Cost Analysis of Raising Replacement Dairy Heifers

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Abstract

The study was carried out from October 2004 to November 2011. The objective of this study was cost analyze and validation of data set on 18 and 15 milking and custom heifer operations respectfully. Average number of Holstein heifers was 108.57 and 78.46 for milking and custom heifer operations respectfully. A cost analysis spreadsheet was carried out with an Excel 2003 Microsoft file. The spreadsheet estimated the costs to raise a replacement heifer by specific age classes. The average total cost to raise a replacement heifer for this data set was lower for custom heifers operations compared to milking ones. The findings presented by this study emphasize the importance of understanding the economics of raising replacement dairy heifers on an individual operation basis.

KEYWORDS: cost, heifer raising, operation,

INTRODUCTION

Raising replacement dairy heifers represent a major expense to dairy operations. Due to the nature of replacement heifer management, a dairy operation has to invest feed, labor and capital for 23 to 25 months and sometimes more without receiving any realized benefits. Heinrichs (1993) reports that heifer rearing represents the second largest expense on a dairy operation, about 20% of the total operation expenses,

following only feed costs for the milking herd. Gabler et al.(2000), Heinrichs et al. (1994), Hoffman et al (1992) demonstrated that minimizing heifer rearing investments while maintaining the productive integrity of the replacement heifers should be the primary objective of replacement heifer management. Lin et al. (1987) reported the lifetime productive benefits of replacement heifers calving between 22 and 24 months of age. Heifers calving at 23 months acquired 107 more days of productive life, yielding 1475 more kg of milk, than replacement heifers calving at 26 months, although earlier age at calving has been proven beneficial . Clark et al. (1962) reported that weight at calving influences first lactation milk yield four times more than age at calving alone. Keown et al. (1986) reported that optimum calving weight of a first calf heifer is between 544 and 567 kg to maximize first lactation milk yield. While an increased rearing rate is required, research has shown that caution must be taken with heifer pre pubertal growth rate. Heifer pre pubertal growth rates above 900g/d results in a decrease in first lactation milk yield (Sejrsen et al. (1982), Van Amburg et al. (1998). Willet, (1990) reported that dairy operations have a variety of resources and objectives, such that the most economical method of obtaining replacement heifers is only determined by individual analysis of costs.

The objective of this study was cost analyze and validation of the cost spreadsheet data set on 18 and 15 milking and custom heifer operations.

MATERIALS AND METHODS

Cost analysis was carried out with an Excel 2007 Microsoft file. Costs were calculated on a per heifer basis. The spreadsheet estimated the costs to raise a replacement heifer by specific age classes for feed, labor, health, reproduction, mortality, bedding, facilities, equipments, mortality, tax on the ownership of the facility and equipment, insurance, interest costs. Cost estimates were separated into age classes, which included from birth until weaning, weaning until 6 months of age, 6 months of age until bred and bred until

prefresh. The cost estimates by age classes were transferred to a summary sheet that provides total cost and cost per day for the age classes. Facilities and equipment cost estimates include a current value of either the facility or equipment acquired through a straight-line depreciation given the expected life of the facility or equipment.

Facilities and equipment cost estimates also incorporate the remaining life of the facility or equipment, number of days heifers occupied the facility or used the equipment, interest, insurance, and tax on the ownership of the facility or equipment. Interest, insurance and tax figures are acquired through the use of annual percentage rates. Mortality cost estimates takes into account the value of a replacement heifer, total cost to raise a replacement heifer, and the percent mortality for the operation at the specified age period. Interest costs include the value of a replacement heifer, total cost to raise a replacement heifer, and an annual percent interest rate. A month in the cost analysis spreadsheet comprised 30 days. A prefresh age defined as 12 days prior to the expected first calving was applied for equal comparison between operations. The cost per age class was based according to the individual operation.

All facilities and equipment were given life expectancies in which a straight –line depreciation was performed to estimate a current value. The annual interest rate was 5 %, while the annual tax and insurance rate were 2 %. Labor hourly wage rates were based according to individual operations. The value of replacement heifers required to calculate mortality and interest costs, was dependent on the value of heifers at the individual operations. Equations used to calculate costs per animal per age class are those developed by Gabler et al. (2000)

Table 1. Life expectancy values placed on facilities and equipment

Facilities	Expectancy (years)	Facilities	Expectancy (years)
Permanent	25	Skid loaders	15
Nonpermanent[1]	15	Manure handling equipment	15
Equipments		Operation vehicles	15
Tractor	18	Feed mixer wagons	15
Silo unloader	15	Milk feeding equipment[2]	2

[1]Nonpermanent facilities represent calf hutches and group housing

[2]Milk feeding equipment represents milk bottles, buckets, and related necessities.

RESULTS AND DISCUSSION

The cost analysis provided for a fair market value estimation of the costs to raise heifers on various operations, Willet, (1990). Results are given as total cost estimates and average daily cost estimates. Costs were estimated for a variety of operations, feeding, housing, labor etc. Cost analysis enabled to evaluate strong and weak points within heifer management. In addition, this analysis showed that economic decisions need to be based on individuals; not based on reported averages that did not allow for statistical comparison of the observed data.

The specifics of the operations analyzed are shown in Table 2. Of the 15 custom heifer operations analyzed, 9 operations received calves at three first days of age. The remaining six custom heifer operations received heifers at an average age of 123.6 days. Milking operations had an average weaning age of 76.23 days, while custom heifer operations had an average age at weaning of 70.39 days (Table 2). Age at weaning

results in a savings of 8.5 % for custom heifer operations over milking operations age at weaning (Table 3).

While total cost to raise a replacement heifer during the period birth until weaning is lowest. This age class is by far the most expensive period for all farms, as shown by the per day cost in Figure 1

Table 2. Milking and custom heifer raising operation specifics

Items	Milking operations				Custom heifer operations			
	n	Avg	Min	Max	n	Avg	Min	Max
No.of heifers	18	108.57	30.0	240.00	15	78.46	23.00	116.00
Age at wean,d	18	76.23	39.0	118.00	9	70.39	48.00	82.00
Age at arrival,d	-	-	-	-	6	123.60	58.00	170.00
Age bred, mo	18	15.34	13.00	18.00	15	14.36	13.00	16.00
Age prefresh, mo	18	24.24	22.00	27.00	15	23.17	20.00	25.00

Average age at breeding was slightly less for custom heifer operations (Table 2), yet the average total cost is larger. Approximate results were reported by Heinrichs et al. (1994), Gabler et al (2000),

Total cost estimates for the age period 6 months until bred for both milking and custom heifer operations vary, which may have attributed to this difference between lower age at bred and larger average total cost. Another likely possibility is the tendency for custom heifer operations to achieve more consistent growth by feeding a high nutrient diet during this period in order to decrease age at first breeding and consequently decreased age at calving.

Table 3. Average total costs for specific age classes and total cost (€-EUR) to raise a replacement heifer for milking and custom heifer operations

Items	Milking operations				Custom heifer operations			
	n	Avg	Min	Max	n	Avg	Min	Max
Total cost	18	1207.14	965.14	1461.48	9	1091.25	854.60	1218.36
Birth to wean cost	18	146.49	67. 23	316.79	9	124.17	85.70	177.25
Wean to 6mo cost	18	185.37	74.19	295.76	9	184.22	122.44	232.80
6 mo to bred cost	18	336.42	125.76	457.82	15	365.13	109.84	576.04
Bred to prefresh cost	18	538.87	425.41	654.40	15	417.73	264.62	543.27

The age classes: weaning until 6 months of age and 6 months of age until bred are the periods of least expensive rearing as shown by the average daily cost per animal (Figure 1). The average age at prefresh for milking operations was 24.24 months and for custom heifer operations was 23.17 months. Heifer rearing represented the second largest expense on a dairy operation, about 21.7 % of the total operation expenses, following only feed costs for the milking herd. Results are consistent with those reported by Heinrichs (1993), Hoffman et al (1992). Heifers calved at 23 months for first 3 lactations produced 724 kg of milk more, than replacement heifers that calved at 25 months. Similar results were reported by Lin et al. (1987), where earlier age at calving was proven to be beneficial. Custom heifer operation's average age at prefresh represented a 10.6% savings over the average age at prefresh for milking operations in these farms. Approximate results were reported by Lin et al. (1987), Gabler et al. (2000).. Heifer pre pubertal growth rates above (780g/d) resulted in an increase of 2.7 % in first lactation milk yield. These value are similar to those reported by Clark (1962) and Keown et al. (1986), but different to values reported by Sejrsen et al.

(1982) and Van Amburg et al. (1998). Mortality expenses were 1.63 and 1.3 % for the entire rearing period for milking and custom operations respectfully Average mortality rate was estimated to be 4.3 and 3.7 % for milking and custom respectfully. These values are higher than those reported by Razzaque et al (2009) and Gabler et al.(2000), which are related to management conditions.

As shown by Figure 2, feed represents 62.4 and 66.7 % of the average total cost for milking and custom heifer operations respectfully. Labor was the second largest expense contributing 9.2 and 11.8 % of the average total costs from birth until prefresh for milking and custom heifer operations, respectfully. Average per day cost was estimated to be 1.66 and 1.57 € for milking and custom heifer operations respectfully. Ownership of the heifer largely influences interest cost. None of the custom heifer operations owned the heifers they raised, thus the average interest costs for these operations was lower than milking operations as shown in Figure 2.

Electricity and Fuel expenses were estimated to be 4.65 and 4.52 % of total cost for milking and custom heifer operations respectfully. A cost, where the operation enters a cost figure per calf heifer per age period to cover all inestimable costs such as labor required to move animals, water and transportation costs, was estimated to be 0.66 and 0.64 % of total cost for milking and custom heifer operations respectfully.

CONCLUSIONS

Study emphasizes the importance of understanding the economics of raising replacement dairy heifers on an individual operation basis. This study can help to improve operation profitability for both milking and custom heifer operations. Making right economic decisions requires to continually evaluate each dairy management decision.

There are different methods for replacement heifer management. Knowing what it costs to raise a replacement

heifer is essential when evaluating an operation's profitability and productivity.

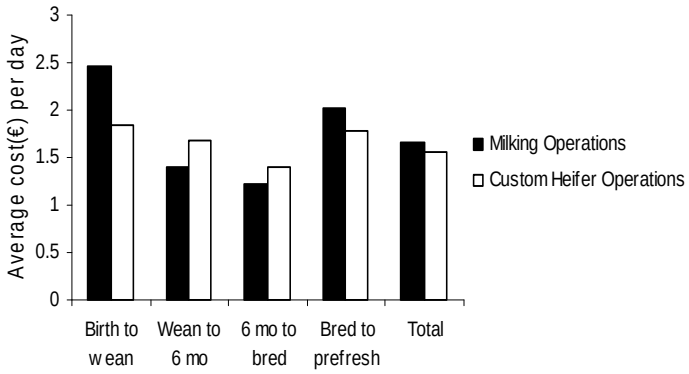

Figure 1. Milking and custom heifer operation's average per day costs by age classes

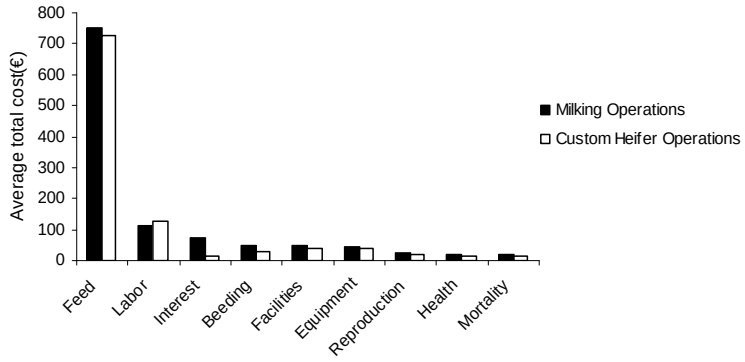

Figure 2. Milking and custom heifer operation's average total cost by task

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