



# Heifer Inventory and the Economics of Replacement Rearing

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## Introduction

Profitability in the dairy business is NOT the herd with the larger milk check, or the greater volume in the bulk tank, but the producer who retains a larger sum of revenues at the end of the month (income minus expenses equals profits). One of the larger expenses incurred on the dairy is replacement heifer rearing. Replacement rearing is second only to feed cost for the lactating cows. In surveys of dairy expenditures, this item accounts for 9 to 20% of the total expenses on the farm. In the authors' experience, producers are seldom aware of what heifers cost to raise, and most producers think that these expenses are negligible. Heifers are a high cost item when expenses are divided among the various enterprises on the farm.

Heifers will not return on the producer's investment of approximately \$1000.00 to \$1300.00 per heifer at 24 months of age until they are lactating. Delay in age to first calving adds approximately \$50.00 per heifer per month to the expenses incurred in raising heifers. Several specific items can reduce expenses while increasing profitability and producing heifers that will milk to their greatest potential: (1) the early development period is critical to a healthy heifer, (2) rations should be specifically formulated for weight gains during strategic time periods of development, but over-feeding prior to puberty can be detrimental to milk production, (3) heifers should weigh 775 to 800 pounds at 14 to 15 months for breeding to calve at 24 to 25 months, (4) heifers should gain 1.8 pounds per day of age to calve at 24 months weighing 1350 pounds, (5) use superior AI sires on replacement heifers for breeding, as first calf heifers represent 33% of the contribution of calves to the replacement pool, (6) weight is more critical than age at calving in relation to milk production, (7) monitor

weight, height, body condition score at calving to reflect heifer development, along with milk production at start-up, peak milk, and mature equivalents as an indicator of good heifer development. Heifers can be adequately developed to calve at 24 months, while decreasing expenses and increasing profits.

## Reducing Heifer Inventory Numbers

Calving heifers at an older age has many disadvantages other than increasing their nonproductive life and delaying potential milk income. When heifers calve at ages greater than 24 to 25 months, larger inventories or numbers of heifers must be maintained in the heifer herd. Increasing the age at calving also increases the generation interval, delaying the introduction of genetically superior replacements in the herd. If the annual replacement rate is 33% in a 100 head herd, a minimum of 33 calving heifers are needed per year. In a real situation, assuming a 15% attrition factor for death loss, infertility and selection within the heifer pool, approximately 38 to 40 heifers are needed to calve each year for culling purposes. When calving is delayed to an age greater than 24 or 25 months, heifers are accumulating in the replacement pool. For every one month increase in the age at calving over 24 months, the replacement inventory numbers are increasing at a rate of 4.2%. This figure takes into account the inventory of heifers from birth through calving. Therefore, if a herd is calving 28 month old heifers with an average culling rate of 33%, the number of replacement heifers on the farm is now increased from 76 to 89 heifers (Table 1, page 2). This equates to 13 additional heifers or an increase of 16.8% in the total number of heifers consuming feed, labor, fuel, facilities, and management on a yearly basis. The tables below demonstrate the increase in heifers needed at various culling rates (Table 2, page 2) and the

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relationship between the culling rate, age at first calving, and increasing heifer inventory (Table 3).

### Additional Heifers Needed in Pool

Some producers typically argue the point that we have the pasture and the land and heifers are “cleaning-up” after the lactating cows, therefore, calving older heifers is not “costing anything.” This is where “opportunity income” enters the equation. “Opportunity income” is potential income lost from not undertaking a more profitable venture. As producers, the heifers need to be fed and managed. This takes time, labor, fuel, feed, etc.

When heifers are calving at greater than 24 or 25 months, a greater longevity of investment is going to replacement heifers than necessary and profits are decreased. Where pasture is available or excessive, consider adding an optional enterprise or diversify. Calving heifers greater than 24 or 25 months is not a profitable venture, simply because “we have the land available.” If heifers are “cleaning-up” after the lactating cows, additional feed must be put on the bunk for these heifers, but more important, the lactating cows are more profitable in converting bunk ration to milk. Remember that a profitable dairy is NOT the one with the

**Table 1: Total Heifer Inventory Numbers for Varying Herd Sizes at a 33% Replacement Per Year: Numbers of heifers represents a 15% increase in replacement numbers for death, culling of heifers, non-breeders, etc.**

Increased Number of Heifers Needed in Replacement Pool for Each Age at Calving at 33% Herd Culling Rate:

Heifer Age at Calving:	24 mos	26 mos	28 mos	30 mos	32 mos	35 mos
Number of Cows in Herd:						
100 cows	76	83	89	95	102	111
125 cows	95	103	111	119	127	139
150 cows	114	124	133	143	152	167
175 cows	133	144	155	167	178	194
200 cows	152	165	176	190	203	222

**Table 2: Total Number of Heifers Needed Per 100 Cows for Various Herd Culling Rates : Calving at 24 Months of Age. Additional 15% increase for culling, non-breeders, death, etc. of replacements.**

Culling Rate	Heifers Needed in Replacement Pool (Number Needed to Calve Per Year)
30	69 (35)
33	76 (38)
35	81 (40)
37	85 (43)
40	92 (46)

**Table 3: Increase in Heifer Replacement Numbers for Various Culling Rates in 100 Cow Herd: First Calf Heifers Calving at 30 Months.**

Culling Rate	Total Heifers Needed* in Replacement Pool (Increase in Heifer Pool Numbers Over 24 Month Calving Age)
30	69 (17 <sup>^</sup> ) = 86*
33	76 (19 <sup>^</sup> ) = 95*
35	81 (21 <sup>^</sup> ) = 102*
37	85 (22 <sup>^</sup> ) = 107*
40	92 (23 <sup>^</sup> ) = 115*

larger milk check, but the dairy that keeps more of the milk check. Calving older heifers is subtracting dollars from profitability. Producers should raise only the number of replacement heifers needed, unless the additional heifers will be marketed.

## Economics of Delayed Parturition

The delay in calving heifers can be an enormous cost; in fact, when the dairy is divided into enterprises, heifer rearing is the second highest cost on the dairy. Projections range from a loss of \$1.50 to \$3.00 for every day in excess of 24 months of age that parturition is delayed. The current research indicates an average cost of \$50.00 to \$60.00 per heifer per month over 24 months of age at calving. A herd of 100 lactating cows with a culling rate of 33% will need to calve 38 heifers per 12 months (5 extra heifers to allow for an additional 15% culling of the first calf heifers). If the average calving age is 30 months, the increase in expenses is approximately \$300.00 per heifer for those 6 months over goal. This translates to an \$11,400.00 (38 X \$300.00) loss per year in extra labor, feed, fuel, etc.

An additional loss in calving heifers at more than 24 months of age is the increase in heifer inventory numbers (Table 2). For example, if producer A is calving 38 heifers at 24 months of age per 100 cows and producer B is calving at 30 months of age, producer B will have additional heifers in his/her replacement inventory to meet the same culling rate as producer A. This is because calving age is extended, heifers are accumulating in these additional months, and they are maintained in a nonproductive state for an additional 6 months before

calving. For each additional month over goal of 24 months, 4.2% more heifers are needed in replacement inventory. Example: Producer A needs 76 heifers in his/her heifer inventory for a 24 month turnover of heifers (from baby calves to calving). Producer B, to meet the same culling rate, will need 95 heifers on his/her farm. These 19 additional heifers are unnecessarily consuming feed and management (Table 3).

Returns from the “transition period” (emphasis is placed on heifer development to decrease age at calving) down to 24 months could also represent generated income. If, for example, the age at first calving is reduced from 30 down to 24 months, the dairy could expect 6 month’s worth of additional heifers for potential sale or place more pressure on the lactating herd for culling. Of the 19 surplus heifers producer B previously needed, or actually 19 less heifers over a 2 year period, he now has these 19 heifers over two years available for sale or culling pressure on the lactating herd. If they were sold at \$1250 per heifer, the income would be \$23,750 over a 2 year period of time. It should be noted this is a one-time transition return and would not be expected in subsequent years if the calving age remained at 24 months. This means that in the first two years heifer development is emphasized, expenses in feed and management are decreased by \$11,400.00 per year, and \$23,750 worth of heifers are sold, bringing the total potential income for those two years to \$35,150.00. Dairymen should not anticipate reducing the age to calving in several months, as experience indicates that it takes at least 18 to 24 months to decrease age at calving to a goal of 24 months.

### Form for Estimating Heifer Rearing Economics for a 100 cow herd:

Cost of Raising a Heifer to 24 Months of Age = **\$1250.00**

Cost Per Month Over 24 Months in Additional Expenses = **\$50.00**

Herd at **33%** Culling Rate

Herd Calving Heifers at 30 Months

**6** Months Over Goal of **24** Months

**6** Months X **\$50.00** = **\$300.00** per heifer per year

Calving **38** Heifers in 12 months @ **\$300.00** additional cost = **\$11,400.00**

Transition to Reduce Age at Calving to 24 Months of Age

Reduced to **24** Month Age at First Calving Would Need Less Heifers

**See Table 1** (reduce inventory from 95 to 76 heifers or 19 heifers over 2 years)

Heifers Selling for **\$1250.00**

**\$1250.00** X **19** Extra or surplus heifers first and second year = **\*\*\$23,750.00 total over 2 year transition period**

**\*\*One time transition recovery of income decreasing from 30 Months to 24 Months. Typically accomplished over a 2 year period of time.**

## Costs at Breeding Age

In a microcomputer simulation model to evaluate management strategies for raising dairy replacements, Dr. Greg Bethard, of Virginia Tech, demonstrated the effects of heat detection efficiency in replacements based on economic analysis. This model looked at three heat detection rates (40, 50, 60%) at each of three conception rates (40, 60, 80%). Across all conception rates, improving heat detection efficiency from 40 to 50% reduced the total rearing costs by \$39.72. The reduction was \$16.22 when moving from a 50 to a 60% heat detection efficiency. This demonstrates that heat detection efficiency is proportionately more costly at lower heat detection rates, emphasizing the costs of poor heat detection. The sum of the two figures (\$55.94) represents the decrease in rearing costs when improving heat de-

tection from 40 to 60%. Across all heat detection and conception rates evaluated, total rearing costs for each heifer entering the milking herd decreased \$2.80 per day for each percent increase in heat detection efficiency. When breeding age is delayed from 15 months to 20 months and calving is delayed then to 29 months of age, a \$2.80 additional cost is incurred. Therefore, additional expenses for this delay in breeding per heifer would be \$336.00. This figure can be used to evaluate the economics of implementing aids that improve heat detection efficiency. An evaluation shows that the figure mimics the cost of a day open over 100 days for lactating cows. By indicating the cost of the delay in breeding heifers, the figure provides another evaluation tool for the economics of heifer development.

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