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Cow Depreciation

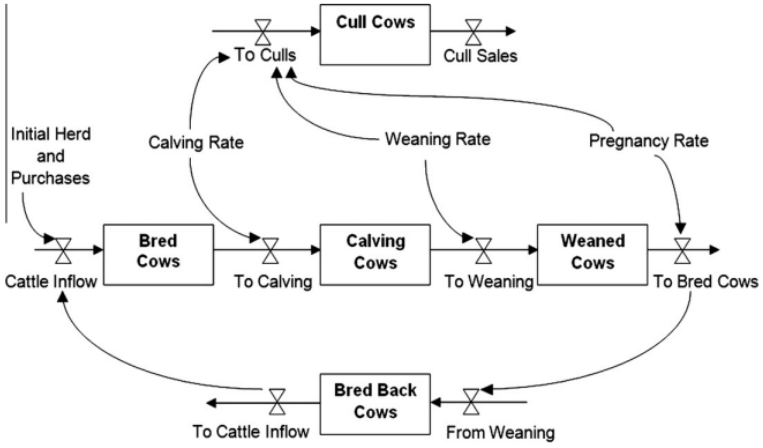
Cow depreciation is a considerable cost in keeping a cow (Pratt, 2015). Cow depreciation is real, and producers should get a realistic estimate of how much it really is (Teichert, 2020). Teichert suggests keeping replacement heifers in a separate enterprise to better evaluate the costs of raising and developing them. Keeping track of cow depreciation and the costs of replacement stock can assist producers in lowering depreciation through the marketing of cull cows, reducing costs of replacements, or keeping productive cows longer.

Calculating cow depreciation

Cow-calf production systems typically follow a similar flow of cattle rotation illustrated in

Figure **1**, from replacement stock inflow to culling outflows (Turner et al., 2013). Following this system, costs associated with culling cattle, known as cow depreciation, are sometimes overlooked by producers. The two key aspects of initial inflow and final outflow of stock impact the overall cost of cow depreciation.

Figure 1: Cowherd flow diagram



Source: Turner et al., 2013

Cow depreciation is made up of three parts illustrated in Equation 1; purchase *price* is the dollar value of the bred heifer or cow when she is bought and enters the herd, *replacement cost* should include all costs starting with the costs to produce the weaned heifer calf till the time she enters the herd as a bred female, and finally the *productive years in the herd* (Berger, 2014).

$$\textbf{Equation 1: } Cow\ depreciation\ = \frac{(Purchase\ Price\ or\ Replacement\ Cost - Salvage\ Value)}{Productive\ Years\ in\ the\ Herd}$$

Reducing cow depreciation

Berger (2014) described three main methods to reduce cow depreciation.

1. Reduce replacement heifer development costs or purchase price for replacement heifers/cows.
2. Increase the salvage value of cows that are leaving the herd.
3. Increase the number of years a cow is productive in the herd.

Reducing the initial costs of the replacement heifers or sourced heifers and bred cows will lower the difference in the salvage value and the purchase or replacement costs. Secondly, increasing the salvage value of females leaving the production herd will increase returns for the animal and lower depreciation. Finally, reduce the replacement rate through prolonging the cow's production years spreads the development costs over more calves (Berger, 2014).

1. Reduce development or purchase replacement costs

Replacement heifer costs make up about 10% of the cost of production within cow-calf operations. These include feeding, breeding, and opportunity costs when using homegrown heifers, with the average cost in raising a replacement heifer being $1,840 per head (Beef Research, 2018).[1] Producers who know their true costs of raising replacement stock can compare to purchasing bred heifers to evaluate the trade-offs (Beef Research, 2018). Producers can also purchase replacements, and the below example (Table 1) demonstrates the importance of purchase price and development costs on cow depreciation.

Table 1: Cow depreciation ($ per head)

	Scenario 1	Scenario 2	Scenario 3
Bred heifer (development cost/ purchase price)	$2,000.00	$1,840.00	$1,650.00
Cull cow (salvage value)	$1,215.00	$1,215.00	$1,215.00
Lifetime depreciation (no death loss)	$785.00	$625.00	$435.00
Productive years in the herd	5	5	5
Annual Cow Depreciation	$157.00	$125.00	$87.00
Adjustment for 2% annual death loss	$160.20	$127.55	$88.78

A bred heifer purchased at $2,000 per head and a salvage value of $1,215 per head (1350 lb cow at $0.90/lb) (Canfax, 2021), leaves $785 per head lifetime depreciation, using a productive life of

[1] http://www.beefresearch.ca/blog/economics-of-raising-or-buying-heifers-for-beef-cow-replacement/

five years and adjusting for 2% annual death loss, the cow would then depreciate $160 per head per year. If the purchase or development costs was reduced to $1,840 or $1,650 per head, annual cow depreciation declines to $127 and $89 per head per year, respectively. Therefore, the initial value of decreasing homegrown or purchasing replacement stock directly impacts the depreciation costs.

2. Increase salvage value of cows

Producers may choose to increase their salvage value through culling earlier to either sell as bred cows prior to the age of five or increase their weight to gain higher prices. Particularly if after five years, all cows receive a similar cull, with the only difference being weight. Increased weight can be achieved by being grass fed or put on feed over the winter. Therefore, the number of productive years would be the determining factor of annual depreciation. Producers with higher replacement rates tend to cull cows earlier, decreasing their productive years. This is offset by the fact that younger cows tend to have lower depreciation due to a higher salvage value as opposed to selling older cows (Berger, 2014).

Producers may choose to increase culling to achieve a production goal such as a shortened calving season. Boyer et al. (2020), noted that producers could see an increase in returns by replacing 10% of late cows when reducing the calving season from 120-days to 60-days annually over 6-years. Producers may then choose to background older cows to see an increased salvage value (Berger, 2014). Teichert (2020) suggested that if you sell most of your cows as bred females by the age of six, you can experience lower depreciation if marketed well. He further described those cows appreciate until the age of four, leaving some time to cull young cows for not meeting their criteria and gaining a higher salvage value.

Table 2: Cow depreciation ($ per head)

	Scenario 1	Scenario 2	Scenario 3
Bred heifer (development cost/ purchase price)	$1,840.00	$1,840.00	$1,840.00
Cull cow (salvage value)	$1,564.00	$1,305.00	$1,215.00
Lifetime depreciation (no death loss)	$276.00	$535.00	$625.00
Productive years in the herd	5	5	5
Annual Cow Depreciation	$55.20	$107.00	$125.00
Adjustment for 2% annual death loss	$56.33	$109.18	$127.55

Scenario 1 in Table 2 uses a bred cow price at 85% of the bred heifer price (2016-20 average difference in Alberta) for a salvage value of $1,564 per head, reducing the cow depreciation to $56.33 per head per year. Scenario 2 increases the sale weight by 100 lbs to 1,450 lbs (still using the 2016-20 annual average D1,2 Alberta cow price) for a salvage value of $1,305 per head, reducing the cow depreciation to $109.18 per head per year compared to Scenario 3.

3. Increase cows' productive years

Anotherr method is to increase the cows' productive years to reduce cow depreciation. Improving genetics, herd health, and nutrition program producers can lengthen their cows' productive years, then reduce the annual and overall cow depreciation (Berger, 2014). The

individual producers must evaluate the trade-off of age to cull cows to fit their operation and market to reduce cow depreciation.

Table 3: Cow depreciation ($ per head)

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Bred heifer (development cost/ purchase price)	$1,840.00	$1,840.00	$1,840.00	$1,840.00
Cull cow (salvage value)	$1,215.00	$1,215.00	$1,215.00	$1,215.00
Lifetime depreciation (no death loss)	$625.00	$625.00	$625.00	$625.00
Productive years in the herd	5	7	9	11
Annual Cow Depreciation	$125.00	$89.29	$69.44	$56.82
Adjustment for 2% annual death loss	$127.55	$91.11	$70.86	$57.98
Implied Culling Rate	20%	14%	11%	9%

Table 3 increases cow age to seven and nine years old with consecutive calves, resulting in cow depreciation dropping to $91 and $71 per cow annually. The herd's overall depreciation will rise along with the culling rate determined by the producer. Producers who have established herd genetics may choose to increase cow productivity and lower replacement rates as the replacement cost of cows may be higher when purchasing bred heifers.

Culling rate impact on longevity

Table 4 shows the estimated replacement rate needed for a group of 100 heifers. The heifer replacement rate equals the cow culling rate plus cow death loss. With an 11% replacement rate, 35 of the original heifers will be in the herd after ten years. Many producers may not cull the correct cows regarding structural and behavioural issues - resulting in a higher cull rate. With a 14% replacement rate, only 25 of the original heifers will be in the herd after ten years. This illustrates how quickly cattle can be in and out of a producer's herd as their culling rates increase, creating higher turnover and depreciation per cow. Producers who want to extend their cows' productive years will have to develop skills in selecting the most appropriate culls to ensure non-culls have the most productive years (Pratt, 2015).

Table 4: Culling rate impact on longevity

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Open cows (at preg-checking)	7%	7%	5%	5%
Dry cows (dry after calving season)	5%	3%	2%	1%
Structural/behavioural issues	6%	2%	3%	2%
Cow Death Loss	2%	2%	1%	1%
Total Replacement Rate	**20%**	**14%**	**11%**	**9%**
# Replacement Heifers (year 1)	100	100	100	100
Year 2	80	86	89	91
Year 3	64	73	79	83
Year 4	51	63	70	75
Year 5	41	54	62	68
Year 6	33	46	55	62
Year 7	26	40	49	56
Year 8	21	34	44	51
Year 9	17	29	39	47
Year 10	13	25	35	42

Key take-aways

- Know your production costs of raising replacement heifers compared to purchasing bred heifers to evaluate the trade-off
- Increase the salvage value of cows by selling bred cow or feeding cull cows to heavier sale weights
- Prolonging cows' productive years can reduce depreciation costs, especially for producers with established genetics in their herd and higher replacement costs

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