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## **DAIRY REPLACEMENT PROGRAMS: COSTS & ANALYSIS WESTERN NEW YORK, 1993**

by

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As the dairy industry becomes more competitive and farms increase in size, economics of heifer management will be more of an integral component of farm profitability. The dairy replacement enterprise offers opportunities where costs can be decreased and efficiency improved. The purpose of this study was to determine the actual costs associated with the replacement programs on large dairy farms that have above average heifer programs. In this study eight western New York participated, averaging 354 dairy replacements per farm.<sup>1</sup>

#### TOTAL COST

At calving total cost per animal averaged \$1,150, with an average calving age of 23.3 months (Table 1). The total cost was

**Table I**

COST TO RAISE DAIRY REPLACEMENTS				
8 Western New York Dairy Farms, 1993				
Total Cost per Animal				
	Average	Interquartile Range		
Number of Heifers	354	250 - 527		
Calving Age, Months	23.3	22 - 24.6		
Calving Weight, Pounds	1338	1275 - 1360		
Expense Item	Cost per Animal		Percent	
Feed	\$ 645	\$ 568 - 774	61.8	
Bedding	25.2	13.0 - 37.4	2.4	
Health	18.2	9.4 - 32.8	1.7	
Breeding	18.5	12.9 - 24.1	1.8	
Labor	138	110 - 185	13.2	
Trucking	.1	.01 - .23	.01	
Insurance	4.3	3.08 - 7.79	.41	
Machinery Operation	38.6	27.8 - 56.6	3.7	
Machinery Overhead	22.2	13.2 - 31.3	2.1	
Building Operation	7.6	3.4 - 20.2	.72	
Building Overhead	60.8	33.1 - 144	5.8	
Death Loss	3.0	1.7 - 6.4	.29	
Interest On Investment	62.1	52.7 - 77.8	6.95	
Total Growing Costs	\$ 1044	\$ 943 - 1212	100	
Value of Calf	\$ 106	\$ 100 - 120		
Total Costs	\$ 1150	\$ 1044 - 1327		

<sup>1</sup>. These eight farms were not a random sample of farms in western New York. The farms were selected based on dairy replacement housing, size & age of heifers at first calving, and body condition, as evaluated by the author. This data set represented above average farms in western New York.

comprised of the expenses associated with raising heifers from birth to calving, which was \$1,044, and the average calf value at birth, which was \$106. Raising, or growing, costs ranged from \$943 to \$1,212, with total costs, raising costs plus value of calf at birth, ranging from \$1044 to \$1327. The interquartile range represents a middle range of values reported and does not include the high and low extremes. The largest expense was feed costs, representing 62% of the raising costs. Labor was the second largest expense, representing 13.2% of the raising costs. All costs are defined and explained on pages 11 & 12.

#### COST PER DAY PER ANIMAL

Average raising cost per day per heifer was \$1.47. (Table II) This cost does not include the original cost of the calf. Half of the farms were within the \$1.32 to \$1.62 range for costs per day per heifer. Feed cost was \$.91 per day and labor cost was \$.195 a day. All remaining costs equaled \$.365 per day per heifer.

**Table II**

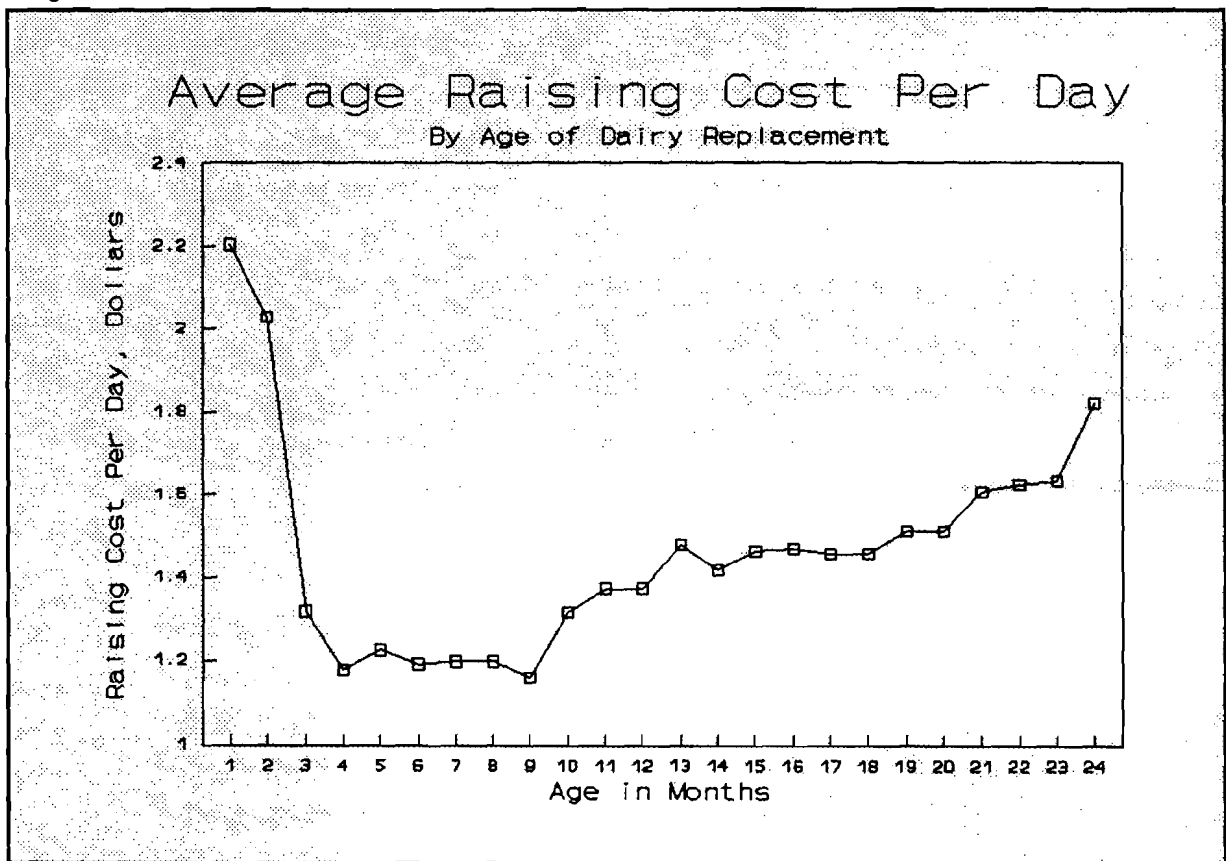
COST TO RAISE DAIRY REPLACEMENTS <sup>1</sup>			
Cost per Day per Animal			
	Average	Interquartile Range	
Number of Animals	354	250 - 527	
Calving Age	23.3	22 - 24.6	
	Cost per Day per Animal		Percent
Feed	\$ .91	.82 - 1.06	61.8
Bedding	.035	.02 - .05	2.4
Health	.026	.01 - .05	1.7
Breeding	.026	.01 - .03	1.7
Labor	.195	.12 - .24	13.3
Trucking	0	0 - .01	0
Insurance	.006	0 - .01	.4
Machinery Operation	.054	.04 - .09	3.8
Machinery Overhead	.031	.02 - .05	2.1
Building Operation	.011	.01 - .03	.7
Building Overhead	.086	.04 - .16	5.8
Death Loss	.004	0 - .01	.3
Interest On Investment	.088	.07 - .1	6.0
<b>Total</b>	<b>\$ 1.47</b>	<b>1.32 - 1.62</b>	<b>100</b>

1. Eight western New York dairy farms, 1993

While the average cost per day per animal was \$1.47, there

was a significant difference in cost per day based on the age of the animal. This difference was caused by changes in feed intake and labor requirements as the heifer grows. The average cost per day per animal averaged \$2.20 during milk feeding, \$1.15 to \$1.20 from weaning to breeding, and \$1.65 from breeding to calving. (Figure 1) Switching from fluid based feed to a dry feed and from hutches to loose housing, which decreased labor requirements, resulted in a \$1.00 reduction of the costs per day per heifer when the animal was weaned. The increase in feed intake around puberty/breeding and for the support of a growing calf lead to the increase in daily cost per day as the heifer approached calving.

**Figure 1**



**COST PER POUND OF GAIN**

The average raising cost per pound of gain was \$.839, with an interquartile range of \$.77 to \$.96. (Table III) This cost was based on an average of 1.77 pounds of gain, with an interquartile range of 1.68 to 1.86 pounds. The average daily rate of gain was based on estimated weights at birth and prior to calving. Feed cost was \$.52 per pound of gain, ranging from \$.46 to \$.62 per

pound of gain. Labor costs contributed another 11.4 cents per pound of gain, with all remaining expenses making up 20.5 cents

**Table III**

<b>COST TO RAISE DAIRY REPLACEMENTS<sup>1</sup></b>			
<b>Cost per Pound of Gain</b>			
	Average	Interquartile Range	
Number of Animals	354	250 - 527	
Calving Age	23.3	22 - 24.6	
Daily Rate of Gain, pounds	1.77	1.68 - 1.86	
	Cost per Pound of Gain		Percent
Feed	\$ .52	\$ .46 - .62	61.9
Bedding	.019	.00 - .03	2.3
Health	.013	.00 - .03	1.6
Breeding	.015	.01 - .02	1.8
Labor	.114	.09 - .15	13.6
Trucking	0	0 - .01	0
Insurance	.001	0 - .01	.1
Machinery Operation	.031	.01 - .06	3.7
Machinery Overhead	.019	.01 - .04	2.3
Building Operation	.005	.00 - .02	.6
Building Overhead	.049	.01 - .05	5.8
Death Loss	.003	0 - .01	.4
Interest On Investment	.051	.03 - .07	6.0
<b>Total</b>	<b>\$ .839</b>	<b>\$ .77 - .96</b>	<b>100</b>

1. Eight western New York dairy farms, 1993.

per pound of gain.

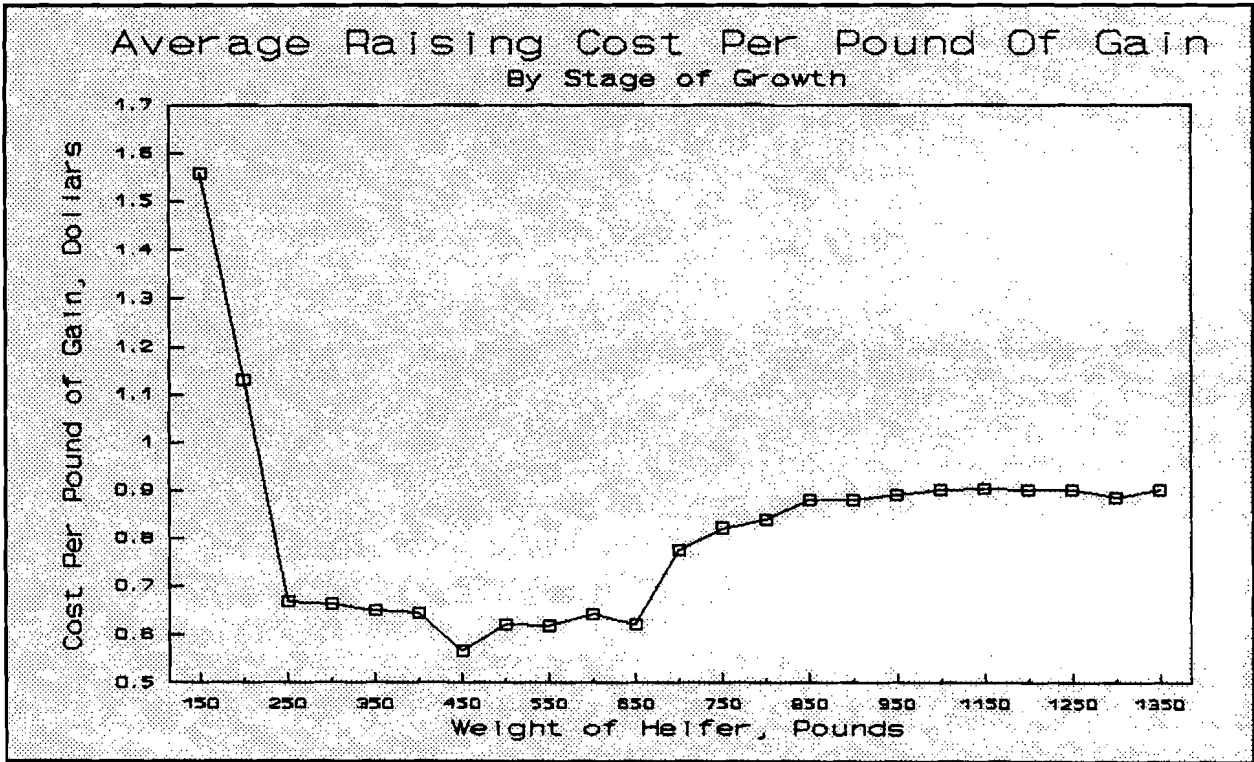
The average cost per pound of gain had the same trend as did cost per day per heifer: \$1.50 per pound of gain prior to weaning, \$.60-\$.65 range per pound a gain from weaning to breeding, and \$.90-\$.95 from breeding to calving. (Figure 2)

Feed and labor costs had the largest impact on costs per pound of gain as the heifer grew. These two costs represents 75% of the raising cost of a heifer. Feed costs were in the low \$.70 range prior to weaning, lowered into the \$.30 range after weaning, and increased again after breeding to \$.60 per pound of gain. (Figure 3) Switching to a non-fluid based feed when the animal was weaned lowered feed costs. The biological changes the animal went through during puberty and breeding lead to a higher feed cost per pound of gain.

Labor costs demonstrated the impact of labor efficiency on costs of raising heifers. Labor costs started at \$.50 plus during milk feeding, then dropped dramatically to below 10 cents

after the animal was weaned, at which point it remained relatively constant (Figure 4). This reflects the decrease in hand labor required to maintain heifers after weaning.

**Figure 2**



**Figure 3**

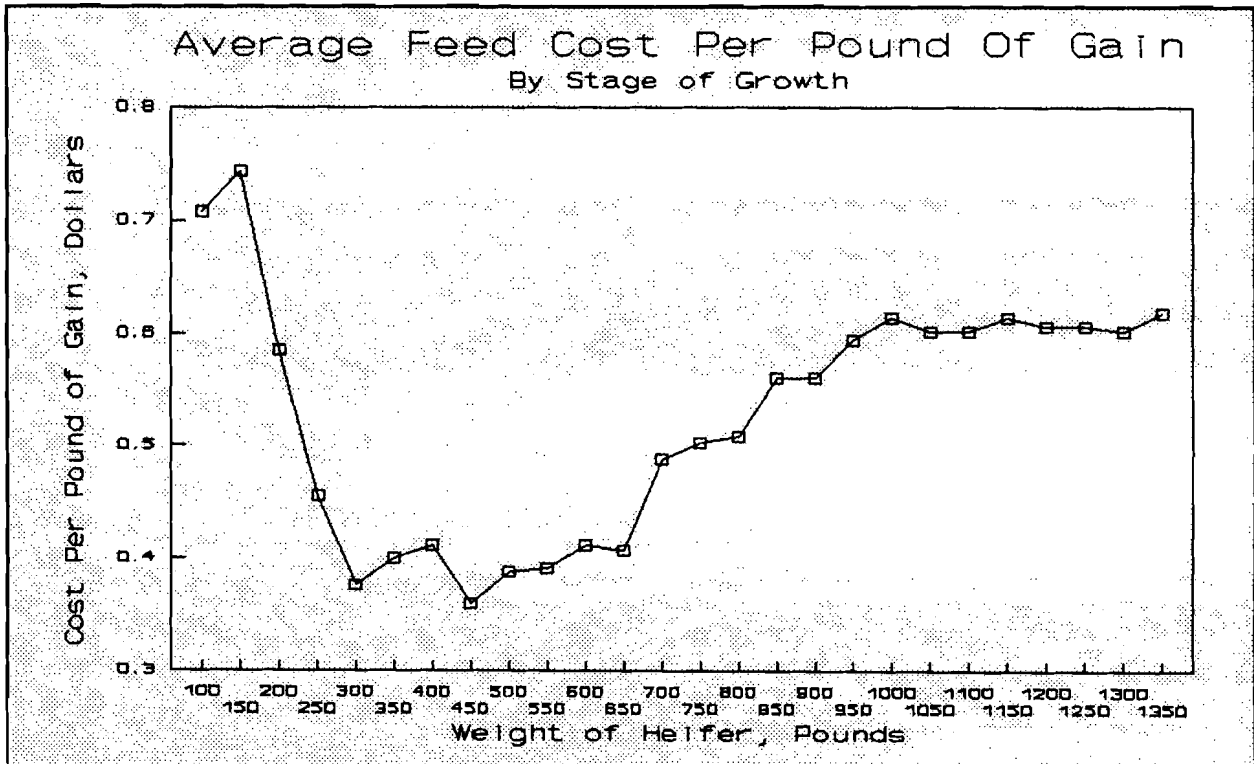
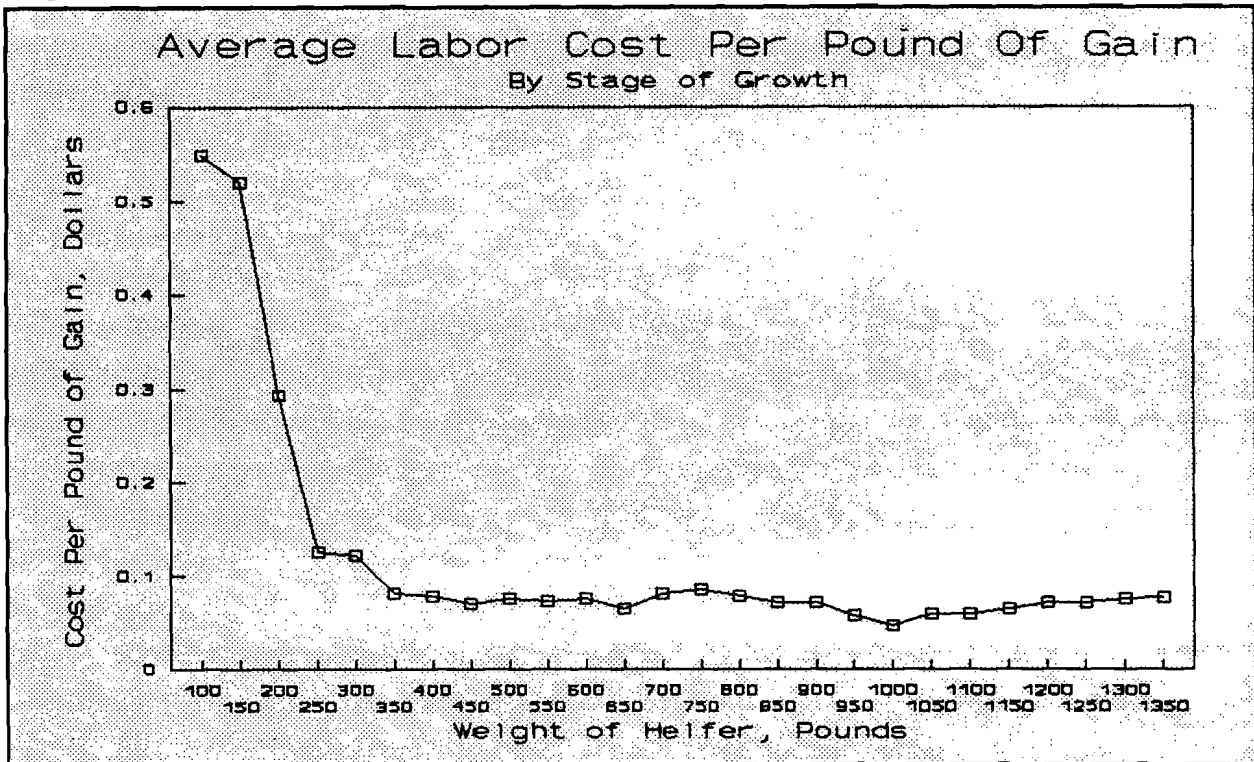


Figure 4



**BREAKDOWN OF EXPENSES BY STAGE OF GROWTH**

The periods from birth to weaning, weaning to puberty, puberty to breeding, and breeding to calving are used to further analyze dairy replacement programs. Table IV shows the breakdown for each of these groups by weight, the average cost per pound of gain, and the average total raising costs per heifer. Costs are broken down into feed costs, labor costs, and other costs.

The period of birth to 200 pounds represented 14% of the total costs, but only accounted for 8% of the weight gain, with an average cost per pound of gain of \$1.41. The weaning to puberty period was 36% of the growth of the animal, but only 27% of the total cost. This equated to an average of \$.63 cost per pound of gain. The breeding stage added another 12% of growth, 12% of cost, and an average of \$.81 cost per pound of gain. While the animal was bred the greatest growth and cost occurred, representing 44% of growth and 47% cost. The average cost per pound of gain during this stage was \$.89.

Table IV

**BREAKDOWN OF COSTS OF RAISING HEIFERS  
BY STAGE OF GROWTH**

**Per Pound Of Gain**

	<u>Stage of Growth</u>			
	<u>Birth - 200lbs</u>	<u>200-650</u>	<u>650-800</u>	<u>800-1350</u>
Feed	\$.68	.40	.50	.59
Labor	.45	.10	.08	.06
All Other Costs	.27	.14	.23	.25
<b>Total</b>	<b>\$1.41</b>	<b>.63</b>	<b>.81</b>	<b>.89</b>

**By Total Cost**

	<u>Stage of Growth</u>			
	<u>Birth - 200lbs</u>	<u>200-650</u>	<u>650-800</u>	<u>800-1350</u>
Feed	\$68	180	75	322
Labor	46	43	12	35
All Other Costs	28	62	35	135
<b>Total</b>	<b>\$144</b>	<b>285</b>	<b>122</b>	<b>492</b>
<b>% of Total Cost</b>	<b>14%</b>	<b>27%</b>	<b>12%</b>	<b>47%</b>
<b>% of Total Weight</b>	<b>8%</b>	<b>36%</b>	<b>12%</b>	<b>44%</b>

**LABOR EFFICIENCY**

Labor expense was the second largest expense associated with raising heifers. Measuring labor efficiency is one way to analyze how well labor is being used. To analyze labor associated with dairy replacements a measure, called "heifers per labor hour<sup>2</sup>", is used. Heifers per labor hour measures how many dairy replacements are taken care of in one labor hour. This measure includes time to feed, clean, bedded, move, and manage heifers. The higher the value, the more efficient that labor is being used.

The average heifers per labor hour for these eight large western New York farms was 49.1, with an interquartile range of 37.6 to 67.8. (Table 5) To further analyze labor efficiency within the dairy replacement program, heifers per labor hour was determined for pre-weaned and post-weaned animals. Pre-weaned heifers per labor hour was 13.7, while post-weaned heifers per

<sup>2</sup>. Total number of heifers on farm divided by the hours of daily labor required to maintain the replacement enterprise. Daily labor required equals the amount of time to complete everyday chores, along with an estimate of the average daily time required to bed, clean, move, and manage youngstock even though they may not be done every day.



**Table V**

<b>LABOR EFFICIENCY</b>		
	<u>Average</u>	<u>Interquartile Range</u>
All heifers per labor hour	49.1	37.9 - 67.8
Pre-weaned heifers/labor hour	13.7	9.6 - 17.7
Post-weaned heifers/labor hour	68.5	54.7 - 91.5
Corresponding labor costs, total	\$138	\$163 - \$97
Number of worker equivalents <sup>1</sup>	.95	1.23 - .69

<sup>1</sup>. One worker equivalent, as defined by Cornell Dairy Farm Business Summary, equals one person working a 55.2 hour week for 50 weeks, which equals 2760 hours a year. The range is based on an average of 354 heifers.

per labor hour was 68.5. This verifies the high labor requirements for calves on milk.

A second method used to measure the total labor requirements for dairy replacement enterprises was to calculate worker equivalents for the enterprise. On these eight large dairy farms, an average of .95 worker equivalent was used within the heifer enterprise. The interquartile range was from 1.23 to .69.

The third measure used to evaluate labor was total labor cost, which averaged \$138 per animal and ranged from \$163 to \$97.

Combining these measures indicates potential cost reductions on dairy farms. As heifers per labor hour increased, worker equivalents decreased and total costs of labor per animal decreased. If labor efficiency can be improved, less labor will be required in the heifer enterprise and the cost of raising heifers will decline.

#### **FACILITIES**

One criterion that was used to select farms for this study was type of structures used. Six farms were using freestalls and two farms were using counterslopes and freestalls for the majority of their housing. Hutches and small bedded transition pens were used for the young calves. The overhead and operating costs of buildings comprised 6.52% of the total cost to raise heifers. (Table 1) These housing styles have a major impact on

labor efficiency. The ability to perform all tasks associated with managing heifers from the seat of a tractor was the single greatest factor in improving labor efficiency within the heifer enterprise.

#### **TOTAL COST DAIRY REPLACEMENT ENTERPRISE**

The majority of these farms participated in the 1992 Dairy Farm Business Summary administered by Cornell Cooperative Extension. Where 1992 total accrual expenses for these farms were determined, the total cost of raising replacement animals to 23.3 months of age contributed between 15% and 20% of the total accrual expenses for the dairy farm. For the average farm in this study, with 354 dairy replacements, the total annual accrual expenses attributed to the dairy replacement program equaled \$209,665.

#### **SUMMARY**

Large, well managed dairy farms with large, loose style housing for dairy replacements and high levels of management bring dairy replacements into the herd with a total investment of \$1150 per animal. These animals are calving at less than 24 months of age and weighing over 1300 pounds. The animals averaged 1.77 pounds of gain per day at a total cost of \$1.47 per day per heifer, or \$.82 per pound of gain. Feed costs was the most significant cost, followed by labor. These two costs explained 75% of the total cost to raise a dairy replacement. Significant changes in cost per day per heifer and per pound of gain occurred when the animal was weaned and when the animal went through puberty.

Labor efficiency on these farms is considered to be above average and equaled 49.1 heifers per labor hour. Housing systems used played a significant role in determining what the labor efficiency was for the replacement enterprise. The dairy replacement enterprise contributed 15% to 20% of the total accrual expenses on the dairy farm.

The numbers reported from this study are considered to be above average. Size of operation, housing systems, rate of gain, calving age, and level of management lead to a total cost for a dairy replacement that would be lower than what the average farmer would expect to achieve.

## **Explanation of Expenses Calculated**

### **Feed**

Feed expense is the cost of all feed that is fed to the group, based on the average amount fed per day. The cost is determined by the market value of homegrown feeds and the price paid for purchased feeds. This number also includes the cost of nutrient testing homegrown feeds and consulting cost for balancing rations.

### **Bedding**

Bedding expense is the cost of the bedding used for the group. This cost is determined by the number of times the group is bedded, the amount of bedding used each time, and the purchase price, or market value of the bedding.

### **Health**

Health expense is the cost of all health related expenses that can be attributed to the group. These expenses can include vaccinations, worming programs, and pregnancy checks. This expense does not include unusual health expenses that are attributed to one animal, such as an infected foot. The expenses included are those that apply to all animals, or commonly are incurred.

### **Breeding**

Breeding expense is the cost of getting the animal pregnant. This number consists of the breeding costs associated with artificial insemination along with the costs of a bull. The artificial insemination costs consists of the average semen cost and service fee weighted by the conception rate. The cost of the bull is determined by the original cost of the bull along with the amount per day that it cost to maintain the bull on the farm.

### **Labor**

Labor expense is the cost of the labor that is used during the year in the heifer enterprise. The cost is based on the number of hours per day spent on the different groups of heifers and the hourly wage rate, including all benefits.

### **Trucking**

Trucking expense is the cost of picking up, delivering, or moving animals between locations. This cost is based on the number of trips made, the miles round trip, and a round trip charge per mile.

### Insurance

Insurance expense is the cost of any insurance that is carried on the dairy replacements.

### Machinery Operation

Machinery operation expense is the cost of the equipment associated with the feeding, bedding, and manure removal for the heifers. The costs includes the cost of fuel, oil, and repairs, which are determined from actual records or based on horsepower, life, and cost of machinery. The cost per day is the same for all groups.

### Machinery Overhead

Machinery overhead expense is the fixed costs associated with the equipment used in the heifer enterprise. These costs are the depreciation and the insurance on the equipment. The costs are determined from farm records or estimated from the amount of investment and useful life of the equipment. The cost per day is the same for all groups.

### Building Operation

Building operation expense is the repair costs of maintaining buildings, fences, etc. The cost per day is the same across all groups.

### Building Overhead

The building overhead expense is the fixed costs associated with the buildings used by the heifer enterprise. These costs include depreciation, taxes, and insurance. The cost per day is the same across all groups.

### Death Loss

Death loss expense is the cost of the time and money that was invested in an animal that died on the farm. This number is based on the number of days the animal was on the farm and the cost per day for the groups on the farm. The expense is assigned to the animals in the group in which the death occurs.

### Interest on Investment

Interest on investment expense is the interest cost for the operating capital that is invested in the animals over time. It is based on a annual rate of return (.05), the beginning value of the animal, and the average investment in the animal by group.