Management Strategies: Replacement Heifers

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Abstract

The acquisition of replacement heifers is a significant cost to milk producers and has a significant effect on profitability. About 20% of total variable expenses to produce milk, go to raising replacement heifers.

A milk producer must first strategize if it is better to sell all calves and purchase needed replacements or raise replacements. The advantages and disadvantages of purchasing needed replacements must be evaluated along with a careful analysis of the cost to raise replacements before a quality decision based on the evidence can be made.

When a milk producer decides to maintain ownership of replacement heifers, a decision must still be made regarding who will raise them. Custom rearing is still an option. This decision is very similar to the "sell/not sell" decision in the process of analyzing the advantages, disadvantages and current situation but is vastly different in how it is implemented and managed.

Whoever takes the responsibility to raise the replacement heifers must consider many different strategies: to achieve a labor efficiency of 14-15 daily labor hours per preweaned calf and 80-90 daily labor hours per postweaned calf, to maintain reproductive efficiency at levels equivalent to lactating cows, to maintain a growth strategy but monitoring and implementing a sound nutritional program.

Introduction

Replacement heifer rearing accounts for about twenty percent of the variable expenses on a dairy.[1] The replacement rearing program has a significant effect on profitability. If heifer rearing expenses were to be reduced by ten percent, a two percent change in total expenses for the dairy would result. If variable expense to raise a heifer to calve at 24 months are 780 dollars, that would be 1.07 dollars per day. A ten percent reduction in these expenses would be 11 cents per day per calf. A ten percent reduction in cost to raise a replacement is within the grasp of the majority of milk producers.

It has been estimated that the cost of raising replacement heifers ranges from less than 77 cents per hundred-weight-of-milk-sold to more than two dollars per hundred-weight-of-milk-sold, depending on cull rate, age at first calving, and pounds of milk sold per cow per year.[2] See Table 2. A ten percent decrease in the cost to raise replacement heifers could translate into a savings of between 8 cents and 20 cents per hundred weight of milk sold.

Many different strategies can be implemented to economically acquire or raise replacement heifers. The first decision or strategy implemented must be to determine if it is better to sell all calves and buy only those needed as replacements or raise replacement heifers. If the decision is to raise replacement heifers then who, when, where and how is it to be done must be decided. If the milk producer decides to raise the replacements then many more alternative strategies of labor efficiency, growth or nutrition, reproduction, and health must be decided upon and implemented. Each of these will be briefly discussed below.

To Sell or Not To Sell

The advantages of selling all calves when they are born are many. Those advantages would include the following: increase in the time and energy spent on managing the milking herd, resources previously used by the replacement herd could now be used for the milking herd, resources such as labor, buildings (increasing herd size) and feed. These changes could increase the efficiency and profitability of producing milk. Especially if better replacements could be purchased than were raised and the purchase price was lower than the true cost of raising replacements. Another advantage is that the producer can purchase only what is needed.

The disadvantages would include possible cash flow problems when purchasing needed replacement heifers. Potentially introducing disease into the milking herd from purchased heifers. Lost of control of how heifers are raised. Possible increased cost of replacements. Potentially purchasing heifers of lower quality than could be raised. Possibly giving up an outlet for lower quality feeds and otherwise unused facilities.

The decision "to sell or not to sell" may be easy for some milk producers. For others a careful analysis of the cost of raising replacement animals and advantages and disadvantages of selling all calves must be done before any action is taken. An example of a Per Heifer Enterprise Budget Summary is given in Table 1.

Table 1. Per Heifer Enterprise Budget Summary

I. Operating Expenses:

Feed	=	_____
Labor	=	_____
Bedding	=	_____
Breeding	=	_____
Veterinary	=	_____
Utilities, Supplies	=	_____

II. Ownership Expenses:

Buildings	=	_____
Equipment	=	_____
Interest on Heifer Value	=	_____
Value of 1 day old heifer calf	=	_____

III. Total cost to raise one heifer = _____

IV. Efficiency Measures:

1. Number of calves per daily labor hour

preweaning	=	_____
Postweaning	=	_____

2. Cost per pound of gain

Feed cost	=	_____
Labor cost	=	_____
Other operating cost	=	_____

Who, When, and Where

If the decision is not to sell all calves when they are born, then it must be decided who will raise the calves, at what ages and where will the calves be raised and how it is to be done. Many milk producers have made the decision that they will raise the calves all the way to calving. For these producers the strategies of how to do it are most important. But many are looking for alternatives and are trying to decide what combination of alternatives best fits a given set of resources and management abilities.

The advantages and disadvantages of custom rearing replacement heifers are the same as selling or not selling calves except that the milk producer has greater control of management, growth, and breeding of calves because of retained ownership. There is also greater potential for owner/custom grower conflicts to develop.

To determine who should raise the calves, a careful analysis of the cost to raise a calf **on a per pen basis** should be done. The summary in Table 1 should be completed on every pen from birth to calving. This will identify those pens (who) that are potential candidates for custom growing because of present inefficiencies. A careful assessment of current resources (building, labor equipment, feed, etc.) used in the heifer rearing enterprise and their alternative uses must also be completed.

To complete the analysis described above may require a lot of time and effort. The quality of the decision made will be determined by the quality of the data used to make the decision. If the cost data can not be obtained then survey values can be obtained and used as long as it is recognized that survey or published values may not reflect what is really happening on the farm.

Where the replacement heifers are raised will be dictated by who it is that will be raising them.

Table 2. Replacement Costs per 100 pounds of milk[2]

Herd Average Milk pounds						
	15,000		18,000		21,000	
Age at 1st calving (months)						
Replacement rate	24 months	Per Mo. over 24 months	24 months	Per Mo. over 24 months	24 months	Per Mo. over 24 months
25%	$1.08	$0.10	$0.90	$0.08	$0.77	$0.07
35%	$1.52	$0.14	$1.26	$0.12	$1.08	$0.10
45%	$1.95	$0.18	$1.63	$0.15	$1.39	$0.13

Estimates are based on rearing costs of $1200 to 24 months and $60 per month over 24 months and cull cow prices of $550 per head culled.

$$\text{Replacement cost} = \frac{(\text{Rearing cost} - \text{Cull cow value}) \bullet \text{Replacement rate}}{\text{Herd average pounds of milk sold per cow per year}}$$

How

There are many strategies that can be implemented to achieve profitable introduction of a productive quality heifer into the milking herd. Table 3 shows the estimated variable cost to raise a heifer to 24 months in Michigan.[3] The major expense areas are feed and labor. These would be the major areas to develop key strategies for profitable rearing of dairy replacement heifers. Another area that doesn't appear as a cost item in Table 3 but is a major determinant of heifer rearing profitability, is reproductive efficiency. It's cost is hidden in all of the variable costs and therefore is often forgotten about or the focus is on nutrition and growth. Simple biology states that if she doesn't get bred she won't calve no matter how well she is cared for and grown.

The cost to maintain a replacement heifer per day over 24 months was reported to be $1.17. Another way of interpreting this is the cost per day open beyond 15 months for virgin heifers.

Table 4 compares the results and distribution of ages-at-first-caving of 2 different heat detection rates assuming no variation and "ideal" growth rates (1250 pounds at 24 months of age), breeding begins at 13 months of age and 830 pounds of body weight, and a 65 percent conception rate. The difference between a 30% heat detection rate and a 50% heat detection rate, with all else being equal, was 1.3 months average age-at-first-calving, 35 pounds of average body weight at calving, and $2527.20 per 100 heifers raised.

For a variety of reasons, many milk producers like their heifers to be older and bigger when they breed them. Table 5 compares 2 different breeding policies and different heat detection rates assuming the same "ideal"

Table 3. Estimated variable cost to raise a heifer to 24 months age-at-first-calving for a good Michigan dairy producer.

ITEM	AMOUNT	PRICE	COST
Milk Replacer	50 lbs.	$0.71/lb	$35.50
Calf Starter	100 lbs	$0.12/lb	$12.00
Grain			$99.40
Dry Hay	.39 ton	$70.00/ton	$27.30
Corn Silage	5.6 ton	$25.00/ton	$140.00
Haylage	5.4 ton	$40.00/ton	$216.00
Labor	22.5 hours	$6.50/hr	$146.25
Bedding	1.1 ton	$40.00/ton	$44.00
Breeding	1.6 services	$15.00/service	$24.00
Veterinary			$20.00
Utilities/Supplies			$12.00
Death Losses	4 percent	$150.00/dead calf	$6.00
Total			$782.45

growth rates and a 65 percent conception rate. The two breeding policies and heat detection rates are: 1) Beginbreeding at 13 months of age and 830 pounds of body weight with a 50 percent heat detection rate, 2) Begin breeding at 15 months of age and 930 pounds of body weight with a 30 percent heat detection rate. Assuming the same cost per day open beyond 15 months of $1.17, the difference between the two scenarios was $7757.10 per 100 heifers raised. This could also be interpreted as the potential savings of going from a breeding policy of 15 months at 930 pounds with a 30% heat detection rate to 13 months at 830 pounds with a 50% heat detection rate. To estimate actual savings would have to include the cost of improving the heat detection rate and any other changes that would need to be implemented. There is a lot of money to be saved by improving reproductive efficiency in virgin heifers.

Labor expense is very variable between farms. This variability due to the value of labor (wage per hour), the facility, and management practices on a particular farm. Table 6 is a list of estimated labor requirements for a herd of 100 calves whose age-at-first-calving is 24 months. This table would indicate that 81% of all labor in raising heifers is utilized in daily chores of feeding and heat detection. Because of the variation in value of labor the best measure of management practices in regards to labor is the Number of Calves per Daily Labor Hour (NC/DLH). Glton *et. al.* [4] proposed using this measure to evaluate labor efficiency of replacement heifer rearing on farms. Regular daily chores of feeding and heat detection along with cleaning, bedding, breeding and other regular chores should be included in the calculation. They propose goals of 14-15 NC/DLH for pre weaned calves and 80-90 NC/DLH for post weaned calves. These are ambitious goals but not unattainable.

Table 4. Distribution of age-at-first-calving, body weight, and total cost per day open beyond 15 months per 100 heifers raised.[1]

AFC[3] (months)	HDR[2] = 50 per cent			HDR[2] = 30 per cent		
	% of heifers	BW[4] pounds	cost[5]	%of heifers	BW[4] pounds	cost[5]
22-23	65	1219	0	49	1221	0
24-25	22	1268	772.20	25	1269	877.50
26-27	6	1308	631.80	12	1309	1263.60
28-29	3	1340	526.50	7	1342	1228.50
30-31	2	1350	491.40	3	1368	737.10
32-33	2	1355	631.80	2	1388	631.80
34-35	0			1	1405	386.10
> 36	0			1	1415	456.30
	Avg AFC[3] = 23.6 months			Avg AFC[3] = 24.9 months		
	Avg BW[4] = 1228 pounds			Avg BW[4] = 1263 pounds		
	Total Cost[5] = $3053.70			Total Cost[5] = $5580.90		

[1] Assumes "ideal" growth, 65% conception rate, cost per day open = $1.17.
[2] HDR = Heat Detection Rate.
[5] AFC = Age at First Calving.
[6] BW = Body Weight after calving.
[7] Cost = Cost of total days open beyond 15 months for % of 100 heifers calving at respective age.

Table 5. Distribution of age-at-first-calving, body weight, and total cost per day open beyond 15 months per 100 heifers raised.[1]

AFC[3] (months)	HDR[2] = 50 per cent VMP[3] = 13 months BWB[4] = 830 pounds			HDR[2] = 30 per cent VMP[3] = 15 months BWB[4] = 930 pounds		
	% of heifers	BW[6] pounds	cost[7]	%of heifers	BW[6] pounds	cost[7]
22-23	65	1219	0	0		0
24-25	22	1268	772.20	49	1269	1719.90
26-27	6	1308	631.80	25	1309	2632.50
28-29	3	1340	526.50	12	1342	2106.00
30-31	2	1350	491.40	7	1368	1719.90
32-33	2	1355	631.80	3	1388	947.70
34-35	0			2	1405	772.20
> 36	0			2	1418	912.60
	Avg AFC[5] = 23.6 months			Avg AFC[5] = 26.9 months		
	Avg BW[6] = 1228 pounds			Avg BW[6] = 1304 pounds		
	Total Cost[7] = $3053.70			Total Cost[7] = $10810.8		

[1] Assumes "ideal" growth, 65% conception rate, cost per day open = $1.17.
[2] HDR = Heat Detection Rate.
[3] VWP = Voluntary Wait Period = age at which breeding begins.
[4] BWP = Body Weight when breeding begins.
[5] AFC = Age at First Calving.
[6] BW = Body Weight after calving.
[7] Cost = Cost of total days open beyond 15 months for % of 100 heifers calving at respective age.

For efficient and profitable rearing of replacement heifers these rates will have to be approached. This

Table 6. Estimated annual labor requirements for a herd of 100 calves with 24 months age-at-first-calving.

DAILY TASKS		ANNUAL HOURS
Feeding bottle calves	1 hr/day * 365 days	365
Feeding other heifers	1 hr/day * 365 days	365
Heat detection	.5 hr/day * 365 days	183
MONTHLY TASKS		
Clean pens/stalls/hutches	2 hr * 12 months	24
Bed pens/stalls/hutches	8 hr * 12 months	96
Regroup/transporting	2 hr * 12 months	24
OCCASIONAL TASKS		
Vaccination/herd health	1.5 hr * 4 times/year	6
Breeding	4 hr/month * 12 months	48
Miscellaneous	2 hr/month * 12 months	12
TOTAL		1123

means that daily chore routines need to be evaluated and critiqued to find a more efficient way of accomplishing the same task. The challenge is that chore routines are often dictated by the facilities and equipment utilized. Large gains in labor efficiency may not be achievable without major expenditure in capital investments. The only exception to this would be to decrease age-at-first-calving or shorten the distribution (variation) of ages-at-first-calving. This would decrease the number of times that daily chores need to be done for a particular calf to reach calving.

The greatest variable expense in raising replacement heifers is feed expense. Feed expenses will vary a lot between farms primarily due to the value placed on feed stuffs and age-at-first-calving.

The value and quality of feed stuffs will vary from region to region and farm to farm. Balancing of rations to meet the requirements of different groups of heifers will certainly improve profitability and improve the efficiency of feed utilization. It will decrease the cost per pound of gain and the cost to grow heifers.

This idea implies that a strategy to manage growth is in place. Rations should be balanced for a certain rate of gain and maintenance. There also needs to be in place a monitoring system to evaluate how well the nutrition program is following the growth strategy. There is much debate about what this monitoring system should look like. As age-at-first-calving decreases and growth rates increase, the level of monitoring must increase as well as the level of management. Cost per pound of gain will decrease, daily feed cost will increase, total feed cost will decrease and the economic window for conception will decrease as age-at-first-calving decreases and growth rates increase. Table 7 contains several possible growth strategies that might be implemented. Recognize the limitations stated above and that an excessively fat heifer is a problem no matter how you look at it.

Conclusion

There are many strategies that can be implemented to acquire replacement heifers profitably. The first and major decision is the source of heifers and who will raise them. In raising heifers alternative strategies

Table 7. Monthly frame size body weights and average daily gains for heifers calving at 1250 pounds and 18, 21, 24 and 27 months of age.

AGE	BW	ADG	BW	ADG	BW	ADG	BW	ADG
0	90		90		90		90	
1	135	1.5	128	1.3	123	1.1	119	1.0
2	192	1.9	175	1.5	163	1.3	153	1.1
3	258	2.2	229	1.8	208	1.5	192	1.3
4	333	2.5	290	2.0	259	1.7	236	1.5
5	414	2.7	356	2.2	315	1.9	284	1.6
6	498	2.8	426	2.3	374	2.0	334	1.7
7	583	2.8	499	2.4	436	2.1	388	1.8
8	668	2.8	572	2.4	500	2.1	444	1.9
9	749	2.7	644	2.4	564	2.1	500	1.9
10	827	2.6	716	2.4	628	2.1	557	1.9
11	899	2.4	784	2.3	691	2.1	614	1.9
12	966	2.2	849	2.2	752	2.0	671	1.9
13	1028	2.0	910	2.0	810	2.0	726	1.8
14	1083	1.8	967	1.9	866	1.9	779	1.8
15	1132	1.6	1020	1.8	919	1.8	830	1.7
16	1176	1.5	1068	1.6	969	1.7	879	1.6
17	1215	1.3	1112	1.5	1015	1.5	926	1.6
18	1249	1.1	1152	1.3	1058	1.4	970	1.5
19			1189	1.2	1098	1.3	1011	1.4
20			1221	1.1	1134	1.2	1050	1.3
21			1250	1.0	1168	1.1	1086	1.2
22					1198	1.0	1119	1.1
23					1226	0.9	1150	1.0
24					1251	0.8	1179	1.0
25							1206	0.9
26							1230	0.8
27							1252	0.7
AVG ADG		2.1		1.8		1.6		1.4

BW = Frame size body weight (pounds) ADG = Average daily gain (pounds)

of labor efficiency, reproductive efficiency, and feed or growth efficiency must be evaluated and implemented to maintain profitability in the heifer rearing enterprise.

References

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Abstracts

Congenital anomalies in calves.

M. T. Mandara and G. Vitellozzi.

Obiettivi e Documenti Veterinari, (1991) 5, 37-41.

The AA. report the results of an investigation performed during a 30 year period on 1085 necropsied calves. The aim of the research was to estimate the frequency of congenital malformations in this species. 99 congenital anomalies were found and their frequency was 6.54% of the examined animals. The organ systems more commonly affected were the urogenital system (34 malformations) and digestive system (30 malformations). The most common defect found was intestinal atresia (7 cases). The results of the investigation showed that congenital defects consistently increased during the period considered. These findings highlight the necessity to characterize the defects and to apply basic epidemiological methods in order to control congenital anomalies in feedlot, to ascertain the etiology and to prevent the economic losses and the spreading of heredity diseases.

Comparison of ultrasonographic and radiographic findings in cows with traumatic reticuloperitonitis

U. Braun, M. Flückiger, M. Götz

Veterinary Record (1994) **135**, 470-478

The radiographic and ultrasonographic findings in 26 cows with traumatic reticuloperitonitis were compared. The cows were divided into three groups based on the radiographic findings; the first group consisted of 12 cows in which the principal radiographic finding was a foreign body penetrating the reticulum; the second group contained four cows in which the principal radiographic finding was gas shadows or a gas-fluid interface, the third group consisted of 10 cows that had no reliable radiographic evidence of traumatic reticuloperitonitis, such as an abnormal contour, position or shape of the reticulum. In no case could the foreign bodies be visualized by ultrasonography. In all the cows except one with radiographic evidence of abnormal gas inclusions and gas-fluid interfaces, ultrasonography revealed echogenic, partitioned and capsulated structures with central hypoechogenic cavities. In addition, in some of the cows with no radiographic evidence of the condition, severe changes indicative of inflammatory processes were visible by ultrasonography.