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Effects of Replacement Rate on Cow Herd Budget

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Cattle inventory numbers and cow herd size vary cyclically over time. Historically, cattle cycles have lasted about 10 years. However, the most recent cycle is in its 15th year (1990 to 2004) as a result of an eight-year period of liquidation caused by multi-year drought in many western states. In 2004 and 2005, many cow-calf producers will likely begin to rebuild their cow herds in response to improved profit projections and drought relief. Purchasing bred heifers or young cows will be an option for some producers; others will likely choose to retain additional females from within their own herd. While the economic cost differences to purchasing replacement stock versus retaining females is important to evaluate when making the decision to rebuild herds or replace older stock, it is also necessary to consider the budgetary effects of increasing the replacement rate in a cow herd.

Issues Associated With Higher Replacement Rates

Both income streams and expenses are likely to change as a result of increasing the replacement rate in a beef cow herd. Assuming that replacements are retained from the herd and that herd size is held constant, revenue from heifer calf sales will decrease and cull cow income will increase. Revenue from steer calf sales could also change because first- and second-calf heifers typically wean lighter calves than the replaced older stock. Beef Improvement Federation data suggests that, relative to mature cows, first-calf heifers will wean steer calves 60 pounds lighter and heifer calves 66 pounds lighter and second-calf cows will wean steer and heifer calves 40 and 54 pounds lighter, respectively. As a result of a younger cow herd, producers will likely sell less total weight; however, the typical feeder cattle price slide will result in higher per hundred weight prices for the lighter calves. Additionally, if the higher replacement rate leads to more females of higher quality in the cow herd and, eventually, higher quality calves, calf-crop revenue may improve.

Costs are also likely to increase as a result of a higher replacement rate in a cow herd. Feed costs may increase as a result of retaining more heifers. Because these females are still growing as well as being prepared to produce a calf, high quality feeds and forages are needed in the diet. In addition, diet quality is important after their first calving because of the extra requirement for lactation and repair of the reproductive tract for the next pregnancy, but these heifers still have a nutrient requirement for growth. Additionally, labor costs, management costs, and capital costs will also increase.

Budget Simulation

The income and cost impacts from higher replacement rates vary across producers depending on feeding practices, facilities, and other management decisions. In the following analysis, a March-calving herd is used in which heifers are retained from within the herd and are developed for 16 months (20 percent will ultimately be culled after one year). The feeding program includes grazing during the summer growing season and winter grazing with minimum hay supplementation. The herd death loss is 1.5 percent and 90 percent of the cows wean a calf. *Tables I* and *II* detail other budget assumptions.

With the assumptions in the tables and the average livestock budget, income and expenses were calculated for replacement rates ranging from 10 percent to 30 percent in 5 percent increments *(Table III)*. Revenue from steer calf sales remain fairly constant across the replacement rates because the lighter weight calves born to first- and second-calf cows are offset by the higher per hundred price ($0.12/cwt for each pound). As replacement rate increases, heifer calf sales decrease and cull cow sales increase because more heifers are retained in the herd and more cull cows are sold. Total income from steer and heifer calf and cull cow sales declines about $0.80/head for each 1 percent increase in replacement rate. However, this does not factor in potential gains from improved genetics in the herd.

The largest cost increases from increasing replacement rate are in the feed category, increasing from about $337/head at the 10 percent replacement rate to $380/head at the 30 percent replacement rate, or about $2.16/head for each 1 percent increase in replacement rate. Other cash costs, labor costs, ownership costs, and overhead and management costs increased about $0.42/head, $0.72/head, $0.49/head, and $0.04/head, respectively, for each 1 percent increase in replacement rate. Thus, total costs increased by nearly $77/head for the herd with a 30 percent replacement rate compared to a 10 percent replacement rate. The increases in expenses and decline in total income observed by increasing the replacement rate increased the net loss

Table I. Prices Used In Budget Simulation.

Growing Season Grazing	$24/AUM
Dormant Season Grazing	$15/AUM
Hay	$55/ton
32% Protein	$0.12/lb
Corn	$2.55/bu
Salt and Mineral	$0.12/lb
575 lb. Steer Calf Sale Price	$115/cwt
525 lb. Heifer Calf Sale Price	$102/cwt
Steer Calf Price Slide (per lb.)	$0.12/cwt
Heifer Calf Price Slide (per lb.)	$0.09/cwt
Cull Cow Sale Price	$46/cwt
Cull Heifer Sale Price (725 lb.)	$85/cwt
Cull Bull Sale Price	$52/cwt
Labor Costs	$8.00/hour
Ownership Costs	7.0%
Overhead Costs	5.0%
Interest Costs (Purchased Feed & Cash Costs)	8.5%

Table II. Income and Cost Assumptions In Budget Simulation.

	First-Calf Heifers (per cow unit)	*Mature Cows (per cow unit)*
Growing Season Grazing	4.0 AUM	8.16 AUM
Dormant Season Grazing	3.5 AUM	4.71 AUM
Hay	1.75 tons	0.75 tons
32% Protein	320 lbs	—
Corn	11 bu	—
Salt and Mineral	40 lbs	60 lbs
Steer Calf Weaning Weight	515 lbs	575 lbs
Heifer Calf Weaning Weight	471 lbs	525 lbs
Labor	9 hours	5.25 hours

by almost $93/head for the 30 percent replacement rate compared to the 10 percent rate. The budget used in this simulation produced losses, partially as a result of including overhead and management costs and opportunity costs of animal ownership that many producers might not account for in their cash-based budgets. Thus, these are *economic* returns rather than accounting returns.

This simulation assumes a constant herd size, or that the number of cows culled equals the number of replacement heifers. In order to increase herd size, the percentage of cows culled must be lower than the replacement rate. This also impacts the cow herd budget because the cull income is reduced while the heifer calf sales are lowered. Assuming a heifer replacement rate of 20 percent (20 percent of which are culled before entering the herd) and a cull cow rate of 10 percent, a producer could increase the herd size by about 10 percent within two years. In doing so, cull cow income would be $27.60/head less (fewer available culls to sell) and feed costs would be $6.30/head higher (more young cows in the herd) for those years of growth.

Implications

Do the simulated budgets in *Table III* indicate that replacements should not be made in the cow herd? No. While they do indicate that higher replacement rates have the effect of potentially reducing revenue and increasing costs, these budgets do not account for several things, including cow-herd productivity. The budget simulation does, however, suggest that maintaining a moderate replacement rate rather than a higher rate (30 percent) could be useful in improving the bottom line for cow-calf producers. Additionally, it suggests that if higher replacements are needed, timing it during periods of greater profitability may be important for cash flow purposes. The focus on marketing also changes as replacement rate increases. If a producer maintains a high replacement rate, it is important to aggressively market cull animals because they become a greater proportion of the total income to the operation.

Table III. Cow-Calf Budgets By Replacement Rate.

	Replacement Rate				
	10%	*15%*	*20%*	*25%*	*30%*
Income	---------- *dollars per head*----------				
Steer Calf Sales	295.72	294.80	293.88	292.95	292.03
Heifer Calf Sales	185.04	157.07	129.10	101.14	75.48
Cull Cow Sales	49.93	74.23	98.52	122.82	147.12
Total Income	530.69	526.10	521.50	516.91	514.63
Expenses					
Feed	336.56	347.37	358.18	368.99	379.80
Other Cash Costs	29.05	31.17	33.28	35.40	37.49
Labor	49.20	52.80	56.40	60.00	63.60
Ownership Costs	97.59	100.05	102.57	105.02	107.47
Overhead & Management	21.95	22.16	22.37	22.58	22.79
Total Expenses	534.36	553.55	572.80	591.99	611.16
Net Income (Loss)	(3.67)	(27.45)	(51.30)	(75.08)	(96.53)

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