Improving Beef Cattle Profitability by Changing Calving Season Length

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Introduction

Cow-calf producers face many annual decisions, as well as some less frequent but very fundamental decisions. A couple of those fundamental decisions include determining the appropriate calving season (e.g., spring or fall) and calving season length (e.g., 45, 60, 90 days). Approximately 67 percent of the cow-calf operations in the United States do not have a defined calving season (United States Department of Agriculture [USDA], 2009). This is despite research showing that a controlled calving season is more profitable than year-round calving (Doye et al., 2008). However, this decision can be difficult because nutritional demands, reproduction, calf performance and market prices have to be considered and evaluated.

A Tennessee study by Henry et al. (2016) found that fall-calving herds had higher net returns and less variability in net returns than spring calving when marketing calves at weaning. However, less is known about the implication calving season length has on profitability for spring- and fall-calving cattle herds. Calving season length is defined here as the number of days from the start of calving to the end of calving.

Given that many cow-calf producers in the United States sell calves at weaning (USDA, 2009) and that weaning is often based on producer convenience, calves born late in the calving season are often marketed at a lighter weight than early-born calves. Another drawback of a longer calving season is that late-calving cows have less time for uterine repair prior to the start of the next breeding season, which could negatively influence reproductive performance (Johnson, 2005; Mousel et al., 2012). A positive aspect of a longer breeding and calving season is that it provides more opportunities for cows to breed and wean a calf. Thus, there could be a trade-off between increasing weaning weight and calf uniformity and a lower percentage of cows bred in a shorter breeding season.

Despite the aforementioned trade-off, there are reproductive management practices that can be utilized to address some of these challenges. One method is to cull open- and late-calving cows and replace them with early-maturing heifers while also utilizing estrus synchronization (ES) and timed artificial insemination (TAI). These practices can narrow the calving window and produce a heavier and more uniform group of calves while maintaining a pregnancy rate that would be associated with a longer breeding season (Johnson, 2005; Johnson and Jones, 2008; Lamb and Mercadante, 2016).

The objective of this research was to determine how calving season length influences net returns for spring- and fall-calving beef cattle herds in Tennessee. Data originated from a 19-year study in Tennessee of spring- and fall-calving herds. Production risk was evaluated for 45-, 60- and 90- day calving season lengths. Scenarios for 45- and 60-day calving season lengths that assume the producer used an improved reproductive management (IRM) practice to increase calving rates were also evaluated. Producers will benefit by better understanding the importance reproductive efficiency has on the profitability of the herd.

Net Returns

Net returns are revenue minus expenses. Revenue comes from selling steers, heifers and culled cows and is influenced by cattle price and calf weaning weight. Production expenses include land, labor, pasture, feed, animal health, trucking costs and marketing fees. Most production expenses are similar across calving season and calving season length. However, supplemental feed costs are generally higher for fall-calving cows than for spring-calving cows due to higher nutritional demand in the winter months (Henry et al., 2016). In this study, feed costs were the only production expenses assumed to vary by calving season. Additionally, it was assumed that production expenses do not vary across calving season length. However, it is likely that longer calving seasons increase labor expense.

Another consideration influencing net returns is that longer calving seasons could lead to more variability in weaning weights and less uniformity, while shorter calving seasons may result in fewer cows being bred and fewer calves to market. Despite the possibility of producing fewer calves, a shorter calving season length may be preferred to a longer calving season length by some producers.

Data

Data were collected from spring- and fall-calving beef cattle herds located at Ames Plantation, cooperating with UT AgResearch, near Grand Junction, Tennessee, from 1990 to 2008. The herds evaluated included commercial and purebred Angus cattle. The commercial cattle were mostly Angus with Hereford and Simmental influence. Spring calving took place from the first of January through mid-April (**Figure 1**), while fall calving was from early September through mid-December (**Figure 2**). In both calving seasons, weaning weights were generally highest for calves born early in the calving season and declined for later-born calves. The one exception would be for calves born extremely early in the fall calving season when ambient temperatures are high. High temperatures can result in cows experiencing a shorter gestation and, thus, lighter calves at birth.

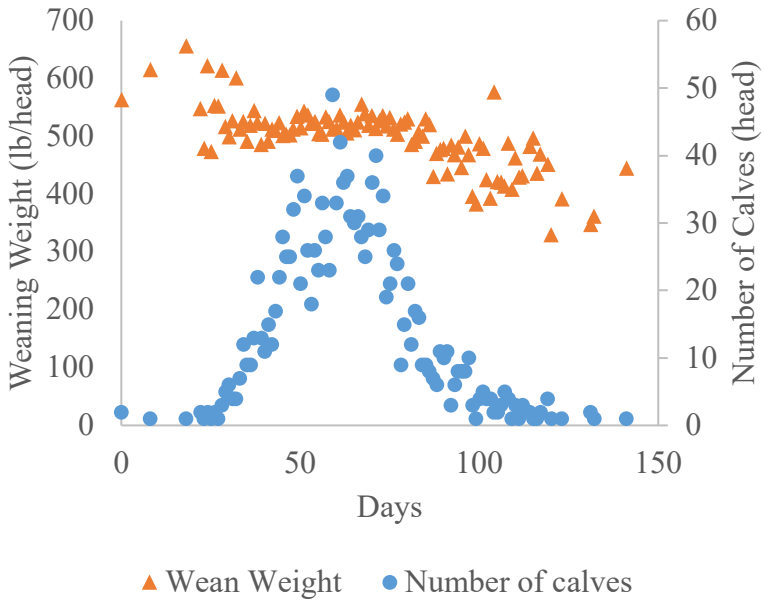

Figure 1. Calving Date and Weaning Weight for Spring-born Calves.

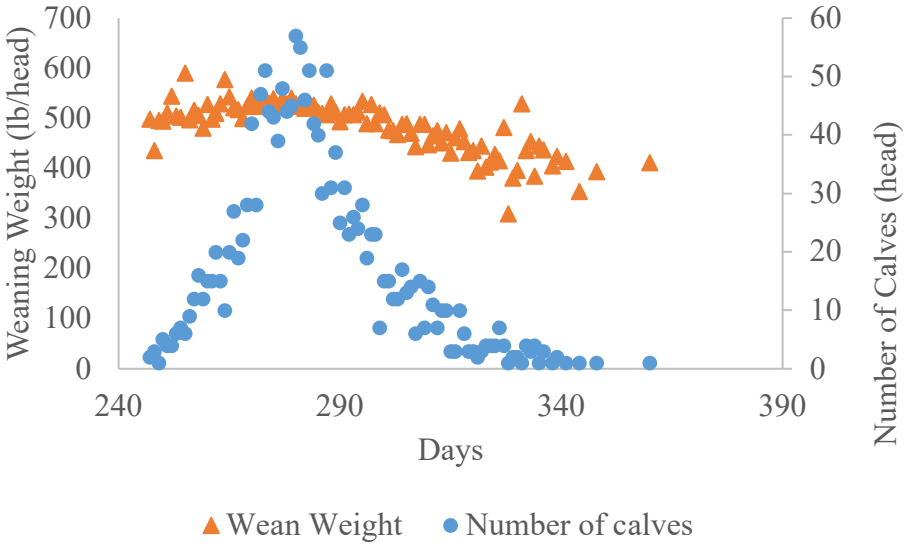

Figure 2. Calving Date and Weaning Weight for Fall-born Calves.

Source: Boyer, C.N., A.P. Griffith, and K.G. Pohler. 2020. "Improving Beef Cattle Profitability by Changing Calving Season Length." *Journal of Applied Farm Economics*, Forthcoming.

Over the study period, the spring herd totaled 478 individual cows that produced 1,534 individual calves, and the fall herd totaled 474 individual cows with 1,727 calves. Records were not kept for cows that did not calve, which makes it difficult to calculate the calving percentage. Due to the unavailability of this information, calving rates were assumed to be 75 percent, 80 percent and 85 percent and replacement rates 25 percent, 20 percent and 15 percent for the 45-, 60- and 90-day calving seasons, respectively (Deutscher et al., 1991; Mousel et al., 2012).

Total variable costs for the spring- and fall-calving herds were calculated to be $690 and $695 per head, respectively. Spring-born calves were assumed to be sold at weaning during September, October and November. The average prices for 500-600 lb steers, 500-600 lb heifers and culled cows during this timeframe were $1.50, $1.37 and $0.70/lb, respectively. Fall-born calves were assumed to be sold at weaning during March, April and May. The average prices for 500-600 lb steers, 500-600 lb heifers and culled cows during this timeframe were $1.56, $1.43 and $0.73/lb, respectively. Culled cows were assumed to weigh 1,200 pounds.

RESULTS

Weaning Weight

Weaning weights were found to be increasing at a decreasing rate until a specific calving date and then weaning weights began to decrease as calving date increased. This resulted in February 15 and September 11 being the profit- and weaning-weight-maximizing calving dates for the spring- and fall-calving herds, respectively. Steers weighed, on average, 35 lb/head more than heifer calves born in the spring, while fall-born steers were 30 lb/head heavier than heifer calves.

Results show that a spring-born calf would be 16 pounds lighter at weaning if the calf was born 30 days after the profit-maximizing calving date and 69 pounds lighter if the calf was born 60 days after the profit-maximizing calving date. Thus, weaning lighter weight calves resulted in revenue decreasing by $21 and $94/head for heifers and $24 and $103/head for steers when calves were born 30 and 60 days after the profit-maximizing calving date, respectively. For the fall-calving herd, calf weaning weight was 6 lb/head and 54 lb/head lighter if born 30 days or 60 days after the profit-maximizing calving date, respectively. Revenue decreased from delaying the calving 30 and 60 days by $9 and $76/head for heifers and $10 and $84/head for steers, respectively. This suggests that revenue losses due to a later calving date were greater for the spring-calving herd than the fall-calving herd.

Calving Season Length

The same calving season starting date was used for 45-, 60- and 90-day calving season lengths in each calving season. It was assumed that producers target the profit-maximizing calving date for the first estrous cycle for all three calving season lengths. For the spring-born calves, January 31 marked the beginning of the calving season with the 45-day calving season ending on March 15, the 60-day calving season ending on March 31, and the 90-day calving season ending on April 30. For the fall-born calves, August 27 was the assumed start of the calving season with the 45-day calving season ending on September 26, the 60-day calving season ending on October 26, and the 90-day calving interval ending on November 25.

Net returns for spring-calving cows were positive for the 60-day calving season and negative for the 45- and 90-day calving season (**Table 1**). This illustrates the importance of the trade-off between increasing the calving rate with a longer calving window at the expense of selling lighter calves. Weaning weights were greatest for the 45-day calving season and decreased by 5 lb/head when going from a 45- to 60-day calving season and 21 lb/head when moving from 45 to 90 days. Assuming a 75 percent and 80 percent calving rate for the 45- and 60-day calving seasons, respectively, a producer utilizing the 60-day calving season would sell more calves that were lighter than the 45-day calving season, but it would mean selling more

total beef pounds than the 45-day calving season. A producer using the 90-day calving season would sell more calves but fewer total pounds of beef because of a lighter weaning weight. One limitation of this study is the lack of consideration of the price slide due to different weaning weights. Lighter weight calves generally bring a higher price, and this study did not evaluate the price slide due to the relatively small difference in sale weight.

Table 1. Summary Statistics of Net Returns and Weaning Weight by Calving Season and Calving Season Length

		Spring Calving Season		Fall Calving Season	
Calving Season Length	Calving Rate	Net Returns ($/head)	Weaning Weight (lb/head)	Net Returns ($/head)	Weaning Weight (lb/head)
45-day[a]	75%	-5.89	525	56.53	522
45-day With Improved Reproductive Management	85%	19.54	525	68.87	522
60-day[b]	80%	2.72	520	56.31	516
60-day With Improved Reproductive Management	85%	14.92	520	61.83	516
90-day[c]	85%	-3.04	504	42.55	499

[a] 30-day calving season was January 30 to March 15 for spring-born calves and August 27 to October 11 for fall-born calves.
[b] 60-day calving season was January 30 to March 30 for spring-born calves and August 27 to October 26 for fall-born calves.
[c] 90-day calving season was January 30 to April 29 for spring-born calves and August 27 to November 26 for fall-born calves.

It was assumed that an improved reproductive management practice (IRM) (i.e., timed artificial insemination [TAI]) could be implemented and increase calving rate to 85 percent. TAI is an IRM that has received considerable attention in commercial beef cattle production. Many producers utilizing TAI are using it to reduce the number of bulls needed for natural service, tighten the calving season, and to purchase better genetics than they could if they were purchasing a bull to service the cow herd. In many cases, producers are using TAI to increase weaning weight, yearling weight, and improve carcass quality. The use of TAI in a beef cattle herd will generally cost $40 to $60 per head, depending on semen cost and breeding cost.

Based on the assumptions of this study, the use of an IRM increased net returns $25.43 per head ($19.54 – (–$5.89) = $25.43) in the 45-day calving season, which means a producer would benefit from utilizing this practice if it cost less than $25 per

head. Similarly, net returns increased $12.20 per head ($14.92 – $2.72 = $12.20) when using an IRM in the 60-day calving season.

Net returns for the fall-calving herd were positive for all calving season lengths evaluated and highest for the 45-day calving season (**Table 1**). Weaning weights decreased 6 lb/head moving from the 45- to 60-day calving season and 23 lb/head from the 45- to 90-day calving season. Assuming an 85 percent calving rate with the use of an IRM, a producer could pay $12.34/head ($68.87 – $56.53 = $12.34) to adopt this practice in a 45-day calving season and $5.52/head ($61.83 – $56.31 = $5.52) in the 60-day calving interval.

At first glance, it would appear that the use of an IRM may not generate enough revenue to justify the expense. However, the maximum amount a producer could pay for this technology may actually be higher if the use of the IRM practice reduces the number of bulls needed for natural service breeding and increases calf performance and weaning weight by being born earlier in the calving season. This study did not evaluate the circumstances in which costs of owning bulls could be reduced or increased weaning weights from more calves being born earlier in the calving season.

In this study, shortening the calving season length increased net returns in the fall-calving herd, while spring-calving herd returns were greatest with a 60-day calving season. Thus, fall-calving producers may have more to gain from a shorter calving season than spring-calving producers. Overall, a 45-day fall calving season resulted in the highest net returns with the use of an IRM practice.

CONCLUSIONS

This study evaluated the impacts of calving season length (45-, 60- and 90-day calving season) on net returns for spring- and fall-calving herds in Tennessee. Two additional scenarios evaluated a 45- and 60-day calving season length that assumed the use of an IRM practice to increase the calving rate. The profit and weaning weight maximizing calving date for the spring-calving herd was February 15, and the profit and weaning weight maximizing calving date for the fall-calving herd was September 11.

Shortening the calving season length increased net returns more in the fall-calving herd than the spring-calving herd which would mean that fall-calving producers could gain more from a shorter calving season than spring-calving producers. Given that all possible calving season lengths were not evaluated, a general conclusion of this study is that many cow-calf producers would benefit from a shorter calving season. Shortening the calving period may require producers to adopt intensive reproductive management practices and rigid culling criteria. Producers must consider their resources, such as labor availability, when deciding to adopt such

practices because the use of an IRM can compress the work load into a shorter time period.

Some of the limitations of this study are associated with not accounting for reduced bull costs when an IRM is utilized, superior production characteristics from calves sired via an IRM, a price slide due to different weaning weights, and premiums associated with calf uniformity at the time of sale. Each of these limitations would most likely increase the value of calves sired by an IRM, which would mean a producer could afford to pay more for the practice than what is stated in this research.

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