/day	0.228	0.075
Calf Equipment	\$\$/day	0.368	0.003
Feed, Variable, Labor and Fixed Cost			
Feed Cost	\$\$/day	0.472	0.001
Other Variable Cost	\$\$/day	0.424	0.001
Labor/Mgt Cost	\$\$/day	0.906	0.001
Fixed Cost	\$\$/day	0.299	0.018
Labor and Management Efficiency			
Labor/Mgt Required	days/year	0.178	0.166
Labor/Mgt Required	hrs/calf	0.815	0.001
Labor Efficiency	calves/hr	-0.695	0.001
Labor Efficiency	calves/man/day	-0.697	0.001
Other			
Weaning Age	weeks	-0.138	0.284
Days on Feed	days	-0.299	0.018

ICPA Heifer Enterprise Analysis Summaries

Table 9. Economic cost and labor required to rear heifers on Wisconsin dairy farms.

Item	Unit	All Herds (n=62)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Feed	\$\$/heifer	\$ 647.15	\$ 432.82	\$ 1,107.40	\$ 144.77
Bedding	\$\$/heifer	\$ 29.07	\$ 0.00	\$ 164.22	\$ 38.46
Veterinary	\$\$/heifer	\$ 37.66	\$ 5.78	\$ 202.71	\$ 35.73
Breeding	\$\$/heifer	\$ 26.07	\$ 5.78	\$ 58.32	\$ 12.95
Electrical and Fuel	\$\$/heifer	\$ 34.74	\$ 23.12	\$ 49.00	\$ 4.36
Interest	\$\$/heifer	\$ 32.92	\$ 23.38	\$ 55.36	\$ 10.04
Death Loss	\$\$/heifer	\$ 6.33	\$ 0.00	\$ 54.00	\$ 11.41
Labor	\$\$/heifer	\$ 128.40	\$ 53.92	\$ 328.30	\$ 60.53
Management	\$\$/heifer	\$ 15.96	\$ 0.00	\$ 114.24	\$ 22.95
Manure Storage	\$\$/heifer	\$ 22.44	\$ 0.00	\$ 125.82	\$ 22.39
Housing	\$\$/heifer	\$ 93.09	\$ 0.00	\$ 304.48	\$ 71.49
Equipment	\$\$/heifer	\$ 24.79	\$ 0.00	\$ 73.59	\$ 19.34
Total Cost (without calf)	\$\$/heifer	\$ 1,099.12	\$ 730.65	\$ 1,530.59	\$ 186.60
Calf Cost	\$\$/calf	\$ 261.62	\$ 184.72	\$ 434.52	\$ 55.54
Total Cost (with calf)	\$\$/heifer	\$ 1,360.74	\$ 922.65	\$ 1,807.90	\$ 199.54
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/heifer	\$ 647.15	\$ 432.82	\$ 1,107.40	\$ 144.77
Other Variable Cost	\$\$/heifer	\$ 145.75	\$ 59.60	\$ 379.08	\$ 63.98
Labor/Mgt Cost	\$\$/heifer	\$ 144.36	\$ 53.92	\$ 388.60	\$ 76.51
Fixed Cost	\$\$/heifer	\$ 140.32	\$ 19.14	\$ 380.60	\$ 90.07
Feed Cost	% of total cost	60.3%	43.9%	82.9%	8.5%
Other Variable Cost	% of total cost	13.5%	4.3%	26.1%	4.8%
Labor/Mgt Cost	% of total cost	13.4%	4.9%	34.0%	6.2%
Fixed Cost	% of total cost	12.9%	2.3%	30.4%	7.4%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	105.3	24.2	307.6	62.1
Labor/Mgt Required	hrs/heifer	9.0	3.1	26.4	5.2
Labor Efficiency	heifers/hr	53.7	13.8	117.7	26.9
Labor Efficiency	heifers/man/day	429.8	110.5	941.6	215.0
Other					
Calving Age	months	24.6	22.0	30.0	1.5
Days on Feed	days	683.3	578.0	821.0	46.8

Table 10. Economic cost and labor required to rear heifers on Wisconsin dairy farms with less than 75 cows.

Item	Unit	Herds (n=20)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Feed	\$\$/heifer	\$ 650.63	\$ 454.92	\$ 1,035.55	\$ 142.18
Bedding	\$\$/heifer	\$ 35.80	\$ 0.00	\$ 164.22	\$ 47.14
Veterinary	\$\$/heifer	\$ 33.49	\$ 13.38	\$ 62.00	\$ 16.34
Breeding	\$\$/heifer	\$ 28.41	\$ 7.45	\$ 54.80	\$ 13.69
Electrical and Fuel	\$\$/heifer	\$ 35.53	\$ 26.76	\$ 42.84	\$ 3.91
Interest	\$\$/heifer	\$ 33.31	\$ 25.13	\$ 47.58	\$ 9.49
Death Loss	\$\$/heifer	\$ 3.78	\$ 0.00	\$ 40.14	\$ 9.37
Labor	\$\$/heifer	\$ 170.93	\$ 73.59	\$ 328.30	\$ 72.25
Management	\$\$/heifer	\$ 28.13	\$ 0.00	\$ 114.24	\$ 30.48
Manure Storage	\$\$/heifer	\$ 23.38	\$ 0.00	\$ 66.90	\$ 16.47
Housing	\$\$/heifer	\$ 90.54	\$ 0.00	\$ 274.29	\$ 76.42
Equipment	\$\$/heifer	\$ 26.04	\$ 0.00	\$ 73.59	\$ 18.00
Total Cost (without calf)	\$\$/heifer	\$ 1,161.13	\$ 778.11	\$ 1,500.59	\$ 171.84
Calf Cost	\$\$/calf	\$ 290.06	\$ 184.72	\$ 434.52	\$ 69.35
Total Cost (with calf)	\$\$/heifer	\$ 1,451.19	\$ 962.83	\$ 1,753.17	\$ 197.86
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/heifer	\$ 650.63	\$ 454.92	\$ 1,035.55	\$ 142.18
Other Variable Cost	\$\$/heifer	\$ 152.84	\$ 59.60	\$ 379.08	\$ 77.06
Labor/Mgt Cost	\$\$/heifer	\$ 199.06	\$ 73.59	\$ 388.60	\$ 91.80
Fixed Cost	\$\$/heifer	\$ 139.95	\$ 31.64	\$ 367.95	\$ 93.89
Feed Cost	% of total cost	57.3%	43.9%	82.9%	9.5%
Other Variable Cost	% of total cost	13.2%	4.3%	24.4%	5.0%
Labor/Mgt Cost	% of total cost	17.4%	6.3%	34.0%	7.6%
Fixed Cost	% of total cost	12.1%	2.6%	27.5%	7.2%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	72.7	24.8	130.7	31.0
Labor/Mgt Required	hrs/heifer	12.3	4.1	26.4	6.1
Labor Efficiency	heifers/hr	38.8	13.8	88.0	22.7
Labor Efficiency	heifers/man/day	310.4	110.5	704.2	182.1
Other					
Calving Age	months	25.3	23.0	30.0	1.7
Days on Feed	days	704.4	645.0	821.0	47.7

Table 11. Economic cost and labor required to rear heifers on Wisconsin dairy farms with 75-150 cows.

Item	Unit	Herds (n=23)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Feed	\$\$/heifer	\$ 662.88	\$ 438.18	\$ 1,107.40	\$ 144.24
Bedding	\$\$/heifer	\$ 26.28	\$ 0.00	\$ 121.60	\$ 36.49
Veterinary	\$\$/heifer	\$ 32.52	\$ 6.69	\$ 181.74	\$ 37.75
Breeding	\$\$/heifer	\$ 25.50	\$ 7.31	\$ 58.32	\$ 13.33
Electrical and Fuel	\$\$/heifer	\$ 35.76	\$ 26.76	\$ 41.94	\$ 3.65
Interest	\$\$/heifer	\$ 33.27	\$ 23.95	\$ 52.89	\$ 10.01
Death Loss	\$\$/heifer	\$ 9.28	\$ 0.00	\$ 54.00	\$ 15.29
Labor	\$\$/heifer	\$ 109.69	\$ 53.92	\$ 182.50	\$ 42.88
Management	\$\$/heifer	\$ 122.29	\$ 0.00	\$ 83.88	\$ 18.07
Manure Storage	\$\$/heifer	\$ 30.97	\$ 6.38	\$ 125.82	\$ 28.22
Housing	\$\$/heifer	\$ 119.46	\$ 6.69	\$ 304.48	\$ 82.97
Equipment	\$\$/heifer	\$ 26.32	\$ 0.00	\$ 69.90	\$ 21.92
Total Cost (without calf)	\$\$/heifer	\$ 1,123.18	\$ 781.82	\$ 1,559.09	\$ 188.82
Calf Cost	\$/calf	\$ 244.78	\$ 191.22	\$ 332.86	\$ 38.97
Total Cost (with calf)	\$\$/heifer	\$ 1,367.96	\$ 1,036.60	\$ 1,836.40	\$ 199.44
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/heifer	\$ 662.88	\$ 438.18	\$ 1,107.40	\$ 144.24
Other Variable Cost	\$\$/heifer	\$ 139.25	\$ 66.90	\$ 258.63	\$ 54.53
Labor/Mgt Cost	\$\$/heifer	\$ 121.98	\$ 53.92	\$ 258.63	\$ 53.14
Fixed Cost	\$\$/heifer	\$ 176.75	\$ 19.14	\$ 380.60	\$ 98.19
Feed Cost	% of total cost	60.3%	51.2%	73.5%	60.4%
Other Variable Cost	% of total cost	12.6%	6.9%	23.0%	4.7%
Labor/Mgt Cost	% of total cost	11.1%	4.9%	20.0%	4.0%
Fixed Cost	% of total cost	15.9%	2.3%	30.4%	8.2%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	81.9	24.2	205.9	43.6
Labor/Mgt Required	hrs/heifer	7.4	3.2	15.5	3.5
Labor Efficiency	heifers/hr	60.3	23.5	113.1	27.4
Labor Efficiency	heifers/man/day	482.1	188.4	905.2	219.3
Other					
Calving Age	months	24.7	23.0	28.0	1.2
Days on Feed	days	690.6	638.0	791.0	38.1

Table 12. Economic cost and labor required to rear heifers on Wisconsin dairy farms with more than 150 cows.

Item	Unit	Herds (n=19)			
		Average	Minimum	Maximum	Std. Dev.
Economic Cost by Category					
Feed	\$\$/heifer	\$ 625.27	\$ 432.82	\$ 976.86	\$ 153.05
Bedding	\$\$/heifer	\$ 25.22	\$ 0.00	\$ 108.63	\$ 30.94
Veterinary	\$\$/heifer	\$ 48.02	\$ 5.78	\$ 202.70	\$ 46.34
Breeding	\$\$/heifer	\$ 24.27	\$ 5.78	\$ 49.00	\$ 12.01
Electrical and Fuel	\$\$/heifer	\$ 32.73	\$ 23.12	\$ 49.00	\$ 5.03
Interest	\$\$/heifer	\$ 32.11	\$ 23.38	\$ 48.52	\$ 10.51
Death Loss	\$\$/heifer	\$ 5.59	\$ 0.00	\$ 26.16	\$ 7.08
Labor	\$\$/heifer	\$ 105.30	\$ 63.58	\$ 198.09	\$ 39.45
Management	\$\$/heifer	\$ 7.40	\$ 0.00	\$ 51.12	\$ 11.69
Manure Storage	\$\$/heifer	\$ 11.59	\$ 0.00	\$ 57.51	\$ 15.54
Housing	\$\$/heifer	\$ 65.24	\$ 21.87	\$ 146.96	\$ 34.11
Equipment	\$\$/heifer	\$ 21.71	\$ 0.00	\$ 63.00	\$ 18.16
Total Cost (without calf)	\$\$/heifer	\$ 1,005.98	\$ 730.65	\$ 1,304.09	\$ 186.83
Calf Cost	\$\$/calf	\$ 251.18	\$ 187.35	\$ 364.27	\$ 45.30
Total Cost (with calf)	\$\$/heifer	\$ 1,257.16	\$ 922.65	\$ 1,544.63	\$ 159.13
Feed, Variable, Labor and Fixed Cost					
Feed Cost	\$\$/heifer	\$ 625.27	\$ 432.82	\$ 976.86	\$ 153.05
Other Variable Cost	\$\$/heifer	\$ 145.81	\$ 75.14	\$ 279.60	\$ 61.64
Labor/Mgt Cost	\$\$/heifer	\$ 112.70	\$ 69.36	\$ 249.21	\$ 48.23
Fixed Cost	\$\$/heifer	\$ 98.54	\$ 40.46	\$ 233.80	\$ 55.02
Feed Cost	% of total cost	63.4%	50.7%	81.0%	8.7%
Other Variable Cost	% of total cost	14.8%	8.2%	26.1%	4.6%
Labor/Mgt Cost	% of total cost	11.8%	6.5%	23.6%	11.8%
Fixed Cost	% of total cost	10.1%	3.4%	24.4%	5.4%
Labor and Management Efficiency					
Labor/Mgt Required	days/year	166.7	87.7	307.6	61.8
Labor/Mgt Required	hrs/heifer	7.2	3.1	17.2	4.0
Labor Efficiency	heifers/hr	61.8	21.2	117.7	24.8
Labor Efficiency	heifers/man/day	495.0	169.5	941.6	198.1
Other					
Calving Age	months	23.7	22.0	26.0	1.2
Days on Feed	days	652.8	578.0	729.0	40.8

Table 13. Summary statistics by herd size of daily heifer rearing costs on Wisconsin dairy farms.

Item	Unit	< 75 Cows (20 herds)			75-150 Cows (23 herds)			> 150 Cows (19 herds)			All Herds (62 herds)		
		Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum	Average	Minimum	Maximum
Economic Cost by Category													
Feed	\$/day	\$ 0.93	\$ 0.68	\$ 1.39	\$ 0.96	\$ 0.67	\$ 1.40	\$ 0.96	\$ 0.67	\$ 1.50	\$ 0.95	\$ 0.67	\$ 1.50
Bedding	\$/day	\$ 0.05	\$ 0.00	\$ 0.23	\$ 0.04	\$ 0.00	\$ 0.17	\$ 0.04	\$ 0.00	\$ 0.17	\$ 0.04	\$ 0.00	\$ 0.23
Veterinary	\$/day	\$ 0.05	\$ 0.02	\$ 0.08	\$ 0.05	\$ 0.01	\$ 0.26	\$ 0.07	\$ 0.01	\$ 0.29	\$ 0.05	\$ 0.01	\$ 0.29
Breeding	\$/day	\$ 0.04	\$ 0.01	\$ 0.08	\$ 0.04	\$ 0.01	\$ 0.08	\$ 0.04	\$ 0.01	\$ 0.07	\$ 0.04	\$ 0.01	\$ 0.08
Electrical & Fuel	\$/day	\$ 0.05	\$ 0.04	\$ 0.06	\$ 0.05	\$ 0.04	\$ 0.06	\$ 0.05	\$ 0.04	\$ 0.07	\$ 0.05	\$ 0.04	\$ 0.07
Interest	\$/day	\$ 0.05	\$ 0.02	\$ 0.09	\$ 0.05	\$ 0.03	\$ 0.08	\$ 0.05	\$ 0.03	\$ 0.07	\$ 0.05	\$ 0.03	\$ 0.07
Death Loss	\$/day	\$ 0.01	\$ 0.00	\$ 0.06	\$ 0.01	\$ 0.00	\$ 0.08	\$ 0.00	\$ 0.00	\$ 0.04	\$ 0.01	\$ 0.00	\$ 0.08
Labor	\$/day	\$ 0.24	\$ 0.11	\$ 0.49	\$ 0.16	\$ 0.08	\$ 0.27	\$ 0.16	\$ 0.10	\$ 0.31	\$ 0.19	\$ 0.08	\$ 0.49
Management	\$/day	\$ 0.04	\$ 0.00	\$ 0.16	\$ 0.02	\$ 0.00	\$ 0.12	\$ 0.01	\$ 0.00	\$ 0.08	\$ 0.02	\$ 0.00	\$ 0.16
Manure Storage	\$/day	\$ 0.03	\$ 0.00	\$ 0.10	\$ 0.05	\$ 0.01	\$ 0.18	\$ 0.02	\$ 0.00	\$ 0.09	\$ 0.03	\$ 0.00	\$ 0.18
Housing	\$/day	\$ 0.13	\$ 0.00	\$ 0.41	\$ 0.17	\$ 0.01	\$ 0.44	\$ 0.10	\$ 0.03	\$ 0.22	\$ 0.14	\$ 0.00	\$ 0.44
Equipment	\$/day	\$ 0.04	\$ 0.00	\$ 0.11	\$ 0.04	\$ 0.00	\$ 0.10	\$ 0.03	\$ 0.00	\$ 0.09	\$ 0.04	\$ 0.00	\$ 0.11
Cost *	\$/day	\$ 1.66	\$ 1.19	\$ 1.83	\$ 1.61	\$ 1.21	\$ 1.95	\$ 1.54	\$ 1.24	\$ 1.80	\$ 1.61	\$ 1.24	\$ 1.88
Feed, Variable, Labor and Fixed Cost													
Feed Cost	\$/day	\$ 0.93	\$ 0.68	\$ 1.39	\$ 0.96	\$ 0.67	\$ 1.40	\$ 0.96	\$ 0.67	\$ 1.50	\$ 0.95	\$ 0.67	\$ 1.50
Other Variable Cost	\$/day	\$ 0.24	\$ 0.08	\$ 0.52	\$ 0.22	\$ 0.10	\$ 0.37	\$ 0.26	\$ 0.13	\$ 0.40	\$ 0.25	\$ 0.08	\$ 0.52
Labor/Mgt Cost	\$/day	\$ 0.28	\$ 0.11	\$ 0.58	\$ 0.18	\$ 0.08	\$ 0.37	\$ 0.17	\$ 0.10	\$ 0.39	\$ 0.21	\$ 0.08	\$ 0.58
Fixed Cost	\$/day	\$ 0.20	\$ 0.04	\$ 0.55	\$ 0.26	\$ 0.03	\$ 0.55	\$ 0.15	\$ 0.06	\$ 0.35	\$ 0.20	\$ 0.03	\$ 0.55

* Does not include calf rearing cost

Table 14. The influence of herd size on daily cost and labor required to rear heifers on Wisconsin dairy farms.

Item	Unit	Herd Size			Statistics *		
		<75	75-150	>150	Pr > F	LSD	
Economic Cost by Category							
Feed	\$\$/day	\$ 0.93	\$ 0.96	\$ 0.96	0.838	NS	
Bedding	\$\$/day	\$ 0.05	\$ 0.04	\$ 0.04	0.705	NS	
Veterinary	\$\$/day	\$ 0.05	\$ 0.05	\$ 0.07	0.211	NS	
Breeding	\$\$/day	\$ 0.04	\$ 0.04	\$ 0.04	0.722	NS	
Electrical and Fuel	\$\$/day	\$ 0.05	\$ 0.05	\$ 0.05	0.522	NS	
Interest	\$\$/day	\$ 0.05	\$ 0.05	\$ 0.05	0.768	NS	
Death Loss	\$\$/day	\$ 0.01	\$ 0.01	\$ 0.01	0.311	NS	
Labor	\$\$/day	\$ 0.24	\$ 0.16	\$ 0.16	0.002	\$ 0.05	
Management	\$\$/day	\$ 0.04	\$ 0.02	\$ 0.01	0.014	\$ 0.02	
Manure Storage	\$\$/day	\$ 0.03	\$ 0.05	\$ 0.02	0.028	\$ 0.02	
Housing	\$\$/day	\$ 0.13	\$ 0.17	\$ 0.10	0.080	\$ 0.06	
Equipment	\$\$/day	\$ 0.04	\$ 0.04	\$ 0.03	0.811	NS	
Cost **	\$\$/day	\$ 1.66	\$ 1.61	\$ 1.54	0.328	NS	
Feed, Variable, Labor and Fixed Cost							
Feed Cost	\$\$/day	\$ 0.93	\$ 0.96	\$ 0.96	0.838	NS	
Other Variable Cost	\$\$/day	\$ 0.26	\$ 0.22	\$ 0.26	0.733	NS	
Labor/Mgt Cost	\$\$/day	\$ 0.28	\$ 0.18	\$ 0.17	0.001	\$ 0.06	
Fixed Cost	\$\$/day	\$ 0.20	\$ 0.26	\$ 0.15	0.036	\$ 0.08	
Feed Cost	% of total cost	55.5%	57.4%	57.3%	0.080	5.2%	
Other Variable Cost	% of total cost	15.6%	13.2%	15.6%	0.350	NS	
Labor/Mgt Cost	% of total cost	17.0%	10.6%	10.4%	0.001	3.6%	
Fixed Cost	% of total cost	12.0%	15.3%	9.1%	0.036	4.5%	
Labor and Management Efficiency							
Labor/Mgt Required	days/year	72.7	81.9	166.7	0.001	29.4	
Labor/Mgt Required	hrs/heifer	12.3	7.4	7.2	0.001	2.9	
Labor Efficiency	heifers/hr	38.8	60.3	61.8	0.008	15.8	
Labor Efficiency	heifers/man/day	310.4	482.1	495.0	0.008	126.5	
Other							
Calving Age	months	25.3	24.7	23.7	0.002	0.9	
Days on Feed	days	704.3	690.6	652.8	0.001	26.6	

* LSD = least significant difference, NS = not significant

** Does not include calf rearing cost

Table 15. Correlation of individual cost or labor efficiency parameters versus total rearing cost of heifers on Wisconsin dairy farms

Item	Unit	vs Total Cost	
		Correlation (r)	P > r
Economic Cost by Category			
Feed	\$\$/day	0.640	0.001
Bedding	\$\$/day	0.322	0.011
Veterinary	\$\$/day	0.139	0.287
Breeding	\$\$/day	0.323	0.011
Electrical and Fuel	\$\$/day	0.293	0.022
Interest	\$\$/day	0.039	0.764
Death Loss	\$\$/day	0.132	0.312
Labor	\$\$/day	0.273	0.033
Management	\$\$/day	0.322	0.011
Manure Storage	\$\$/day	0.302	0.018
Housing	\$\$/day	0.273	0.033
Equipment	\$\$/day	0.324	0.011
Feed, Variable, Labor and Fixed Cost			
Feed Cost	\$\$/day	0.640	0.001
Other Variable Cost	\$\$/day	0.408	0.001
Labor/Mgt Cost	\$\$/day	0.314	0.014
Fixed Cost	\$\$/day	0.361	0.004
Feed Cost	% of total cost	-0.175	0.176
Other Variable Cost	% of total cost	0.053	0.688
Labor/Mgt Cost	% of total cost	0.041	0.752
Fixed Cost	% of total cost	0.132	0.309
Labor and Management Efficiency			
Labor/Mgt Required	days/year	-0.194	0.134
Labor/Mgt Required	hrs/heifer	0.311	0.014
Labor Efficiency	heifers/hr	-0.321	0.012
Labor Efficiency	heifers/man/day	-0.321	0.012
Other			
Calving Age	months	0.432	0.001
Days on Feed	days	0.473	0.001

Table 16. The effect of body size and age on variable, fixed and total cost associated with rearing heifers on Wisconsin dairy farms.

Weight lbs	Age months	Variable Cost										Fixed Cost			Total Cost
		Feed	Bedding	Veterinary	Breeding	Electricity and Fuel	Labor	Management	Interest	Death	Cost				
											Equip- ment	Building s	Manure		
\$/head/day															
219	3.0	0.66	0.07	0.06	0.00	0.02	0.14	0.01	0.04	0.00	0.04	0.17	0.01	1.22	
299	4.4	0.76	0.05	0.05	0.00	0.02	0.17	0.02	0.04	0.01	0.04	0.13	0.01	1.30	
403	6.1	0.76	0.06	0.05	0.00	0.03	0.17	0.02	0.05	0.01	0.04	0.11	0.01	1.33	
511	8.5	0.80	0.05	0.05	0.00	0.03	0.19	0.02	0.05	0.00	0.04	0.13	0.03	1.38	
601	10.0	0.74	0.04	0.03	0.00	0.04	0.17	0.03	0.05	0.00	0.05	0.15	0.03	1.35	
700	12.0	0.91	0.06	0.04	0.00	0.05	0.21	0.02	0.06	0.01	0.04	0.12	0.03	1.52	
810	14.2	0.92	0.08	0.06	0.14	0.05	0.25	0.02	0.07	0.01	0.04	0.13	0.03	1.80	
906	16.3	1.02	0.03	0.04	0.13	0.06	0.26	0.02	0.11	0.00	0.04	0.14	0.04	1.90	
1020	19.1	1.00	0.04	0.04	0.05	0.07	0.19	0.03	0.11	0.01	0.05	0.12	0.05	1.75	
1114	20.7	1.14	0.03	0.07	0.02	0.08	0.16	0.02	0.05	0.01	0.04	0.15	0.05	1.81	
1196	21.8	1.37	0.04	0.07	0.01	0.08	0.17	0.02	0.07	0.02	0.04	0.14	0.04	2.06	

Cooperating Farms

<u>Farm</u>	<u>City</u>
Ken Passow	Alma, WI
DS Farms	Alma, WI
Noll's Dairy	Alma, WI
Rick and Lu Ann Flury	Alma, WI
Howard Misch	Cochrane, WI
Larry Johnson	Ellsworth, WI
Dean Doornick	Baldwin, WI
Dan Luckwaldt	Woodville, WI
Dennis Donahue	Baldwin, WI
Mel Pittman	Plum City, WI
Charles Garbe	Hudson, WI
John Neumann	Hammond, WI
Rick Jacobson	Hammond, WI
Melvin and Sharon Niemann	Edgar, WI
Dave and Gerri Loucks	Abbotsford, WI
Twin-B Dairy, Floyd and Lloyd Baumann	Marathon, WI
Robert and Lucy Sippl	Birnamwood, WI
Jeff and Maggie Utech	Merrill, WI
Robert Knoeck	Marathon, WI
John Steuber	Stratford, WI
Double J Dairy, Dan and Carl Vosters	Appleton, WI
Randy Erickson	Bear Creek, WI
John Everett	DePere, WI
Dale Kropp	Seymour, WI
Landl Farms, Bob and Rick Schuessler	Kaukauna, WI
Larrand Dairy	
Randy Smith & Larry Oudenhoven	DePere, WI
Kurt Moeller	Seymour, WI
Merlin and Peggy Rohm	Seymour, WI
Bill and Brent Schuh	Kaukauna, WI
Vernon Ainsworth	Shawano, WI
Dale Zahn	Clintonville, WI
Terry Goerl	Seymour, WI
Jeff Betley	Pulaski, WI
Tracy Anker	Bonduel, WI
Rick and Valerie Adamski	Seymour, WI
Brecken Farms	Bonduel, WI
Scott Wendler	Pulaski, WI
Dan and Ruth Boerst	Manawa, WI
Arlyn and Jeff Wepner	Manawa, WI
Steve and Scott Bartel	Weyauwega, WI

Cooperating Farms, continued

<u>Farm</u>	<u>City</u>
Doug, Tom, Mary & Vicki Behnke	Clintonville, WI
Duane Zable, Zable Farms	Weyauwega, WI
Jim Senn	Cambellsport, WI
Ed Smith	Oakfield, WI
Robert Koenen	Mt. Calvary, WI
Doug Hodorff	Eden, WI
Holschback Cloveredge Farms	Manitowoc, WI
Meadow Brook Farms	Manitowoc, WI
Tom and Jane Lensmire	Cleveland, WI
Mike and Lori Propson	Valders, WI
Steve and Mary Leitner	Reedsville, WI
El-Na Farms, Eli and Nancy Fenendael	Algoma, WI
Dueschers Legendairy Farm	
Keith and Terri Duescher	Algoma, WI
Jauquet Farms, Jeff and Cheryl Jauquet	Luxemburg, WI
Jeff Jeanquart	Buussels, WI
Larry Brickner	Sturgeon Bay, WI
Lynn Johnson	Pepin, WI
Chuck Raethke	Pepin, WI
Dan and Cindy Evenson	Stockholm, WI
Kyle Fagerland	Mondovi, WI
David and Adelle Huser	Vesper, WI
Quentin Hess	Edgar, WI
Mark Mroczenski	Athens, WI
Lyle Guralski	Athens, WI
Mike Fischer	Hatley, WI
Bob Brandt	Mosinee, WI
Jeff and Marie Pagenkopf, Sandy Acres	Elk Mound, WI
Tim Seibel	Bloomer, WI
Jack Bremer	Markesan, WI
Tim Graff	Markesan, WI
Todd Worm	Markesan, WI
Lee Ellens	Brandon, WI
William Clewien	Berlin, WI
Steve Sidwell	Greenwood, WI
Duane Boon	Greenwood, WI
Richard Vine	Granton, WI
Gary and Elma Luchterhand	Spencer, WI
Barb Drewry-Zimmerman	Plymouth, WI
Ed Strauss	Sheboygan Falls, WI