Cow Longevity: Economics & Genetic Solutions

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INTRODUCTION

In a commercial cow/calf production enterprise, reproductive performance (weaning rate as a function of cows exposed for breeding) is a large driver of profitability. Cow longevity is determined by reproductive efficiency, maternal performance, health, physiological soundness, and disposition. This two-part general session presentation focuses on the economics of cow longevity and genetic contributors to longevity (presentation by Dr. Bob Weaber).

ECONOMIC CASE FOR LONGEVITY

A review of commercial cow/calf enterprise total cost allocation managerial accounting records indicates pasture cost, supplemental feed/hay, labor (including ownership compensation), and depreciation are typically among the largest annual expenses. Among these expenses, depreciation is a non-cash yet very real cost.

The Farm Financial Standards Council defines depreciation as "the allocation of the expense that reflects the 'using up' of business assets employed by the entity". Tax depreciation is defined by the Internal Revenue Service (IRS), is entered on line 14 of a Schedule F in the tax return, and serves to reduce taxable income. In contrast, management depreciation is a systematic approach to providing an accurate assessment of accrual adjusted net income and net worth. Depreciation of purchased cows is calculated as:

Annual depreciation = (Purchase price – Salvage value) / Years of useful life

If replacement females are raised, purchase price is replaced by book value (the value when females are put in service and capitalized). An example of depreciation calculation is shown in Table 1.

Table 1. An example of cow depreciation

Purchase price, $	2500
Useful life, years	5
Market weight, lbs.	1150
Market price, $/cwt[1]	82
Salvage value, $[2]	950
Depreciation, $/cow/year	310

[1]Average annual canner/cutter cow price reported by CattleFax, 2022-2024
[2]Rounded up from $943 to $950

The IRS defines the useful life of beef cows to be five years. In this example, purchase price is an average of current prices from several markets for bred, two-year-old heifers. Salvage value must be estimated; to mitigate seasonal/annual variations in market cow price, ranch accountants often use an average cow salvage value adjusted as warranted every three to five years. Here, salvage value was determined as specified in the footnote of Table 1. For those who do not regularly review depreciation costs, $310 per year may be surprising. As mentioned, total cost allocation accounting usually identifies depreciation among the top five contributors to annual cow cost.

Annual cow cost is unique for every cow/calf enterprise; when adjusted for weaning rate, cow cost is divided by average weaning weight to calculate weaned calf unit cost of production (UCOP). For this illustration, depreciation ($310) was added to the 2023 CattleFax southeast region annual cash cow cost ($640) to arrive at an annual cow cost of $950 (Table 2). Cows demonstrating longevity are assumed to enter production as a two-year-old and calve annually through at least age nine. To parallel ever-rising production costs, annual cow cost was escalated 4% annually.

Table 2. Annual cow cost and weaned calf unit cost of production (UCOP) for a cow age 2 through 9

Cow age, years	2	3	4	5	6	7	8	9
Annual cost, $[1]	950	988	1028	1069	1111	833	867	901
UCOP, $/cwt[2]	224	232	242	251	261	193	201	209

[1]2023 CattleFax southeast region cash cow cost ($650) + depreciation ($310/cow/year, ages 2 through 6) escalated 4% annually
[2]Unit cost of production assuming a 500 lb. average weaning weight and 85% weaning rate

For clarity, weaned calf UCOP differs from breakeven price because it does not include secondary income arising from the sale of market cows and bulls and heifers exiting the enterprise. Weaned calf UCOP is an essential component for economically efficient calf marketing and a primary determinant of cow/calf enterprise profitability.

Recall the five-year depreciation schedule; heifers appear on the schedule as bred two-year-olds and depart as six-year-olds. As shown in Table 2 and depicted in Figure 1, cows well adapted to their production environment/system who remain productive beyond their departure from the depreciation schedule realize a 'reset' in annual cow cost for years seven and beyond. More importantly, note the reduction in weaned calf UCOP for the older cows. Admittedly, older cows (ex. beyond age seven) typically wean lighter calves. However, this lower annual cow cost and weaned calf UCOP should be considered; as long as commercial cows wean a calf annually at or above average value for the herd, consider keeping them in production.

Graduate students Caroline Wild and Nathan Clackum recently worked with Leachman Cattle of Colorado to add an economic component to a Fertility EPD Index. Students created a model to examine and quantify the relationship between the average number of calves produced in a lifetime to average herd weaning percentage. Assumptions for the model are included in Table 3. With this relationship established, values were associated with profit and loss estimates, allowing assignment of economic value to fertility and longevity. For this project, open cows were removed from the herd.

Predictions generated by the model are represented in Figure 2. The model must account for depreciation paid, therefore annual depreciation payment is multiplied by the number of calves produced in her lifetime. A cow in a herd with an 87% weaning percentage will average weaning five calves, multiplied by the $180 annual depreciation results in full retirement of depreciation cost ($900). In comparison, a cow in a herd with a 76% weaning percentage who has three calves will only retire $533 of her total depreciation expense, meaning there is $367 of depreciation expense left unpaid, which is categorized as a depreciation debit. Since a cow that weans five

Figure 1. Weaned calf unit cost of production (UCOP) by cows age 2 through 9

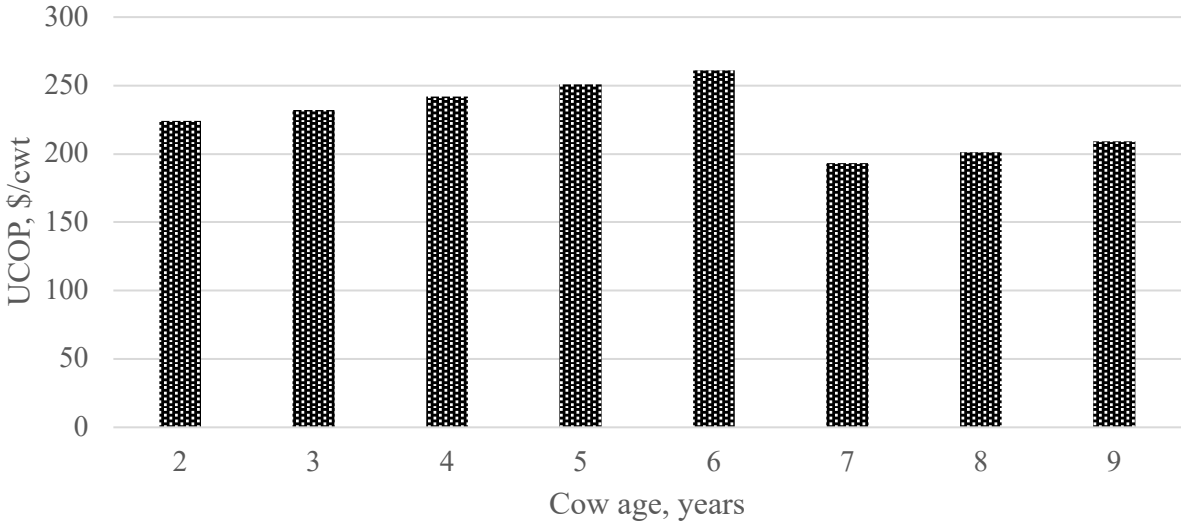

Table 3. Assumed production costs and revenue estimates used in the Leachman Cattle of Colorado project	
Heifer capitalization cost, $	1500
Cow salvage value, $	600
Depreciation, $/cow	900
Useful life, years	5
Annual depreciation expense, $/cow	180
Sale price of calf, $/cwt	170
Weaning weight, lbs.	500
Annual cow cost, $	600

calves retires her total depreciation, a weaning percentage of 87% was used as the base for calculating marginal change.

Any profit/loss less than the $798 made by a cow weaning five calves is considered marginal loss of profit. Any profit greater than $798 is considered marginal gain of profit. The same concept applies for depreciation expense paid; in this scenario, cows weaning less than five calves will not pay the total depreciation expense ($900) before departing the herd, meaning that the difference between what they were able to pay and what a cow that produced five calves paid has to be absorbed by cows remaining in the herd, captured as 'depreciation debit or credit' and is measured in $ per cow lifetime. A depreciation debit would be depreciation expense that was not paid, such as the case of the cow that weans three calves and has $367 unpaid depreciation credit. This is considered a depreciation debit because this cow fails to retire $367 in depreciation expense.

A depreciation credit is realized in years six and thereafter (when depreciation has been completely retired). For example, calves from a cow in a herd that weans six calves (91% weaning rate) pay $1,111 in depreciation expense over her lifetime (or provide $211 more than the $900 required to

retire her from the depreciation schedule). The $211 is considered a depreciation credit because this amount is more than the required depreciation expense, meaning it can be considered profit above the base. To determine the true marginal change in profit for a cow that has more or less calves than the base (n=5), the marginal gain/loss of profit and the depreciation debit/credit are added together to get the total marginal change from the base (Figure 2).

Figure 2. Relationship of average number of calves per cow lifetime and profit (loss) from base scenario

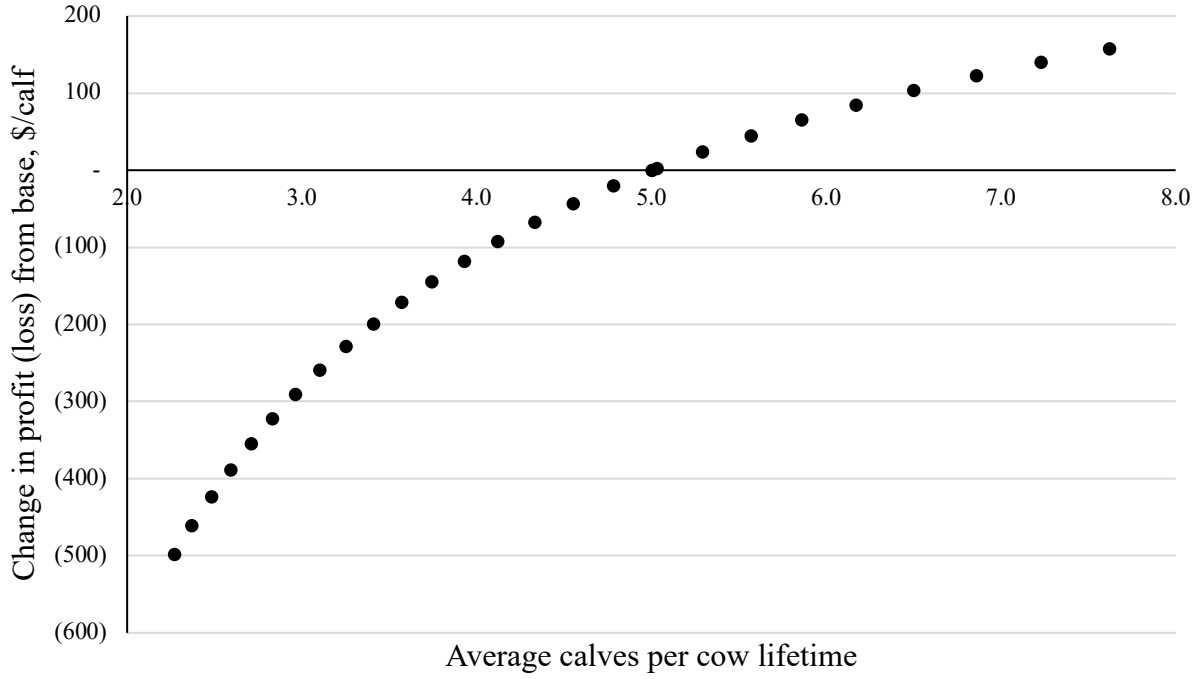

Figure 2 is another visual illustration of the economic benefit associated with cows that remain productive beyond their departure from the depreciation schedule.

CONCLUSION

Cattle breeders and economists alike have long recognized the benefits of cow longevity. Cows well suited to the environment and production system conceive early in the breeding season and wean an older, heavier, and more valuable calf. Early calvers tend to raise heifers that calve early. Cows that have retired their depreciation cost have a lower weaned calf unit cost of production, a greater likelihood of being profitable, and are contributors to enterprise sustainability.

Commercial producers make most genetic progress via paternal genetic selection. The economic advantage associated with longevity may not be applicable for seedstock breeders seeking to shorten generation interval and thereby accelerate genetic progress.