Angus Cow Longevity Estimates and Relationship to Production Traits

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Summary

Cow longevity is a trait that has great economic importance to commercial beef cattle producers. Increased costs associated with early removal of a female from the herd include young female development costs, increased depreciation costs and lower productivity of young females compared to mature females. Improving longevity allows producers to cull a cow from the breeding herd for voluntary reasons (poor producer) rather than involuntary reasons (death, lameness, did not conceive, etc). Further, the ability of producers to cull brood cows for voluntary reasons (productivity reasons such as calf weaning weight, calving ease, etc.) rather than cows removing themselves for involuntary removal causes (no heat, failing to conceive, etc.) would allow commercial cow – calf producers to increase the overall productivity of their herd at a more rapid pace. Production records from the East Tennessee Research & Education Center (Knoxville, TN) Angus research herd were used in the present study. Evaluation of the production records demonstrates that about a third of the herd had longevity and calving success sufficient to insure economic profitability. However, about a third of the cows were lost after producing one calf, and fell far short of the productivity needed to make the original cow investment a profitable decision. The results of the present study illustrate the need for cow - calf producers to focus on improving cow longevity in their herd.

Introduction

Longevity measures the composite ability of animals to remain in the cowherd and reflects the ability of a cow to reproduce, wean calves (produce adequate amounts of milk), remain sound, and resist disease. Beef cow longevity has been defined many ways by numerous researchers. Rohrer et al. (1988) suggested that productive longevity can be defined as the age at which a cow dies or is culled from the breeding herd because she is incapable of weaning another live calf due to physical weakness or sub-fertility. Nunez-Dominguez et al. (1990) suggested that cumulative weaned calf production per initial replacement female is an appropriate statistic that takes into account fertility, milking ability, maternal instinct and cow longevity in order to measure herd reproductive performance. Tanida et al. (1988) defined stayability as the probability of surviving to a given age, provided the cow is given the opportunity to reach that age. Lastly, Snelling et al. (1994) defined stayability as the probability of a cow weaning a calf after reaching her break-even age, designed to predict which bulls are most likely to have daughters that will be profitable in a breeding herd.

The length of time a cow remains in the herd can significantly impact the bottom line of the cow-calf operation or cow – calf production system that retains ownership of the calves through the finishing or fattening phase of the operation when harvest of the animal occurs. The length of time a cow must remain in the herd to return profit to the enterprise depends on the initial investment (heifer purchase price or opportunity costs if producers raise their own replacement heifers), future returns (calf sales), future costs (feed costs, yardage costs, etc.), salvage value (cull cow value) and discount rate (interest

rate) (Dalstead and Gutierrez, 1989). Table 1, adapted from Dalstead and Gutierrez (1989), gives the number of years a cow must remain in the herd and produce a saleable calf with varying replacement heifer values, salvage values and net returns per cow. The majority of beef cattle producers raise their replacement females. Estimates of costs of raising these replacement females are from $447.24 to $648.22 (Strohbehn and Busby, 1991) and from $482.01 to $812.19 (Dalstead and Gutierrez, 1989). Table 1 suggests a cow could become profitable after 1 calf, or after 10 calves, depending on economic value assumptions made.

In this paper we explore longevity experienced in the Angus research herd at East Tennessee Research and Education Center, Knoxville, TN. While levels of nutrition and management are expected to be above average because of the nature of a research herd in a University setting, the range of values will provide information about the biological capability of beef cows that would be relevant values comparable to the variation most commercial cow-calf experienced in Tennessee and throughout the U.S. For example, is it possible to get 10 calves from a cow, and how often does that happen in commercial cow-calf operations?

Table 1. Breakeven Ownership Period of a Cow (Dalstead and Gutierrez, 1989)

Replacement Heifer Value	Salvage Value	Net Return Per Cow*		
		$50	$100	$150
		Breakeven Years**		
	$400	4	2	1
$500	$450	2	1	1
	$500	1	1	1
	$400	8	3	2
$600	$450	6	2	2
	$500	5	2	1
	$400	14	5	3
$700	$450	12	4	3
	$500	10	3	2

* A 90% weaning rate is assumed and a 5% discount rate was used to discount future returns.
** Rounded to nearest year.

Methods

Calving data from East Tennessee Research and Education Center, Knoxville, TN were compiled for Angus cows born between 1980 and 2001. Cows currently in the herd were excluded as their longevity values are not complete. Also, cows that did not have a first calf were excluded from the data set, as these animals could not be reliably separated from those not given an opportunity to breed. Longevity is thereby defined as

(last calf birth date - cow birth date)/30,

which calculates months of productive life, *given* a successful first calving. The American Angus Association (St. Joseph, MO) kindly provided EPD genetic merit estimates for all individuals. The final dataset had longevity and EPD records for 944 cows. Data were analyzed using SAS software (SAS Institute, Inc., Cary, NC).

Results and Discussion

Cow longevity (length of time a cow remained in the breeding herd) ranged from 23 to 196 months, with a mean of 65 months resulting from a positively skewed distribution (Figure 1), with an exponential decline in frequency of cows having higher longevity values. A 2 year longevity (24 months) value represents cows that had one calf, and then were culled from the herd. Almost all (>90%) culling was due to failure to rebreed, the rest representing disease, accidental deaths, and selection decisions. Figure 1 highlights the reason for current interest in brood cow longevity, as one third of the cows only have one calf, and only the upper third stay in the herd long enough to have 5 calves. Obviously, the future objective would be to decrease the percentage of cows that only have one calf and then are culled while increasing the percentage or number of cows that remain in the herd long enough to have five calves or even more. A herd having a greater proportion of cows that remain in the breeding herd long enough to have five calves or more will result in increased bottom line profitability for the beef cattle producer achieving this goal.

However, the definition of longevity is when the last calf was born, and does not guarantee that a calf was born every year. To address this, cows were separated by number of calves born versus years in the herd, calculating

Percent Calving Success = 100*Number of Calves/(Years in Herd - 2)

. A value of 100% means the cow had a calf at every opportunity. The light blue portion of the bars in Figure 2 demonstrate that at all ages, approximately half or more of the

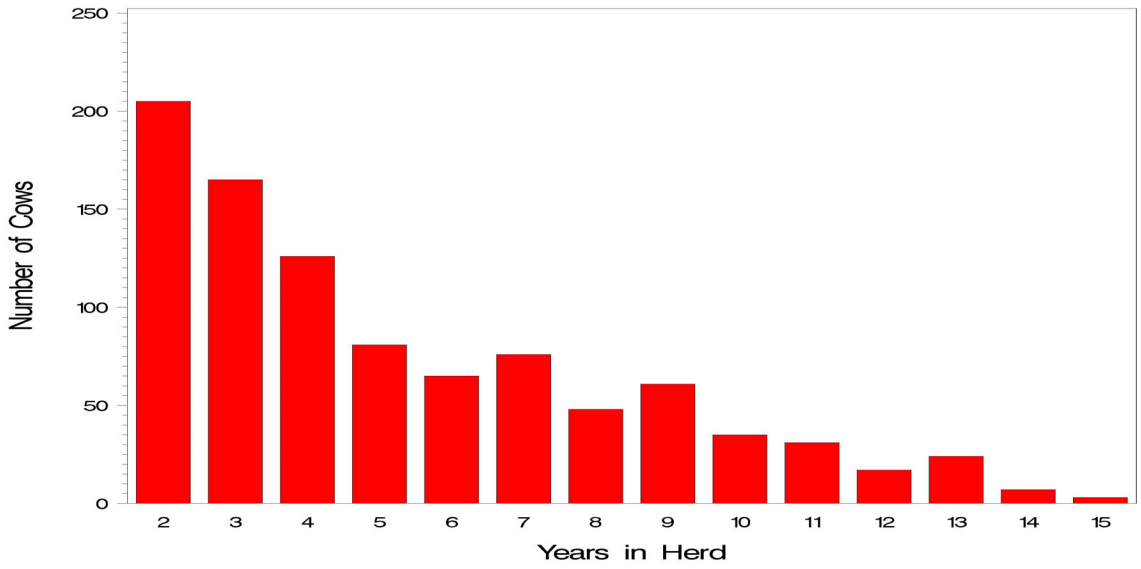

Figure 1. Distribution of herd longevity for Angus cows that produced a first calf from the .East Tennessee Research and Education Center.

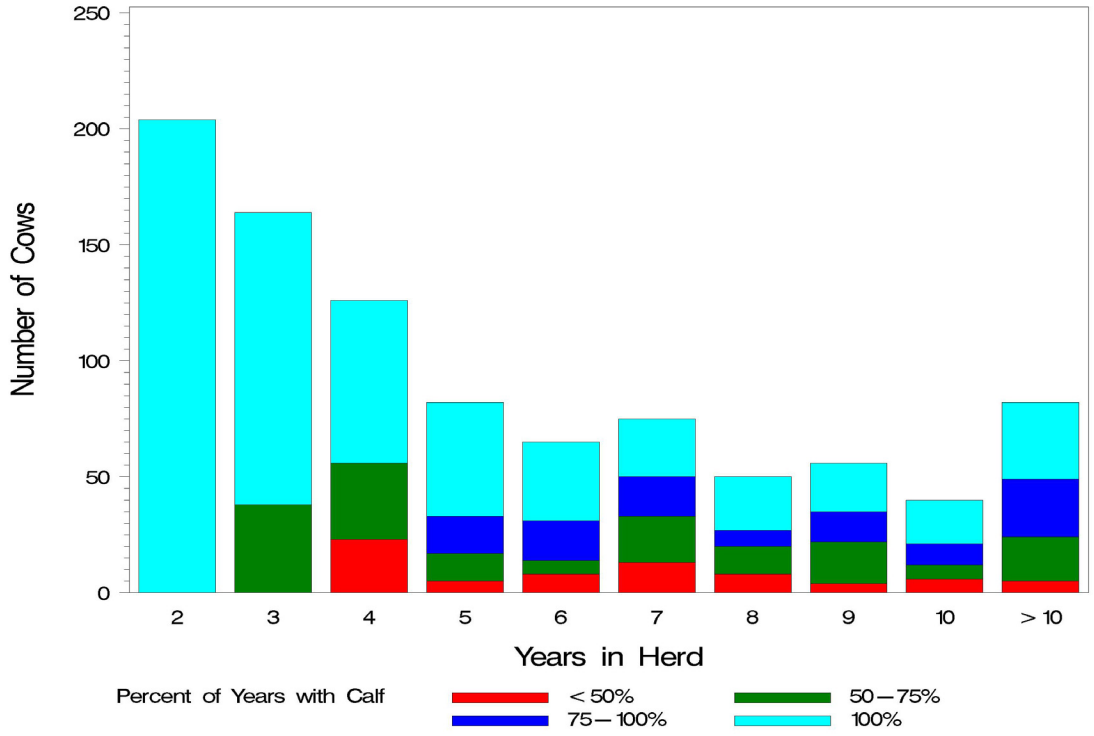

Figure 2. Lifetime calving success as a function of longevity from an analysis of the Angus herd at the East Tennessee Research and Education Center.

cows had a calf every year. This is inherently biased by the culling of open cows that typically occurs after each breeding season. Hence, most cows with less than 100% calving success are removed from the herd. The important message from Figure 2 is that a substantial fraction of cows can meet the calf production requirements needed for economic profitability.

Relationships of longevity and percent calving success calculated from the data with EPD values obtained from the American Angus Association were estimated using correlations. Weaning weight, yearling weight, and maternal calving ease EPD's were moderately negatively correlated with longevity (all r = -0.33), and moderately positively correlated with percent calving success (r = 0.30 to 0.50). Two possible explanations for correlations with longevity are that the herd manager was culling faster growth animals, or that faster growth reduced energy for reproduction and thus shortened herd longevity by increasing the chance of being culled for not rebreeding.

Correlations with percent calving success appear to be contradictory, as higher growth is positively related to higher reproductive success. But Figure 2 shows an intrinsic negative relationship between longevity (actual r = -0.23), since the longer the cow is in the herd, the greater the chance she has of missing a calf. This will bias correlations with percent calving success in the positive direction. Separating these factors may be impossible, but given the weak relationships, there appears to be no need to sacrifice growth in order to achieve better longevity and presumably greater profitability.

Remember, however, that levels of nutrition and management are expected to be above average in a research herd.

Conclusions

Angus cow performance in this University research herd clearly demonstrate that it is possible to obtain cow longevity and reproductive performance needed for economic profitability. Production records found that about a third of the cows consistently produced a calf year after year. A major stumbling block is the loss of a third of the herd due to failure to produce a second calf. This demonstrates the need to move a greater proportion of the cows from the group that are culled after having only one calf to the group of cows that consistently produce a calf year after year. A commercial cow-calf operation that achieves a very high proportion of cows producing a calf year after year, and a small proportion of cows having only one calf prior to culling, will likely be more profitable in the long term. Nutrition and management strategies, or possibly genetic improvement, should be used to improve poor longevity performance.

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Reviewers