Economic Analysis of Keeping a Nonpregnant Cow

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Summary

Abnormally large numbers of nonpregnant cows in cow-calf herds may be caused by diseases like trichomoniasis or a culmination of environmental factors such as heat stress during breeding and abnormally cold winters and wet spring conditions. Typically, producers sell nonpregnant females and replace them with bred heifers or cows. The five-year cash flow budgets developed in this study suggest that in some circumstances it is economically feasible to keep a nonpregnant cow.

Introduction

Sales of cull cows represent 10-20% of total gross income for the herd on average. While culling a nonpregnant cow is still an appropriate option and may be economically optimal in many cases (e.g., at high cull cow prices or for older, less productive cows), it has not been confirmed to be the best economic strategy in all situations. The variability in cattle prices and changing spreads between cull and bred stock values suggest other possible alternatives could exist. In certain circumstances, based on input and cattle prices, it is worth determining the economic feasibility of retaining a nonpregnant cow in the herd and re-breeding her the following year instead of replacing her with a new bred heifer or cow. The objectives of this analysis were to determine the feasibility of keeping a nonpregnant cow in comparison to three other common alternatives.

Procedures

Five-year discounted cash flow budgets were used to determine the feasibility of keeping nonpregnant cows. Budgets were created to calculate the annual costs of retaining replacement heifers within the herd, purchasing bred heifers, or purchasing cows to replace culled, nonpregnant cows. The budgets for retained nonpregnant cows reflected lower annual cow carrying costs (feed expenses plus operating costs) due to lower nutrient requirements.

The five-year discounted cash flow budgets are based on a case study herd of 100 cows. Each class of cattle (cows, heifers, steer calves, heifer calves) were assigned budgeted costs as well as income. Cattle prices from December 2010 to February 2011 used in this analysis are from USDA AMS for either the Burwell, Nebraska Livestock Market (bred cow and heifer prices) or from the Nebraska Combined 7-Auction Weighted Average price (cull cow and feeder calf prices) and are shown in Table 1.

Four alternatives for a nonpregnant cow are analyzed to compare annual cash flow values as well as the Total Five-Year Discounted Cash Flow Values. The four alternatives are as follows:

Alternative 1: Retain Heifers — The producer elects to cull all nonpregnant females and retain heifers from the mature cow herd's calf crop. It is assumed there is a normal 20% replacement level and a 2% death loss in the 100-head case study; therefore, 22 heifers are retained in a normal year. Certain cow herd inventory implications arise when the nonpregnant rate rises above the number of available heifers and cow herd inventories cannot be held at the target herd size of 100 head in the immediate

years following a high nonpregnant cow rate. An additional assumption for this alternative is that the producer would normally retain 22 heifers waiting to enter the herd from the previous year that were not affected by any increases in nonpregnant cow rates.

Alternative 2: Purchase Bred Heifers — The producer elects to cull all nonpregnant females and replace them with purchased pregnant heifers.

Alternative 3: Purchase Bred Cows — Similar to purchasing bred heifers, the producer culls all nonpregnant cows and replaces them with purchased pregnant cows.

Alternative 4: Keep Nonpregnant Cows — The producer culls the normal rate (20%) and purchases pregnant cows as replacement. However, when nonpregnant cow rates rise above the normal cull rate, the producer keeps the additional nonpregnant cows for an entire year. In the second year of the analysis, the cow is re-bred and in the third year of this analysis, she has a calf.

Results

Table 2 reports the total five-year discounted cash flow value for each alternative evaluated for the five-year case study. All annual cash flow values are discounted at a rate of 5% to derive the totals. Alternative 1, retaining heifers, resulted in the highest cash returns followed by purchasing cows (Alternative 3) and keeping the nonpregnant cows (Alternative 4). Purchasing heifers (Alternative 2) resulted in the lowest-return alternative. Alternative 4 does not result in the lowest return and profits are possible when implementing this alternative.

Alternative 1 has implications at a high nonpregnant cow rate. At the 100% nonpregnant rate, the total five-year discounted cash flow value is the highest nonpregnant cow rate cash flow value. The influx of cash in

Table 1. Winter 2011 prices.

550 lb Steer Calf ($/cwt)	$151.76
500 lb Heifer Calf ($/cwt)	136.26
650 lb Cull Heifer ($/cwt)	125.45
Cull Cow Value ($/cwt)	62.63
Purchase Price of Bred Heifer ($/head)	1385.00
Purchase Price of Bred Cow ($/head)	1310.00

Year 1 from culling the entire herd of nonpregnant cows is not re-invested quickly if retained heifers are used as the alternative. With the assumption that the normal replacement heifers are available in Year 1, even in the event of the rest of the cow herd being nonpregnant, the producer still has 22 first-calf heifers available to rebuild a herd. By Year 5, the ending year of this case study, the producer has yet to return to target herd size of 100.

Table 2 shows profitable levels throughout many of the nonpregnant cow rates. This is to be expected with the profitability of the cow-calf sector using price levels in the winter of 2011 time period. Furthermore, the relatively high cull cow values listed in Table 1 are a major contributor to the profit potentials in this case-study cow herd. Table 2 also illustrates the return potential of keeping a nonpregnant cow (Alternative 4) could be attractive in many instances. In our analysis, keeping the nonpregnant cow is always more profitable than purchasing a bred heifer at all non-pregnant cow rates.

Table 3 shows the ranking of each alternative's total five-year discounted cash flow values under different cull cow prices and nonpregnant cow rates (similar rankings are grouped by shaded areas). Recall the order from Table 2 that shows Alternative 1 being the highest return alternative, followed by Alternative 3, Alternative 4, and lastly Alternative 2. By using Table 1 prices and an analysis similar to that reported in Table 2, Table 3 shows this result is consistent throughout many of the cull cow value and nonpregnant rates analyzed. However, when cull cow values drop below $40/cwt and nonpregnant cow rates rise above 30%, keeping a nonpregnant cow becomes second in the ranking order. When cull cow prices rise above $76/cwt and high nonpregnant cow rates rise, it becomes advantageous to cull the nonpregnant cow and replace with either retained heifers, purchased cows, or purchased heifers. This would suggest that producers should elect to take advantage of elevated cull cow values if he or she is experiencing high nonpregnant cow rates.

The higher valued classes of cattle used in this analysis (Winter 2011 prices) show potential of keeping a nonpregnant cow out of production for an entire year. While the total five-year discounted Cash flow values prove a deterministic answer, Table 3 shows an important ranking system to assist in a producer's decision. Facing high nonpregnant cow rates can be economically devastating to a cow herd, however the previous data suggest that options are available, and keeping a nonpregnant cow could potentially be considered.

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Table 2. Total five-year discounted cash flow values for each alternative at differing nonpregnant cow rates.

	Nonpregnant cow rate				
	0%	25%	50%	75%	100%
Alternative 1- Retain Heifer	36,234.57	30,198.65	28,449.62	17,345.51	35,665.57
Alternative 2- Purchase Heifer	10,939.99	4,280.55	(8,759.38)	(21,557.99)	(33,338.49)
Alternative 3- Purchase Cows	30,001.33	28,802.65	21,580.22	14,357.79	7,135.37
Alternative 4- Keep Nonpregnant Cows	30,001.33	27,659.10	14,204.57	746.24	(11,956.38)

Table 3. Ranking of alternatives (highest return first) at differing nonpregnant cow percentages and cull cow values, winter 2011 prices.

					Nonpregnant Cow Percentage (Year 1)							
	$head	$/cwt	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	$300	$24	1,3,4,2	1,3,4,2	1,3,4,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2
	350	28	1,3,4,2	1,3,4,2	1,3,4,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2
	400	32	1,3,4,2	1,3,4,2	1,3,4,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2
	450	36	1,3,4,2	1,3,4,2	1,3,4,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2
	500	40	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2	1,4,3,2
	550	44	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	600	48	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	650	52	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	700	56	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
Cull Cow Value	750	60	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	800	64	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	850	68	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	900	72	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2
	950	76	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4
	1000	80	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4	1,3,2,4
	1050	84	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4	1,3,2,4	1,3,2,4
	1100	88	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4	1,3,2,4	1,3,2,4
	1150	92	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4	1,3,2,4	1,3,2,4
	1200	96	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,4,2	1,3,2,4	1,3,2,4	1,3,2,4	1,3,2,4	1,3,2,4