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Cost of Raising Dairy Heifers in Northern Utah

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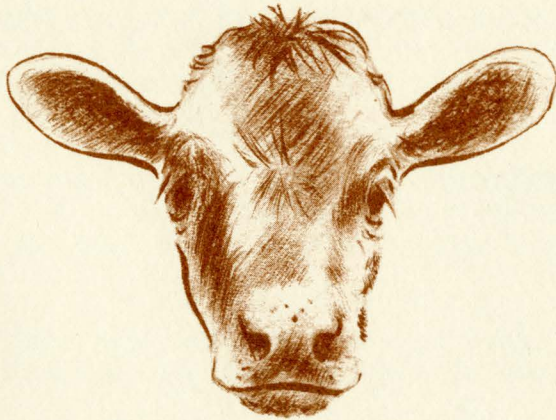
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Cost of RAISING DAIRY HEIFERS in NORTHERN UTAH

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SUMMARY

1. Data were obtained for 1960 and 1961 from 69 dairy heifer enterprises in Cache, Box Elder, and Weber Counties, Utah, for an economic study of the enterprises.

2. Average cost to produce a dairy heifer were \$253.56. The costs were broken down as follows: feed, 70.0 percent; labor, 13.0 percent; overhead, 11.0 percent; and material, 6.0 percent.

3. Feed cost ranged from 50 to 80 percent of total cost. Approximately 42 percent of the cost was for hay, 12 percent for pasture, 11 percent for prepared feed, 8 percent for milk and milk substitutes, and 5 percent for silage.

4. Labor cost amounted to \$33.50 for 26.8 hours at \$1.25 per hour. About 77 percent of the labor was used in daily operations for feeding, watering, and managing heifers.

5. Overhead cost amounted to \$27.40, or 11 percent of the total cost. Interest on operating money tied up in heifer raising was the most important item.

6. Material cost amounted to \$15.23 per heifer or 6 percent of the total cost. Bedding and breeding fees were the most important material items accounting for 85 percent of these costs.

7. Analysis of the data indicated that size of herd, and cost of feed and labor were the largest items in total cost.

8. Three alternatives available to dairymen for herd replacement procedures are: raising their own heifers, purchasing heifers in the market, or contracting the raising of their own heifers. To determine which alternative to choose, a break even point of \$268.83 was calculated.

Raising their own heifers cost dairymen an average of \$253.56 per heifer.

Dairymen who purchased heifers during that time paid an average of \$257.50 for good to choice heifers and \$190 for small and common heifers.

9. Heifer specialists were contracting heifers for 23 cents per pound gain during that period and expected 1,000 pounds gain from age 2 to 24 months. The cost to the contractor was \$230 plus interest on partial payments and production costs up to the age of 2 months.

C O S T S O F R A I S I N G D A I R Y H E I F E R S

I N N O R T H E R N U T A H , 1 9 6 1

Earnest M. Morrison
J'Wayne McArthur

Dairymen have a continuing problem in maintaining herd size. Disease, injuries, and low production, make it necessary for them to cull animals from their herds. Replacements equal to a complete herd turnover are necessary every two to six years. Consequently, many are wondering as to the most profitable practice to supply the needed replacements in the herd. Three alternatives are available: Dairymen can produce herd replacements. They can purchase either heifers or cows. They can contract with growers specializing in raising heifers to provide replacements. Since all dairy enterprises differ to some degree, each dairyman should seek a specific solution to his herd replacement problem.

This report was prepared to help solve the dairyman's problem. Data on the cost of raising a heifer in 1961 are presented followed by an analysis of factors associated with low cost production. Alternatives available to the dairyman are discussed and a break-even analysis is included that suggests a way to determine if income will be greater by raising or buying herd replacements.

C O S T O F R A I S I N G D A I R Y H E I F E R S 1 9 6 1

Data were obtained by interviews with dairy farmers in Cache, Box Elder, and Weber Counties. Contacts were made during the period July 1, 1961, and August 15, 1961, and 67 useable schedules obtained. Dairy heifer replacement enterprises of only Holstein herds of 15 or more cows per herd were surveyed. That number of cows per milking herd was selected because there would likely be a sufficient number of heifer calves of the same age to make a reasonable unit to challenge a producer. From the assorted

Table 1. Cost of raising Holstein dairy heifers from birth to freshening northern Utah, 1961

Cost item	Cost per animal	Percent of total cost
Feed cost	dollars	percent
Milk	11.99	4.7
Milk substitute	2.81	1.1
Prepared feed	19.85	7.8
Barley and oats	4.21	1.7
Hay	106.11	41.9
Pasture	22.21	8.8
Silage	9.07	3.6
Miscellaneous	1.18	.4
Total	177.43	70.0
Labor cost		
Procuring calves	.10	.*
Procuring feed	.43	.2
Preparing feed	.16	.*
Daily routine	25.86	10.2
Adding bedding	3.73	1.4
Removing bedding	2.34	.9
Dehorning, vaccinating, branding	.39	.1
Transporting	.45	.2
Marketing	.04	.*
Total	33.50	13.0

Overhead cost		
Interest on buildings and land	3.52	1.4
Building depreciation	3.76	1.5
Interest on heifers	3.43	1.4
Interest on operating money	13.88	5.6
Insurance on buildings	.46	.2
Property tax on heifers	2.35	.9
Total	27.40	11.0

Material		
Bedding	6.97	2.8
Water	.54	.2
Medicine and veterinary	1.52	.6
Machine and power	.16	.*
Electricity	.04	.*
Breeding fee	6.00	2.4
Total	15.23	6.0

TOTAL COST†	253.56	100.0
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*Less than .1 percent.

†Does not include the value of the heifer at the beginning of the enterprise which averaged \$28.00.

ages of heifers on each farm, one uniform age group was chosen to study from birth until freshening. They were generally a group that were to freshen in the fall of 1961.

All cost items were classified in one of four groups: feed, labor, overhead, and material. All inputs were valued and considered a cost of raising a heifer whether or not the operator paid cash for them. The value of a new born calf was not included as a cost.

Feed was 70.0 percent of the cost of raising a dairy heifer (table 1). This amounted to \$177.43 per heifer. Labor was the second largest cost, \$33.50 or 13.0 percent of total cost. Overhead cost \$27.40. Material costs were \$15.23 and were 6 percent of the total cost. The total cost for raising a dairy heifer from birth to freshening at 26.3 months of age was \$253.56.

Feed

Feed costs ranged from 50 to 80 percent of total cost. From birth to three months, heifers were generally fed milk or milk substitutes, prepared feeds, and a small amount of hay (table 2). They consumed more hay during the three to six month period than they had previously. No heifers were pastured before six months of age. Some received silage during the 6 to 12 month period. The 12 to 24 month old group consumed more hay and silage than previous age groups.

Only small amounts of oats and barley were fed. Pasture accounted for about 12.5 percent of feed cost. The amount of prepared feeds in the ration decreased after heifers reached six months of age and was about 11 percent of total feed cost. Milk and milk substitutes combined amounted to about 8 percent of the total feed cost. Silage cost was about 5 percent. The total feed cost per heifer averaged \$177.43. The average cost of hay was \$23.19 per ton. Cost of commercially prepared feeds averaged \$3.08 per hundredweight and grain \$2.38.

Labor

Labor was the second largest cost item. Daily routine accounted for the largest amount of labor (table 3) and was 77.2 percent of the total required. The accumulative amount of labor used increased at a decreasing rate as heifers aged because of discontinued use of milk for feed at age six months, pasturing heifers at 6 to 12 months of age, and increasing the use of pasture as heifers grew older. Little of the total labor was used to procure calves or market heifers.

Hauling silage or other feeds to heifers amounted to 1.3 percent of the total labor used per heifer. Heifers were dehorned, vaccinated, and branded between birth and six months of age. Those that were turned out on pasture the following spring were vaccinated before being turned out. For heifers pastured labor to transport them from pastures and back again was involved. That did not occur until they reached the age of six months and only 1.3 percent of total labor was used in that operation. The total amount of labor used for all operations was 26.8 hours or \$33.50 per heifer.

The largest amount of labor (88 percent) connected with the dairy heifer enterprise was contributed by the operator (table 4). Of the remaining 12 percent, 10 percent was family labor and 2 percent hired labor. All labor was converted to a man-hour basis and charged at \$1.25 per hour.

Overhead

Overhead included interest on capital invested in buildings and land, building depreciation, interest on capital invested in heifers and on operating money, building insurance, and property tax on heifers. Interest was figured on capital invested in buildings used for production of dairy heifers. Only the portion used by heifers was charged as an overhead cost. These buildings were open-

Table 2. Amount and cost of feed per heifer by age

Age interval	Milk	Milk substitute	Commercially prepared feed
0 - 3 months			
Pounds of feed	475.00	23.00	130.00
Cost in dollars	11.99	2.81	4.40
3 - 6 months			
Pounds of feed	-	-	170.00
Cost in dollars	-	-	4.74
6 - 12 months			
Pounds of feed	-	-	145.00
Cost in dollars	-	-	3.84
12 - 24 months			
Pounds of feed	-	-	120.00
Cost in dollars	-	-	4.95
24 - 30 months*			
Pounds of feed	-	-	80.00
Cost in dollars	-	-	1.92
0 - 30 months			
Pounds of feed	477.00	23.00	645.00
Cost in dollars	11.99	2.81	19.85
Percent of total cost	6.80	1.60	11.20

*All heifers entered this age interval and all had time in this interval was 2.3 months.

front sheds, converted buildings, or portions of barns. On these same buildings a depreciation was figured. The depreciation and interest on capital invested in buildings each came to about 13 percent of the total overhead cost (table 5). Interest was also figured on capital invested in each heifer by multiplying its value at birth times an interest rate allowing for its age at freshening.

intervals, northern Utah, 1961

Oats and barley	Hay	Pasture	Silage	Misc.	Total cost
43.00	357.00	-	-	1.00	
1.02	4.46	-	-	.05	24.72
72.00	945.00	-	39.00	4.00	
1.67	10.55	-	.14	.11	17.21
34.00	1710.00	-	1.97	19.00	
.93	19.17	6.13	.88	.02	30.96
18.00	4809.00	-	1654.00	207.00	
.39	56.04	12.81	6.54	.76	81.50
10.00	1328.00	-	390.00	11.00	
.20	15.89	3.27	1.51	.24	23.04
177.00	9149.00	-	2280.00	242.00	
4.21	106.11	22.21	9.07	1.18	177.43
2.30	59.80	12.50	5.10	.70	100.00

freshened by the 30th month. For the group the average

This accounted for 12.5 percent of the total overhead cost. Interest on operating money was calculated on labor and feed costs on an accumulative basis from the heifer's birth until she freshened.

Property tax was allocated according to age of heifers at freshening. The total overhead cost amounted to \$27.40 or 11 percent of the total cost.

Table 3. Amount and cost of labor per heifer by age interval, northern Utah, 1961

Age interval	Procur- ing calves*	Procur- ing feed†	Prepar- ing feed‡	Daily rou- tine§	Adding bed- ding#	Remov- ing bed- ding¶	Dehorn vaccinate brand**	Trans- porta- tion††	Mar- ket- ing‡‡	To- tal
0 - 3 months										
Hours	.08	.01	.060	4.56	.72	.53	.20	-	-	6.16
Cost in dollars	.10	.01	.080	5.70	.90	.66	.25	-	-	7.70
3 - 6 months										
Hours	-	-	.020	2.52	.69	.46	.08	-	-	3.78
Cost in dollars	-	-	.030	3.15	.86	.58	.10	-	-	4.72
6 - 12 months										
Hours	-	.02	.050	3.98	.40	.21	.02	.12	-	4.80
Cost in dollars	-	.03	.060	4.98	.50	.26	.03	.15	-	6.00
12 - 24 months										
Hours	-	.29	-	7.81	.97	.55	.01	.21	-	9.84
Cost in dollars	-	.36	-	9.76	1.21	.69	.01	.26	-	12.30
24 - 30 months§§										
Hours	-	.02	.004	1.82	.20	.12	-	.03	.03	2.22
Cost in dollars	-	.03	.005	2.28	.25	.15	-	.04	.04	2.78

0 - 30 months											
Hours	.08	.34	.130	20.70	2.98	1.87	.31	.36	.03	26.80	
Cost in dollars	.10	.43	.160	25.86	3.73	2.34	.39	.45	.04	33.50	
Percent of total cost	.30	1.30	.500	77.20	11.10	7.00	1.20	1.30	.10	100.00	

*Procuring calves refers to time involved in obtaining calves to add to the heifer enterprise. Only time involved in actual bargaining for and purchasing heifer calves was recorded.

†Procuring feed refers to time spent obtaining feed from mills and stores and/or hauling silage to heifers when purchased from off-the-farm sources.

#Preparing feeds encompassed all cracking, rolling, chopping, and mixing performed by the dairyman.

§Daily routine included the daily operations of feeding, watering, and managing dairy heifers.

#Adding bedding refers to actual time involved in obtaining bedding and scattering it in pens and sheds.

¶Removing bedding refers to time involved in forking droppings from calf pens.

**Branding, dehorning, and vaccinating refer to time incurred gathering corralling, and throwing calves, then performing the operations and returning calves to their place of confinement.

††Transportation refers to time involved in transporting heifers to and from pastures or fields. Heifers were transported by truck or trail driven.

##Marketing refers to time involved in selling heifers that were in excess of dairyman's replacement needs.

§§All heifers entered this age interval and all had freshened by the 30th month. For the group the average time in this interval was 2.3 months.

Table 4. Labor inputs per heifer by age interval and source of labor, northern Utah, 1961

Heifers age	Operator		Family		Hired		Total	
	Hour	Cost	Hour	Cost	Hour	Cost	Hour	Cost
Months		dol.		dol.		dol.		dol.
0 - 3	4.93	6.16	1.00	1.250	.23	.29	6.16	7.70
3 - 6	3.19	3.99	.54	.680	.05	.06	3.78	4.73
6 - 12	4.41	5.51	.36	.450	.03	.04	4.80	6.00
12 - 24	8.92	11.15	.75	.930	.18	.22	9.85	12.30
24 - 30	2.12	2.65	.07	.009	.02	.03	2.21	2.77
Total	23.57	29.46	2.72	3.404	.51	.64	26.80	33.50

Table 5. Overhead cost per heifer, northern Utah, 1961

Item	Average cost	Percent
	per heifer	of total
	dollars	percent
Interest on buildings and land	3.52	12.8
Building depreciation	3.76	13.7
Interest on heifers	3.43	12.5
Interest on operating money	13.88	50.7
Insurance on buildings	.46	1.7
Property tax on heifers	2.35	8.6
Total	27.40	100.0

Material

Material cost includes such items as bedding, water, medicine and veterinary fees, machines and power, electricity, and breeding fees. Some dairymen used no bedding while others fed in dry lot and bedded heifers regularly. For the average enterprise, bedding was 46 percent of material cost (table 6). This was the largest material cost. The average water cost was 3.5 percent of the total material cost. Medicine and veterinary expenses were the third largest cost of material. Machines and power in-

cluded costs attributed to heifers for transportation to and from the pasture, and machinery and power used for preparing feed to be used in the heifers' ration.

Breeding fees were charged at \$6.00 per heifer. Breeding fees made up 39.4 percent of material cost and were the second largest material cost of production. All material costs combined amounted to \$15.23 per heifer or 6.0 percent of the total cost (table 6).

FACTORS ASSOCIATED WITH LOW COST PRODUCTION

Cross tabular analysis permitted comparison of variation in one factor with that of others. The records were classified into groups according to one factor in an effort to hold the effect of that factor relatively constant within classes. Averages were then calculated for other factors. In that way it was shown whether the average of other factors increased or decreased as the causal factor changed from one level to another. An appraisal of the cross tabular sorts led to a number of conclusions. Since feed cost was 70 percent of the total cost of producing a heifer to calving time anything that affects cost affects the success of the enterprise if low cost is the primary measure of success. The longer the heifer was kept in the rearing enterprise the higher the feed

Table 6. Material cost per heifer, northern Utah, 1961

Item	Average cost per heifer	Percent of total
	dollars	percent
Bedding	6.97	45.8
Water	.54	3.5
Medicine and veterinary fees	1.52	10.0
Machines and power*	.20	1.3
Breeding fee	6.00	39.4
Total	15.23	100.0

*Includes electricity used.

cost. Some dairymen contend that slower rates of maturity are not necessarily associated with higher cost, that the same inputs are merely spread over a longer period of time. This did not seem to be true in the average situation in this study. As the feed cost increased the labor input per heifer also increased. The age of heifer had some influence on the amount of labor used as did the feeding method used.

In general, pasture was priced to reflect an equivalent value to a comparable crop of alfalfa hay in the field. Hence the cost of feed obtained from pasture was lower than corral feeding of hay by at least the cost of harvesting, storing, and feeding. The management practice that maximized pasturing and minimized manger feeding would reduce both feed and labor costs. There was a positive association between maximized pasturing of the heifers and lower cost of production. Labor cost was reduced because of less time spent feeding hay, bedding, and cleaning confinement areas.

Larger numbers of heifers per herd were associated with a smaller labor input per heifer. Growers did not take twice as long to care for 20 heifers as for 10. That was the only way, however, that the number of heifers per herd seemed to influence the cost per heifer. Capital investment per heifer, feed cost, or death loss was unassociated with size of herd. Lower death losses were associated with greater number of days heifers were on pasture. Higher death losses were associated with confinement raising.

ALTERNATIVE METHODS AVAILABLE FOR OBTAINING DAIRY HEIFERS

In considering his replacement problem, a dairyman must decide what proportion of his farm resources to devote to the production of dairy heifers and what proportion to the production of milk. Hay can usually be fed to either cows or heifers. Most pasture is equally suited to grazing by cows or heifers. Labor can be used in taking care of either cows or heifers. The dairyman must decide how

he can best use his feed, building space, labor, and other productive resources to maximize his profits.

The problem of deciding how to use productive resources must be solved by each dairyman according to his individual farm situation.

There are three alternatives that are available to most dairymen:

1. They may raise dairy heifers.
2. They may purchase replacements or
3. They may contract with a "heifer specialist" for replacements.

An economic evaluation of the use of production resources on a dairy farm in relation to the number of needed heifers that should be raised, purchased, or contracted must take into account the advantages and disadvantages of each system.

If it is assumed that resources are equally adaptable of producing milk or dairy heifers, then by eliminating the heifer enterprise from the farm more feed, labor, and other resources would be available for milk production. To determine the productive value such resources would have in the production of milk, the cost of producing a dairy heifer was equated to the portion of a producing cow which these resources would maintain in production. The total cost of producing a heifer divided by the total cost of producing milk yields an exchange ratio of converting all factors of production from raising heifers to milk production. It cost \$253.56 to produce a dairy heifer from birth to freshening in northern Utah in 1961. Using a previous study reported by the Utah Agricultural Experiment Station in bulletin 401 the total cost of producing milk was adjusted to 1961 prices. With the adjustment the cost of producing about 11,000 pounds of milk in 1961 was \$417.64 per year per cow. The ratio of costs for factors of production from raising dairy heifers to producing milk of .6 has been identified as an "exchange ratio."

Total receipts from milk production in 1961 were \$442.67. The difference between receipts and costs was \$25.03. This difference of \$25.03 was multiplied by the exchange ratio to arrive at the amount of income that

could be had if the resources for raising a dairy heifer had been used to produce milk. This amount was \$15.27. By adding this to the cost of raising a heifer the break even point of \$268.83 was found. That figure can be used to determine whether to raise or purchase replacements. If the cost of purchasing heifers was less than \$268.83, it would be cheaper to purchase replacements, but any time the cost of purchasing exceeded \$268.83, it would be cheaper to raise heifers (table 7).

The break even point needs adjustment according to individual farm use of resources. As presented, it is an average of all costs for enterprises that were a part of our studies. A dairyman that could add to the size of his milking herd by only the purchase price of extra cows would have a higher break even point because existing facility costs could be divided among more cows thus lowering costs in proportion to receipts. Dairymen who must add additional facilities to expand the dairy herd would have a lower break even point because the added cost would have to be divided over the herd and each cow's cost of production would increase. Dairies producing grade A milk would have to have a wider spread between costs and receipts. Dairies producing manufacturing milk and dairies with lower than average efficiency tend to have a low break even point. Lower cost of producing milk and higher returns for products will result in a higher break even point.

Table 7. Calculation of break even point in heifer raising, 1961

Items	Values
1. Total cost of raising dairy heifer	\$253.56
2. Total cost of producing milk per cow per year	\$417.64
3. Exchange ratio (line 1 divided by line 2)	.60
4. Total receipts from milk per cow per year	\$442.67
5. Net return from milk per cow per year (line 4 minus line 2)	\$ 25.03
6. Adjusted income from 1 cow (line 3 x line 5)	\$ 15.27
7. Break even point (line 1 + line 6)	\$268.83

Dairyman cannot leave or enter the dairy heifer enterprise freely. Once a dairyman decides to raise, buy, or contract heifers he should follow that practice until he can change procedures and cut costs while holding constant or increasing the quality of heifers.

After a dairyman calculates his break even point he can then observe the market and check with "heifer specialists" to see if he can procure heifers for less than the break even point. If he finds that heifers are selling higher than his break even point, but he can contract them raised for less than the break even point, he can expect the latter method to be the most economical.

During the time when this study was conducted, the price of choice dairy heifers at the Smithfield Livestock Auction, Smithfield, Utah, averaged \$257.50 per head. The average price for small and common heifers during the same time was \$190 per head. Depending on the quality of heifers a dairyman raises, he can determine the price he would have to pay to replace these heifers with purchased heifers of the same quality.

Heifer specialists, in the area studied, contracted heifers for different prices. Some used a given charge per pound gain while others charged according to days fed in calculating the cost to the contractor. Some heifer specialists were contracting heifers for 23 cents per pound gain and expected to put 1,000 pounds on the heifers from age 2 to 24 months. The total cost per heifer to the grower was \$230 plus interest on partial payments he had made and all production cost for the first 2 months.

Dairy heifer specialists may be able to raise heifers for less than the break even price because of economies of specialization on their part. Through larger size, they may be more efficient and use better methods.

Figures used here were for this study only and a dairyman should arrive at his own figures according to his costs and receipts.

CONCLUSIONS

The wide range in cost of raising a heifer suggests that most dairymen have an opportunity to reduce costs of production. For some the opportunity is great and for the best there probably are some opportunities available.

In this study the most successful enterprises were those larger than average. The study was not expanded on the upper limits of size far enough to determine where, if existent, larger size causes inefficiency. Since maximum size was not reached, increasing the number of heifers per enterprise seemed to be a means of reducing costs.

Lower feed cost resulted in lower total adjusted cost; lower feed costs often resulted from use of pasture and by eliminating waste through careful feeding practices. Number of days heifers spent on pasture was a significant factor in cutting feed cost. Lower dollar values were placed on pasture because of smaller harvesting expenses due to heifers harvesting their own feed supply. Since feeding programs and pasture management were factors which a producer could largely control, practices he used determined to a large degree his success in production.

Labor cost provided an opportunity to reduce total adjusted costs. Labor cost per heifer was reduced by increasing the number of heifers per enterprise and the use of pasture. At no point did labor cost cease to decrease as size of enterprise increased. Dairymen that adopted labor saving techniques and used buildings and equipment that were a substitute for labor greatly reduced labor cost. Labor is one important input that can be controlled to a large extent.

Dairy heifer specialists have some advantages in production over general dairy farmers. They can specialize their facilities for heifer raising and can more easily attain the economics of size of enterprise. In addition, they do not have the cost of "foregone" income from the use of their resources to add to production cost as the dairyman has who has an alternative of devoting his resources to milk production. The general dairyman not only has the

cost of using his resources to produce a heifer but by so doing he foregoes the opportunity of making a net return if those same resources were used to produce more milk.

Costs of producing heifers differ among dairymen. The desirability of raising heifers will depend on existing conditions. Dairymen who are selling exclusively manufacturing milk or are below average in efficiency in the production of grade A milk would have a lower return from milk production, therefore their break even point would be lower. Since the break even point is calculated by considering all existing factors, some dairymen may have a break even cost that is below the cost of producing a heifer. In these cases they may increase their income by converting their resources to the production of dairy heifers and discontinue producing milk.

Efficient dairymen who are producing grade A milk will likely have a high break even point because of the net returns to the enterprise. Most of these dairy units are operating under capacity. By increasing size while maintaining or increasing efficiency they can increase net returns. Dairymen in this position should convert their resources into producing milk and discontinue raising heifers unless for some reason heifers can use a resource that milk cows cannot on a particular farm.

Some dairymen may be in a position to do both efficiently because they are operating a large scale unit and have resources in excess of capacity milk production. If the break even point for this type unit is lower than the cost to obtain heifers elsewhere, all advantages and disadvantages evaluated, then the dairymen should raise his own heifers.

If dairymen can demonstrate that heifers from their herd return higher profits or for other reasons are more advantageous than purchased heifers they should consider raising their own heifers under contract. Some may realize they can improve their milking herds by bringing in heifers of higher quality and breeding than those produced by their own herds. They should determine the extra value contributed by one method over the other and use it to adjust to the break even point.

