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Effect of Calving Season and Wintering System on Cow Performance

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Summary

Four years of data from three different calving seasons and two different cow wintering systems were evaluated utilizing 218 cows/year. Cows calved in spring, summer, or fall and were wintered on native Sandhills range or cornstalks. Calving season affected cow body weight (BW) and body condition score (BCS) throughout the production year; calving in the fall reduced number of calves weaned per cow. No differences were observed between cows wintered on Sandhills range and those wintered on cornstalks.

Introduction

The amount of feed required to maintain cows in the Sandhills can be affected by calving date (Adams et al., 1996 *Rangelands* 18:57). To meet cow nutrient requirements, producers feed hay and purchased feeds that can increase costs (Stockton et al., 2007 *Prof. Anim. Sci*. 23:500). Changing calving date could decrease the use of harvested forages and purchased feeds by matching the cow's requirements with the nutrient supply of the forage. The use of corn residue can be advantageous in beef production systems. As corn price increases, there is potential for increased corn acres leading to increased cornstalk availability. Cornstalks offer producers an inexpensive feed and help minimize the use of harvested forages and purchased feeds. Therefore, the objective of this study was to determine the effect of calving season and wintering system on cow BW change and breeding performance.

Procedure

Cow Management

Data were collected over four years from 218 cows (5/8 Red Angus, 3/8 Continental) per year. Cows were located at the Gudmundsen Sandhills Laboratory (Whitman, Neb.). Cows were assigned to one of five treatments: 1) spring calving cows (SP) wintered on native range (n = 44); 2) SP wintered on cornstalks (n = 44); 3) summer calving cows (SUM) wintered on native range (n = 37); 4) SUM wintered on cornstalks (n = 37); or 5) fall calving cows (FA) wintered on cornstalks (n = 55). Average calving dates were March 24, June 15, and August 5 for SP, SUM, and FA, respectively.

SP wintered on native range (treatment 1) were allowed to graze native Sandhills range from mid-May until the end of February, then were fed meadow hay from the beginning of March until mid-May. SP wintered on cornstalks (treatment 2) were allowed to graze native Sandhills range from mid-May until mid-October when cows were transported to cornstalks in the Platte River valley; at the end of February, they were returned to the ranch and fed meadow hay until mid-May. From late winter to early spring, both groups (SP wintered on range and SP wintered on cornstalks) were supplemented 1 lb/head daily with a 28% crude protein (CP) dried distillers grain cube (Table 1).

SUM wintered on native range (treatment 3) were allowed to graze native Sandhills range for the entire year. SUM wintered on cornstalks (treatment 4) were allowed to graze native Sandhills range from April until the beginning of October, transported to cornstalks in mid-October, and returned to the ranch at the beginning of April. FA wintered on cornstalks (treatment 5) also were transported to cornstalks in mid-October and returned to the ranch at the beginning of April. During late winter to early spring, SUM and FA were not fed hay; however, SUM calving cows wintered on range (treatment 3) were supplemented 2.5 lb/head daily of 28% CP dried distillers grain cube to meet protein requirements. Additionally, SUM wintered on cornstalks (treatment 4) and FA (treatment 5) were supplemented 1.0 lb/head daily.

Table 1. Composition of 28% CP distillers grain cube[1].

Item, %	DM basis
DDGS	62
Wheat midds	11
Cottonseed meal	9
Corn gluten feed	5
Molasses	5
Urea	2
Calcium carbonate	3
Binder	3

[1]Formulated to provide 10,000 IU/lb of vitamin A and 16 mg/lb of Rumensin (Elanco Animal Health, Greenfield, Ind.).

At calving, cows were assigned a calving difficulty score from 1 to 5 (1 = no assistance; 2 = minor assistance; 3 = difficult assistance; 4 = caesarean section; 5 = abnormal presentation) and a calf vigor score from 1 to 5 (1 = nursed unassisted; 3 = nursed with assistance; and 5 = dead at birth). Calves from SP cows were weaned on October 31 (220 days of age). Calves from SUM and FA were weaned on April 11, at 298 and 247 days of age, respectively. April 11 also was the date SUM and FA cows grazing cornstalks during the winter were returned to the ranch.

For each system, cow BW and BCS were recorded at three different periods during the year: at 21 days before calving (pre-calving), at 59 days post calving (pre-breeding), and at weaning. Calf BW was recorded at birth, dam pre-breeding, and weaning.

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Statistical Analysis

Data from this study were analyzed as a completely randomized design using the MIXED procedure of SAS. The experimental unit for this study was group of cows within treatment; therefore, the only replication in this study is year. To determine the effect of calving date, the model included calving season with year included as a random effect. Contrast statements were used to evaluate the differences between calving seasons (SP vs. SUM, SP vs. FA, and SUM vs. FA). To compare FA to SP and SUM, performance data from SP and SUM cows wintered on range and SP and SUM cows wintered on cornstalks were averaged and compared to FA (FA were wintered only on cornstalks). SP and SUM cows were used to determine the difference between wintering systems, since FA were wintered only on cornstalks. The model to test for differences between wintering system included wintering system with year included as a random effect. Data are presented as least square means with differences considered significant at $P < 0.05$.

Results

Calving Season

Calving difficulty was greatest for SP ($P = 0.05$; Table 2) compared to SUM and FA, which were not different from each other ($P = 0.70$). Calf vigor ($P = 0.78$) was not different among calving seasons. Pre-calving BW was greatest for FA ($P < 0.01$) and least for SUM ($P < 0.01$). BW at pre-breeding was greatest for FA when compared to SP ($P < 0.01$) and SUM ($P < 0.01$); BW for SUM was 199 lb heavier ($P < 0.01$) than for SP. Cow BW at weaning was lower for SP ($P = 0.04$) compared to SUM; however, SP and FA were not different ($P = 0.14$). In addition, for SUM and FA, BW at weaning was not different ($P = 0.64$).

Pre-calving BCS differed ($P < 0.03$) among calving seasons, with FA having the greatest BCS, followed by SUM and SP (Table 2). At pre-breeding, SP had

Table 2. The effect of calving season on cow performance.

Item	SP[1]	SUM[2]	FA[3]	SEM
n/yr	89	74	55	—
Calf vigor[4]	1.01	1.01	1.01	0.01
Calving difficulty[5]	1.03^{x}	1.01^{y}	1.00^{y}	0.01
Cow BW				
Pre-calving, lb	1172^{y}	1251^{y}	1384^{x}	23
Pre-breeding, lb	1055^{z}	1254^{y}	1296^{x}	12
Weaning, lb	1102^{y}	1154^{x}	1142^{xy}	25
Cow BCS				
Pre-calving	5.3^{z}	5.9^{y}	6.6^{x}	0.1
Pre-breeding	5.3^{y}	6.1^{x}	6.0^{x}	0.1
Weaning	5.1	5.1	5.0	0.1
Calf BW				
Birth BW, lb	81	83	84	2
Pre-breed BW, lb	203^{y}	231^{x}	226^{x}	4
Weaning BW, lb	523^{y}	558^{x}	514^{y}	9
Adj. weaning BW[6], lb	491^{x}	410^{z}	441^{y}	7
Calf ADG[7], lb/day	2.00^{x}	1.60^{z}	1.74^{y}	0.03
Calved[8], %	98.4	97.1	94.4	2.7
Rebreeding[9], %	93.6	93.2	90.0	3.3
Calves weaned per cow	96.2^{x}	94.5^{xy}	85.7^{x}	4.6

[1]SP = spring calving cows (average calving date = March 24); reflects the combined performance measures for cows wintered on cornstalks and native range.
[2]SUM = summer calving cows (average calving date = June 15); reflects the combined performance measures for cows wintered on cornstalks and native range.
[3]FA = fall calving cows (average calving date = August 5); reflects cows wintered on cornstalks only.
[4]Calf vigor = 1 = nursed unassisted, 3 = nursed with assistance, and 5 = dead at birth.
[5]Calving difficulty = 1 = no assistance, 3 = hard assistance, and 5 = abnormal presentation.
[6]Adj. weaning BW = calf weaning weight adjusted to 205 days.
[7]Calf ADG = ADG for the calf from birth to weaning.
[8]Calved = percent of cows that calved in the production year.
[9]Rebreeding = percent of cows determined to be bred at weaning.
[xyz]Means with unlike superscripts differ ($P < 0.05$).

Table 3. The effect of wintering system on cow performance.

Item	Cornstalks	Native Range	SEM	*P*-value
n	82	81	—	—
Calf vigor[1]	1.02	1.00	0.01	0.06
Calving difficulty[2]	1.02	1.02	0.01	1.00
Cow BW				
Pre-calving, lb	1202	1220	26	0.57
Pre-breeding, lb	1160	1149	42	0.86
Weaning, lb	1135	1121	20	0.61
Cow BCS				
Pre-calving	5.5	5.6	0.2	0.61
Pre-breeding	5.6	5.7	0.2	0.70
Weaning	5.1	5.1	0.1	0.80
Calf BW				
Birth BW, lb	82	82	1	0.64
Pre-breed BW, lb	215	219	7	0.64
Weaning BW, lb	537	544	11	0.63
Adj. weaning BW[3], lb	446	452	15	0.77
Calf ADG[4], lb/day	1.77	1.81	0.09	0.72
Calved[5], %	97.8	97.7	1.6	0.94
Rebreeding[6], %	92.3	88.3	0.8	0.04
Calves weaned per cow	94.8	95.8	2.8	0.65

[1]Calf vigor = 1 = nursed unassisted, 3 = nursed with assistance, and 5 = dead at birth.
[2]Calving difficulty = 1 = no assistance, 3 = hard assistance, and 5 = abnormal presentation.
[3]Adj. weaning BW = calf weaning weight adjusted to 205 days.
[4]Calf ADG = ADG for the calf from birth to weaning.
[5]Calved = percent of cows that calved in the production year.
[6]Rebreeding = percent of cows determined to be bred at weaning.

the lowest BCS ($P < 0.01$) compared to SUM and FA, which were not different ($P = 0.82$). There were no differences ($P = 0.22$) in BCS at weaning among calving seasons.

There was no difference in birth BW for the different calving seasons ($P = 0.26$; Table 2). Spring calves were 28 and 23 lb lighter at pre-breeding than SUM ($P < 0.01$) and FA ($P < 0.01$) calves, respectively. Calf weaning BW was similar ($P = 0.36$) for SP and FA calves; however, because of increased days of age, SUM calves were 44 and 35 lb heavier than FA ($P < 0.01$) and SP ($P < 0.01$) calves, respectively. Calf ADG from birth to weaning was 0.40 and 0.26 lb/day greater for SP calves compared to SUM ($P < 0.01$) and FA ($P = 0.03$) calves, respectively. Adjusted 205-day weaning BW for calves was greatest for SP calves ($P < 0.01$) compared to SUM and FA calves. Adjusted weaning weights for FA calves were 31 lb greater than for SUM calves ($P < 0.01$).

Percentage of cows to calve was not different when comparing calving seasons ($P = 0.16$; Table 2). In addition, rebreeding rates were similar for SP, SUM, and FA (93.6 vs. 93.2 vs. 90.0; $P = 0.29$). Calves weaned per cow was not different for SP and SUM (0.962 vs. 0.945; $P = 0.67$); however, FA weaned fewer calves per cow then SP (0.857 vs. 0.962; $P = 0.05$) and tended to wean fewer calves per cow than SUM (0.857 vs. 0.945; $P = 0.08$).

Wintering System

Calf vigor scores tended to be greater for cows wintered on cornstalks compared to those wintered on Sandhills range ($P = 0.06$; Table 3); however, calving difficulty ($P = 1.00$) was not different between cows wintered on Sandhills range and those wintered on cornstalks. In this study cows wintered on cornstalks received 1.5 lb/day more supplement than cows wintered on Sandhills range. However, cow BW and BCS at pre-calving ($P > 0.57$), pre-breeding ($P > 0.70$), and weaning ($P > 0.61$) were not different between wintering systems.

Wintering system did not influence calf BW at birth ($P = 0.64$), at start of the breeding season ($P = 0.64$), or at weaning ($P = 0.63$). Additionally, calf ADG ($P = 0.72$) from birth to weaning and adjusted 205-day weaning BW ($P = 0.77$) were not different between wintering systems. Neither percentage of cows to calve, rebreeding rate, or calves weaned per cow were influenced ($P > 0.65$) by wintering system.

Results from this study indicate that calving season can affect cow BW and BCS throughout the production year. However, calving season does not impact rebreeding rate but can impact the number of calves weaned per cow. In terms of wintering system, cows can be wintered on Sandhills range or cornstalks without affecting breeding performance or cow BW and BCS.

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