FINANCIAL AND PERFORMANCE BENCHMARKS FOR THE HEIFER OPERATION

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Summary

Financial and performance benchmarks have had a positive effect overall in dairy heifer production. Benchmarks, however are not without limitations and possible drawbacks. More specifically, benchmarks (1) tend to be static, (2) induce a lemming effect in many industry segments, and (3) can be deceptive in that they ignore inter-dependence between each-other. Some of the prevailing benchmarks in dairy heifer production ignore the cost of time and neglect the cost of dead animals. Feed cost benchmarks have naively used the cost of corn, soybean, and hay as exclusive "barometer" feeds. A novel approach is suggested where unit costs of nutrients are derived from prices of all feed commodities traded in a given market. These nutrient unit costs are easily merged with nutrient requirements to calculate benchmark nutrient costs that are free of specific feed programs and reflect the effect of targeted animal performance on feed costs.

Introduction

The replacement heifer enterprise is getting increasing attention in the dairy industry. This is due to the fact that 1) heifer raising cost is the second largest expenditure on a dairy farm (second to the cost of feeding the milking herd), 2) it has traditionally been an overlooked enterprise on the farm, and 3) often, many of the non-cash costs included in raising heifers are ignored when calculating heifer replacement budgets.

For professional heifer growers, however, it is evident that production costs must be properly assessed. It is also important that one's production costs be compared to some "standards". Often, these "standards" are benchmarks derived from production and from financial surveys of peer farms. The positive aspects of such benchmarks in the management of farm businesses have been emphasized by others. In this paper, we review some of the negative aspects of benchmarks. In taking a somewhat negative position in regard to their use (or abuse), we hope to restore a more cautious approach to their use.

Benchmarks: the Rest of the Story

How much should it cost to raise (competitively) a dairy heifer to 23 months of age? What should feed costs be? These are two of the most frequent questions asked by heifer growers or their prospective clients. To help this clientele, numerous extension workers and industry specialists have produced typical, or benchmark budgets. One such benchmark

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budget is presented in Table 1. This benchmark budget illustrates very well some of the concerns that we should have with benchmarks.

Static

Benchmarks based on surveys are always at least one period behind (and sometimes are very outdated). Growers risk managing their heifer operation in a manner similar to an automobile driver looking exclusively through the rear-view mirror while driving. Benchmarks based on expert opinion are often very static. For example, the budget presented in Table 1 was prepared in 1996 (although such information is not included in the table) and it still was displayed on an OSU Web site in early 2002. Certainly, the financial and production landscape in heifer management has changed in six years, but how do you update the figures to make them applicable and relevant to 2002?

The Lemming Effect

This effect can be particularly evident in survey based benchmarks. After a few periods (years) of survey, it becomes very difficult to determine whether the benchmarks are driving the producers, or the producers driving the benchmarks. The benchmarks become somewhat validated because a large mass of producers are attempting to meet said benchmarks. But this may have little to do with whether the benchmarks are appropriate in the first place. This behavior reminds me of the massive periodic migration of lemmings (small rodents) in Scandinavian countries. Every few years, most of the lemmings follow a new "trend" and jump in the North Sea, trying to swim 500 miles across to nowhere. On such year, the lemming benchmark is to jump in the water. In all of known history, not one single lemming has survived the attempt. But periodically, jumping in the sea is the "correct" benchmark…

Inter-dependency

One set of financial benchmark uses the "sweet 16", where 16 measures of profitability, solvency, liquidity, repayment capacity and financial efficiency are provided as if each were independent of each other. For example, these solvency ratios are recommended: debt to asset ratio, debt to equity ratio, and equity to asset ratio. By definition, however, asset = debt + equity. Thus, if you know the debt to asset ratio (say 0.40), you automatically know the equity to asset ratio (1.0 – 0.40 = 0.60), and the debt to equity ratio (0.40 ÷ 0.60 = 0.66). So why should you keep track of three ratios when one captures 100% of the available information?

Financial benchmarks often ignore their inter-dependence with production efficiency. A low asset turnover ratio may be the result of too much assets used, or it may also result from poor physical performance (lack of output).

As we looked at different budget benchmarks for heifer growers (such as Table 1), we found some items that were not very clear and others that were plainly wrong. Two frequent ones are (1) the time value of money, and (2) the cost of death.

Two Forgotten Hidden Costs

Not all born heifers are raised to freshening age: some die at birth while other die after a significant portion of the raising cost is incurred. From a heifer enterprise point-of-view, the live heifers must pay for the dead ones. The cost of a dead heifer is more then the $100-125 value at birth. It must also include all the costs incurred from birth until the time the heifer died.

The growth of a heifer can be viewed as a series of daily investments over a period of time (from birth to freshening). Payback time from the dairy producer's point of view begins only once the heifer freshens. The money that is tied up in heifers during the two year growth period must carry interest because this money could have been invested in other investment opportunities. This aspect is very important if a heifer grower raises his own purchased animals. Interest cost on inventory (mostly feed) must also be calculated in instances where the grower is custom raising heifers on a contract basis with monthly payments. For the rest of this discussion, we will assume that investments are rewarded at an annual rate of 8%.

The Cost of Raising Heifers

In Table 2, we present an example of the cost of raising a heifer to 23.5 months, without the hidden costs of mortality and interest compounding. Housing costs include depreciation on buildings using a 10 year straight-line method on building assets worth $350 per heifer. Feed costs are based on $25/ton corn silage and $100/ton of hay equivalent. Total grain cost for the two years is calculated at $225/heifer. Labor cost is based on 23.5 hours/heifer at $7.00/hour. Equipment cost includes the ownership and operation cost apportioned across animal enterprises, of all equipment used for manure removal, storage and spreading as well as the equipment used for feeding. The last line in Table 2 includes the initial cost for the animal, plus breeding cost, registration and miscellaneous charges. In total, over $1200 is invested per live heifer over a two year period. However, this number does not include mortality and investment cost. These were calculated in Table 3: $34 per live heifer for an 8% mortality rate, and $141 of interest on capital, calculated at 8%/year.

As a result, the total cost to raise a heifer to 1350 lb pre-freshening weight in 23.5 months is estimated at approximately $1400 per heifer.

Effect of Forage Costs

The assumed forage costs in Table 2 are representative of those incurred by well managed crops grown on $1000/acre land with 16 tons/acre corn silage yield and 4.5 tons/acre hay equivalent yield. But the heifer enterprise is very forage dependent and forage costs are themselves dependent on land price. Therefore, the cost of raising replacement heifers is linked to land price. In Table 4, we calculated the additional cost of raising a heifer on $4000/acre vs. $1000 /acre land assuming constant crop yield.

The increased land value results in substantially higher forage costs: corn silage cost (out of silo, as fed basis) increases by $11/ton (from $25 to $36/ton), while hay increases by $53/ton (from $100 to $153/ton). Over a two-year period, the higher land price results in additional feeding costs of $240 per heifer. In our calculation, we assumed that $4,000/acre land was appreciating at 2% per year. The rate of appreciation has a direct effect on net costs of raising forage. Certainly, there are instances where the average annual rate of appreciation makes investment in land attractive economically. However, return on land (capital gain) occurs only when the land is sold. It is becoming increasingly difficult to cash-flow out of agricultural production land investments exceeding $1500-$2000 per acre.

The Corn/Soybean/Hay Syndrome

In Table 5, we show a variant of a table that ties feed costs to the price of corn and hay. Beside the obvious lack of characterization of hay quality, these benchmark tables show an over-fixation on corn, soybean, and hay prices as if these three commodities were perfect market drivers of all other feed commodities. Unfortunately for the designers of such tables (and fortunately for heifer growers) this is not the case. However, until recently, there were no methods available to synthesize the information from the trading of all commodities in a given market into usable benchmarks of feed costs. The method and software that we present in a companion paper (St-Pierre, 2002) address this problem by deriving the unit cost of all major nutrients from the market price of all commodities traded in a given market. This information can be merged with the nutritional requirements of growing dairy animals (NRC, 2001) to produce benchmark feed costs that are specific to a given level of performance and are exempt of any distortion due to specific combinations of feed ingredients in the diets.

An example of our procedure is shown in Table 6. For this analysis, we calculated the total nutrient cost incurred in growing a dairy heifer from 150 to 600 kg (330 to 1320 lbs) at a rate of 0.8 kg/day (1.75 lbs/d). Nutrient requirements are from NRC (2001) Table 14-13 and 14-15. Unit costs of nutrients were those estimated for the Northeastern U.S.A. in January 2002 using the SESAME software (St-Pierre, 2002). Nutrients factored in the analysis and their unit cost were: metabolizable energy (ME): $0.0517/Mcal; rumen degradable protein (RDP): -$0.014/kg; rumen undegradable protein (RUP): $0.138/kg. An additional $0.05/day was added to cover the costs of vitamins and minerals. Under the prevailing market conditions existing in the Northeast in early 2002, a benchmark cost of $624/heifer is calculated as “nutrient cost”, which averages $1.39/kg of grain ($0.63/lb). Notice that this benchmark is exempt of any information regarding the specific combination of feed ingredients to achieve the targeted results. In essence, feed prices (all of them) are simultaneously converted into nutrient prices. This is why we prefer the label “nutrient cost” when calculations are based on this method as opposed to the old label “feed cost”.

With this approach, it is easy to calculate benchmark nutrient costs under different rate of gain objectives. In Table 7, we present the results for a 400 kg heifer with rate of gains varying from 0.5 to 1.0 kg/d. Similar calculations could be used in contracts between heifer growers and their clients to establish bases for animals under contracts.

References

National Research Council. 2001. Nutrient Requirements of Dairy Cattle. 7th rev. ed. Natl. Acad. Sci. Washington, D.C.

St-Pierre, N.R. 2002. Pricing feed ingredients based on their market value. Proc. Of PDHGA Dairy Calf and Heifer Conference, Baltimore, MD.

Table 1. Heifer raising costs incurred by the grower, 3 to 24 months, Ohio.

Item	---------- Costs Breakdown by Period [1] ---------- 3 to 12	13 to 23	3 to 23
Feed Costs			
Corn	$45	$62	$107
SBOM	24	31	55
Dical phosphate	6	6	12
Salt	2	2	4
Hay	128	179	307
Corn silage	62	86	148
Total Feed Costs	$267	$366	$633
Other Variable Costs			
Veterinary and medicine	$4	$9	$13
Utilities	6	7	13
Bedding	22	22	44
Misc. and supplies	7	8	15
Total Other Variable Costs	$39	$46	$85
Labor Costs	$56	$67	$123
Facility Costs			
Equipment charge	$15	$16	$31
Building charge	37	41	78
Total Fixed Costs	$52	$57	$109
Total Costs	$414	$536	$950
Per Day Costs			
Feed costs	$0.88	$1.09	$0.99
Other variable costs	0.13	0.14	0.13
Labor costs	0.18	0.20	0.19
Facility costs	0.17	0.17	0.17
Total Per Day Costs	$1.36	$1.60	$1.48

[1]The '3 to 12' column givens costs of raising a heifer from 3 months of age to 12 months of age '13 to 23' lists costs for 13 to 23 months.

Table 2. Example of estimated cost of raising replacement heifers.

	Period				
	0-7W	6.5 Mo.	16.5 Mo.	23.5 Mo.	Total
Housing ($)	3.00	14.00	31.00	22.00	70.00
Feed ($)	40.00	165.00	180.00	268.00	653.00
Bedding ($)	5.00	33.00	7.00	3.00	48.00
Labor ($)	32.00	31.00	60.00	41.00	164.00
Equipment ($)	0	39.00	56.00	44.00	139.00
Breeding, Reg, Sup. ($)	100.00		40.00		140.00
Total	180.00	282.00	374.00	378.00	1214.00

Table 3. Cost of raising replacement heifers: incorporating mortality and time value of money.

	Period				
	0-7W	6.5 Mo.	16.5 Mo.	23.5 Mo.	Total
Total ($)	180.00	282.00	374.00	378.00	1214.00
Cumulative ($)	140.00	321.00	649.00	1025.00	
Death Factor	1.03	1.02	1.02	1.01	
Death Cost ($)	4.00	6.50	13.00	10.50	34.00
Total W. death ($)	184.00	288.50	387.00	388.50	1248.00
Future Value	222.00	340.00	427.00	400.00	1389.00

Table 4. Effect of land price on feed costs.

Land Value ($/acre)	$1,000	$4,000
Corn Silage Yield (T/A)	16	16
Hay Yield (T/A)	4.5	4.5
Net Interest (%)	8	6
Corn Silage (IN) $/ton	22.50	32.50
(OUT) $/ton	25.00	36.11
Hay ($/ton)	100.00	153.00
Additional Costs		
Corn Silage ($/heifer)		+$100.00
Hay ($/heifer)		+$120.00
Sub-Total		+$220.00
Interest (Ave. 1 year, 8%)		17.50
Total		+$237.50

Table 5. Per day feed costs given differing corn and hay prices, heifers from 3 to 24 months[1]

Hay Price ($ per ton)	Corn Price ($ per bushel) $2.00	$2.50	$3.00	$3.50
$ 60	.70	.76	.82	.88
$ 80	.79	.85	.92	.98
$100	.89	.95	1.01	1.08
$120	.98	1.05	1.11	1.17

[1] Calculated using feed requirement in Ohio Dairy Enterprise Budgets.

Table 6. Nutrient cost incurred in the growth of a large breed heifer from 150 to 600 kg BW growing at a constant rate of 0.8 kg/d, using unit price of nutrients derived from market prices of commodities in the Northeast U.S.A., January 2002.

Weight (kg)	Days	ME Mcal/d	RDP g/d	RUP g/d	ME[1] $/d	RDP $/d	RUP $/d	Min + Vit $/d	Total $/d	Total $/Period
150 – 175	31.25	9.6	407	261	0.496	-0.006	0.036	0.05	0.577	18.02
175 – 225	62.5	11.9	505	233	0.615	-0.007	0.032	0.05	0.690	43.14
225 – 275	62.5	14.1	597	207	0.729	-0.008	0.029	0.05	0.799	49.95
275 – 325	62.5	16.2	685	183	0.838	-0.010	0.025	0.05	0.903	56.45
325 – 375	62.5	18.2	769	162	0.941	-0.011	0.022	0.05	1.003	62.66
375 – 425	62.5	20.1	850	142	1.039	-0.012	0.020	0.05	1.097	68.55
425 – 475	62.5	24.5	1038	448	1.267	-0.015	0.062	0.05	1.364	85.25
475 - 525	62.5	26.4	1119	432	1.365	-0.016	0.060	0.05	1.459	91.18
525 – 575	62.5	28.3	1197	418	1.463	-0.017	0.058	0.05	1.554	97.13
575 – 600	31.25	30.1	1274	407	1.556	-0.018	0.056	0.05	1.645	51.39
TOTAL	562.5									$623.72

[1]ME unit cost = $0.0517/Mcal; RDP unit cost = -$0.014/kg; RUP unit cost = $0.138/kg.

Table 7. Nutrient cost for a 400 kg large breed heifer at various rates of daily gains.

Gain (kg/d)	ME Mcal/d	RDP g/d	RUP g/d	ME[1] $/d	RDP $/d	RUP $/d	Min + Vit $/d	Total $/d	Total $/kg
0.5	18.0	760	86	0.931	-0.011	0.012	0.05	0.982	1.964
0.6	18.7	791	105	0.967	-0.011	0.014	0.05	1.020	1.700
0.7	19.4	821	124	1.003	-0.011	0.017	0.05	1.059	1.512
0.8	20.1	850	142	1.039	-0.012	0.020	0.05	1.097	1.371
0.9	20.7	878	159	1.070	-0.012	0.022	0.05	1.130	1.255
1.0	21.4	905	176	1.106	-0.013	0.024	0.05	1.168	1.168