Factors Affecting Timing and Intensity of Calving Season of Beef Cow-Calf Producers in the Midwest

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Summary and Implications

Despite demonstrated market incentives to adopt controlled calving seasons, many producers still have herds that calve somewhat broadly throughout the year. Primary data, collected through a coordinated survey effort with USDA's National Agricultural Statistics Service, were used to quantify factors that affect producers' decisions regarding timing and intensity of calving season. Ninety-seven, 50, 33, and 26% of farms calve in the spring (Mar, Apr, May), summer (Jun, Jul, Aug), fall (Sep, Oct, Nov), and winter (Dec, Jan, Feb), respectively. Twenty-two percent observed a calving season exclusively in the spring. Sixty-six percent of respondents indicated calving season was dictated by weather, 34% because of labor availability, and 31% because of tradition. Least often reasons for calving season were market timing (16%), feed availability (8%), and other (4%). Producer stated reasons for calving season explained 62% of the variation in timing and intensity of calving on an operation, whereas a model of producer demographic and operation characteristics explained 83% of the variation. These results highlight the importance of evaluating producer and operation characteristics in addition to producer input when making recommendations to enhance production efficiency and profitability. Furthermore, understanding the factors which impact calving season provides opportunities for improved extension and research programming.

Introduction

There are many factors that impact the production efficiency and profitability of cow-calf operations, including access to adequate nutrients, labor, and weather conditions. While these factors play a role in the decision making of all producers, the importance and use of certain factors tends to vary between operations based on region and herd size. Numerous studies indicate the timing of calving for beef cattle operations is key to both profitability and sustainability.

However, despite these demonstrated incentives to target a specific calving interval, many producers still have herds that calve somewhat broadly throughout the year, which often results in decreased profit when compared to a narrower calving interval. Few, if any, analyses have sought to quantify what factors, including producer stated reasons as well as producer demographics and operational characteristics, dictate calving season for individual operations. Therefore, objectives of this study are to examine factors that affect calving decisions and quantify their effects on producer's timing and intensity of their herd's calving season.

Materials and Methods

A mail survey was designed to obtain information from Iowa cow-calf producers. The comprehensive survey included questions regarding various aspects of cow-calf production, including demographics and current production and marketing practices. The survey was sent to a sample of 1,030 cow-calf producers identified by USDA's National Agricultural Statistics Service Upper Midwest Regional Office. All known operations with 200 or more head of beef cows were surveyed and a stratified simple random sample of operations with 20-49, 50-99, and 100-199 beef cows were surveyed.

Of the 1,030 cow-calf producer surveys distributed, 27 were returned by the U.S. postal service with the address unknown, and 243 were returned with responses (24% effective response rate). However, several surveys were only partially completed. For the questions used in this analysis, 206 usable surveys were available.

Post-stratification weights were created based on population totals from the 2012 Census of Agriculture number of farms with beef cows. Once weights were applied to the data, the mean beef cows per operation match those of the Iowa herd sizes. Because the weighted statistics are more reflective of the actual population and corrected imbalances in sampling ratios from the general population to the sample, all results reported in the analysis use the derived weights.

Timing and intensity of calving season was analyzed using ordinary least squares regression models. *Timing* measures the season in which cows are calved. Timing, or calving seasons, include: (i) spring = Mar, Apr, May, (ii) summer = Jun, Jul, Aug, (iii) fall = Sep, Oct, Nov, and (iv) winter = Dec, Jan, Feb. *Intensity* is defined as the percentage of calves born in a particular season.

Results and Discussion

Calving distribution across seasons shows that 97%, 50%, 33%, and 16% of farms calve in the spring, summer, fall, and winter, respectively. Twenty-two percent of producers indicate that they calve exclusively in the spring.

When asked to state their primary reasons for an operation calving when it does, 66% indicated weather, 34%

because of labor, and 31% because of tradition. It is common for producers in the Midwest to use weather as a very important factor when determining calving season. Weather may play a major role in calf health and require increased labor during unfavorable conditions. With an abundance of diversified operations, labor availability is an important factor and can dictate calving season by necessitating the coordination of labor for calving season with other seasonal activities such as planting and harvesting.

The least common reasons were market timing (16%), feed availability (8%), and other (4%). It has been indicated that a shift in calving season may not only lower the cost of production by reducing feed costs, but also take advantage of seasonal marketing advantages. However, due to the availability of corn co-products and corn residue in the Midwest, feed availability and cost may not play as big of a role in determining calving season compared to other parts of the United States.

An ordinary least squares regression model of producers' stated reasons for calving when they do explained 62% of the variation in timing and intensity of calving season (Table 1). If a respondent indicated tradition was a primary reason the operation calves when it does, calving intensity was increased 18.50 percentage points (**pp**) in the spring and decreased 9.93 pp in the fall.[1] Calving intensity was 28.43 pp lower in the fall compared to the spring.

On average, calving intensity for respondents who indicated labor availability was a primary reason the operation calves when it does, increased 25.05 pp in spring and decreased 9.03 pp, 7.41 pp , and 8.62 pp in the summer, fall, and winter, respectively. Calving intensity was 34.08 pp lower in the summer, 32.46 pp lower in the fall, and 33.67 pp lower in the winter compared to the spring. As 94 pp of respondents have diversified operations and do farm cropland, choosing a calving season that does not compete with other seasonal activities such as planting and harvesting may permit more labor focus on a single activity, presumably allowing better monitoring of the calving process and reducing calving and health issues.

If a respondent indicated weather was a primary reason the operation calves when it does, calving intensity was increased 44.79 pp in spring and decreased 11.12 pp, 15.52 pp, and 18.15 pp in summer, fall, and winter, respectively. The effect of weather was statistically different across calving season. Calving intensity was 55.92 pp lower in the summer, 60.31 pp lower in the fall, and 62.94 pp lower in the winter compared to the spring. Central U.S. cattle producers (Arkansas, Illinois, Iowa, and Missouri) typically use weather as a determining factor for time of calving more than any other region in the United States. This is not surprising, as calving earlier in the year requires additional labor to monitor beef cows and immediately move calves to a shelter in order to protect them from the elements. Furthermore, calving seasons set for late spring or early fall tend to reduce cold stress on calves along with exposure to conditions of excess moisture combined with cold temperatures. Reduced immunoglobulin absorption and increased energy requirements have been found in calves in wet, muddy, and cold environments. However, it should be noted that late spring or early summer calves may be more susceptible to heat stress due to an inability to dissipate heat effectively, making them vulnerable to dehydration.

An ordinary least squares regression model of producer and operation characteristics' impact on calving when they do explained 83% of the variation in timing and intensity of calving season (Table 2). When compared to commercial operations, seedstock operations had a 9.17 pp decrease in spring calving intensity while a 6.10 pp percent increase occurred in fall calving intensity. Calving intensity was increased by 15.27 pp for seedstock operations in the fall compared to spring. Calving intensity was increased by 5.07 pp in the fall and was 6.16 pp higher in the fall than in the spring for every 100 additional cows on an operation. Larger operations often utilize more than one calving season in order to allow more frequent periods of income and to spread more cows over fewer bulls, thus decreasing feed and depreciation costs. Additionally, non-traditional calving seasons give the producer the opportunity to capitalize on seasonal increases in feeder calf prices.

For every additional 10 years of experience calving intensity was increased by 15.64 pp in the spring and decreased by 5.69 pp, 5.65 pp, and 4.30 pp in summer, fall, and winter, respectively.

Geographical location was used as representation of weather conditions. When compared to South Central Iowa, North Central producers are less likely (22.19 pp) to calve in the spring and more likely (13.58 pp) to calve in the fall. Southwest producers are 15.22 pp more likely to calve in the spring and 4.55 pp less likely to calve in the fall compared to South Central producers. In Southeast Iowa, calving intensity was decreased (28.64 pp) in the spring and increased (15.94 pp and 18.21 pp) in the fall and winter compared to the South Central producers. These results demonstrate a producer's ability to benefit from a combination of more ideal weather for calving along with matching peak lactation with peak forage production.

For operations that rent pasture for grazing, compared to operations that do not rent pasture, calving intensity was decreased 6.21 pp in the summer and 4.93 pp in the fall, and increased 4.85 pp in the winter. The effect of renting pasture acres for grazing differed across the calving season, as calving intensity was 12.50 pp lower in the summer and 11.23 pp lower in the fall than in the spring. Because rented pasture is likely not in close proximity to where cattle are wintered, these results are consistent with expectations.

[1] Because calving intensity is measured in percentage, coefficient estimates refer to changes in calving intensity in percentage points (pp) from one-unit changes in the independent variables. A percentage point is the unit for the arithmetic difference of two percentages. For example, going from 10% to 15% is a 5 pp increase.

Increased calving during the winter months allows producers to assist in calving events if necessary as well as get calves well established prior to moving them to a summer pasture where health checks are likely more sporadic. Likewise, calving on rented pasture during the summer and fall months likely prevents the ability to assist during calving and ensure timely processing of newborn calves occurs.

Producers that use continuous or rotational grazing or both, as well as producers that implement more intensive grazing systems (strip/controlled grazing or mob grazing or both), had a reduced calving intensity in the winter of 7.08 pp and 14.89 pp, respectively, when compared with producers that use no grass grazing system. This was not surprising as producers with no grass grazing system in the Midwest are moving towards a production system that includes some sort of a housing structure. Thus, it is logical that producers with no grass grazing system may increase calving intensity in the winter to capitalize on the traditional seasonality of feeder cattle markets.

When compared to operations that did not use cornstalks for feed in 2013, those that only harvested cornstalks for a feed resource decreased spring calving intensity by 22.97 pp and increased winter calving intensity by 12.58 pp. Moreover, those producers that grazed and harvested cornstalks for feed had a decreased calving intensity of 14.15 pp in the spring compared to producers that did not use cornstalks for feed. Given producers that harvested and grazed cornstalks farmed more acres than those that did not harvest cornstalks, it would be expected that spring calving would interfere with planting season. Thus, the reduction in calving intensity of these operations in the spring was not surprising.

Producers that exclusively harvest cornstalks managed on average 79 cows on a total of 448 acres of pasture and crop ground (5.67 acres of land managed per cow). Based on this viewpoint, producers that only harvest cornstalks had the most intensive production system. Producers that did not use cornstalks for feed had 6.69 acres of land per cow, producers that grazed and harvested stalks had 10.6 acres per cows, and those that only grazed stalks managed 11.8 acres per cow. Thus, it is likely that producers that only harvest cornstalks attempt to maximize value of the residual corn plant by baling and feeding more stalks throughout the year to capitalize on more economical feedstuffs. This may further allow calving season to be shifted within this group of producers to target seasonal highs in feeder cattle prices.

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Table 1. Coefficient estimates for independent variables in the ordinary least squares regression model estimating effect of stated reasons on timing and intensity of calving season[1,2,3,4,5,6,7]

Variable	Spring	Summer	Fall	Winter
Labor availability	25.05***	-9.03***,†††	-7.41**,†††	-8.62***,†††
Feed availability	1.33	0.32	-1.80	0.15
Market timing	4.24	-3.73	-1.82	1.30
Weather	44.79***	-11.12***,†††	-15.52***,†††	-18.15***,†††
Tradition	18.50***	-2.94	-9.93**,†††	-5.63
Other	-24.60	26.64	3.24	-5.28

[1] Model estimated using weights that adjust sample characteristics to match USDA's National Agricultural Statistics Service Iowa cow-calf operation estimates.
[2] Because calving intensity is measured in percentage, coefficient estimates refer to changes in calving intensity in percentage points from one-unit changes in the independent variables.
[3] Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov; and Winter = Dec, Jan, Feb.
[4] Single, double, and triple asterisks (*, **, ***) indicate significance of coefficient estimates at the 10%, 5%, and 1% level, respectively.
[5] Single, double, and triple daggers (†, ††, †††) indicate significance of test if summer, fall, or winter are different from spring at the 10%, 5%, and 1% level, respectively. Test performed if statistical significance of coefficient estimates at the 10%, 5%, or 1% level,
[6] Intercept = 25.00***.
[7] R^2 = 0.6227.

Table 2. Coefficient estimates for independent variables in the ordinary least squares regression model estimating effect of producer and operation characteristics on timing and intensity of calving season[1,2,3,4,5,6,7]

Variable	Spring	Summer	Fall	Winter
Inventory on January 1, 2014 of beef cows (100 head)	-1.09	-3.79**	5.07***,††	-0.19
Seedstock or seedstock/commercial operation	-9.17*	-1.50	6.10***,†††	4.57
Black-hide beef cows	3.25	-3.52	0.12	0.16
Experience in raising beef cattle (10 years)	15.64***	-5.69*,†††	-5.65***,†††	-4.30**,†††
60% or more of household income from off-farm sources	-4.69	1.12	-3.88	7.45**,†
25% or less of labor supplied by non-family, paid employees	0.02	3.51	2.95	-6.48
Northwest Iowa crop reporting district (Base: South Central Iowa)	-0.42	1.27	3.13	-3.98
North Central Iowa crop reporting district (Base: South Central Iowa)	-22.19*	-3.53	13.58**,††	12.14
Northeast Iowa crop reporting district (Base: South Central Iowa)	5.17	2.54	-1.98	-5.73*
West Central Iowa crop reporting district (Base: South Central Iowa)	2.66	-7.63	0.37	4.61
Central Iowa crop reporting district (Base: South Central Iowa)	1.64	7.21	-2.73	-6.12
East Central Iowa crop reporting district (Base: South Central Iowa)	-0.42	-3.82	2.30	1.93
Southwest Iowa crop reporting district (Base: South Central Iowa)	15.22**	-6.61	-4.55*,††	-4.06
Southeast Iowa crop reporting district (Base: South Central Iowa)	-28.64***	-5.51	15.94	18.21**,†††
Typically background calves, then sell (Base: Typically sell calves at weaning)	7.33	-1.46	-2.32	-3.55
Typically retain calves through finishing (Base: Typically sell calves at weaning)	-0.55	4.20	-0.65	-2.99
Typically pool cattle for sale	4.55	-10.08	4.63	0.90
No feeder cattle production practices prior to sale	-3.62	-3.32	2.02	4.92
Cropland farmed in 2013 (100 acres)	0.51	0.19	-0.52**,††	-0.18
Rented pasture acres in 2013	6.29	-6.21**,††	-4.93**,††	4.85*
Continuous or rotational grass grazing, or both (Base: No grass grazing)	3.03	7.06	-3.01	-7.08**
Controlled or mob grass grazing, or both (Base: No grass grazing)	-4.87	11.88	7.88	-14.89***
Continuous or rotational and controlled or mob grass grazing (Base: No grass grazing)	1.82	6.63	-3.57	-4.89
Grazed cornstalks for feed in 2013 (Base: No grazing or harvesting of cornstalks)	-10.20	6.60	-0.66	4.26
Harvested cornstalks for feed in 2013 (Base: No grazing or harvesting of cornstalks)	-22.97***	6.47	3.93	12.58**,†††
Grazed and harvested cornstalks for feed in 2013 (Base: No grazing or harvesting of cornstalks)	-14.15*	5.22	1.41	7.52

[1] Model estimated using weights that adjust sample characteristics to match USDA's National Agricultural Statistics Service Iowa cow-calf operation estimates.
[2] Because calving intensity is measured in percentage, coefficient estimates refer to changes in calving intensity in percentage points from one-unit changes in the independent variables.
[3] Spring = Mar, Apr, May; Summer = Jun, Jul, Aug; Fall = Sep, Oct, Nov; and Winter = Dec, Jan, Feb.
[4] Single, double, and triple asterisks (*, **, ***) indicate statistical significance of coefficient estimates at the 10%, 5%, and 1% level, respectively.
[5] Single, double, and triple daggers (†, ††, †††) indicate statistical significance of the test if summer, fall, and winter are different from spring at the 10%, 5%, and 1% level, respectively. Test performed if statistical significance of coefficient estimates at the 10%, 5%, or 1% level,
[6] Intercept = 25.00***.
[7] R^2 = 0.8290.