Effects of Late Gestation Supplementation, Synchronization, and Creep Feeding in a Spring Calving Beef Herd in the Nebraska Sandhills

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Summary with Implications

Supplementation during winter grazing increased cow BW and BCS but had no effect on reproduction or calf performance, thus increasing production costs without increasing returns. Using a CIDR for estrus synchronization in a herd with existing acceptable reproductive performance did not increase cow pregnancy rate or advance calving date. Feeding creep feed to calves is an effective means of increasing weaning BW which resulted in increased live and carcass weight. Under the conditions of this study, when additional feed and price slide for heavier calves was considered, feeding creep feed did not result in added profits.

Introduction

Extending the grazing season to include grazing dormant pasture decreases production costs, however supplemental rumen degradable protein is necessary to maintain BCS of gestating cows grazing winter range in the Nebraska Sandhills. Feeding supplement to cows grazing winter range during the last trimester of gestation can increase calf BW at weaning, but it is not known if the timing of supplementation optimized progeny performance. Undernutrition during gestation causes suboptimal conditions in the maternal uterine environment, which translate into depressed progeny performance. Cost savings may be achieved if supplement amount and duration of supplementation were reduced. Further efficiency may be achieved if supplement is delivered directly to the calf and could potentially overcome detrimental effects of undernutrition during gestation. Supplementation directly to the calf significantly affects calf weaning BW (2017 Nebraska Beef Report, pp. 22–24), but it is not known if this weight advantage will persist at slaughter. Administration of exogenous progesterone can shorten the postpartum interval. If weaning occurs on the same d for all calves, those born to cows with a shorter postpartum interval will be older and therefore weigh more than contemporaries born to cows that become pregnant later in the breeding season. Thus, the objectives of this study were to determine effects of late-gestation supplementation, postpartum progestin, and creep feeding on cow and calf productivity in a spring-calving herd.

Procedure

A 3-yr experiment utilized 120 crossbred (5/8 Red Angus, 3/8 Simmental), March-calving cows (initial BW = 1096 ± 126 lb) at the Gudmundsen Sandhills Laboratory, Whitman, Nebraska. Cows were stratified by BW within age. Treatments were assigned randomly in a 4 × 2 × 2 factorial arrangement in a completely random design. The 4 supplement (45% DDGS, 32% CP; 89% TDN) treatments were: 0 lb / (cow • d) Dec 1 to Mar 1 (DM0), 1 lb DM/ (cow • d) Dec 1 to Mar 1 (DM1), 1 lb DM/ (cow • d) Jan 15 to Mar 1 (JM1), or 2 lb DM/ (cow • d) Jan 15 to Mar 1 (JM2). Administration of exogenous progesterone postpartum via a controlled internal drug release device for 7 d and prostaglandin $F_{2\alpha}$ (5 mL Lutalyse, Zoetis) administered on d 7 (CIDR), or no progesterone (NoCIDR). Unrestricted access for calf to creep feed which contained 80% Corn and 20% of an intake limiter (Accuration) from July 15 to Nov 1 (Creep) or no access to creep feed (NoCreep). The study began in December when cows were located in 1 of 8 upland range pastures (86 ac) and supplement treatments were delivered on a pasture basis 3 d/wk until March 1. Beginning March 1, cows were managed as a single group and fed hay until the end of the calving season. On May 28, CIDR inserts were administered to cows assigned to the CIDR treatment. On June 4, CIDR inserts were removed and cows were administered prostaglandin $F_{2\alpha}$. All cows were exposed to fertile bulls (1:25 bull:cow ratio) for 45 d, with breeding season ending July 15. The non-creep treatment occupied 1 pasture and creep treatments occupied 2 separate pastures. Creep-treated cattle were introduced into pastures containing creep feeders surrounded by panels with openings sufficient to admit calves but prevent cow entry (8 openings, 38 cm wide).

Cow BW and BCS were measured at the beginning and end of the supplementation period, prebreeding, and weaning. Calf BW was measured at birth, prebreeding, and weaning. Steer calves remained in a drylot on ad libitum hay for 2 weeks postweaning before being shipped 104 mi to a feedlot at the West Central Research and Extension Center, North Platte, NE. Steers received a Synovex Choice (100 mg trenbolone acetate [TBA] and 14 mg estradiol benzoate [EB]) at the beginning of the feeding period. Steers were re-implanted with Synovex Plus (200 mg TBA and 24 mg EB) 105 d later (110 d prior to harvest). Calves were slaughtered on June 14 (Tyson Fresh Meats, Lexington, NE). Carcass data was collected 24 h following slaughter and final BW was calculated from HCW based on average dressing percentage of 63%. Carcass data included HCW, yield grade, LM area, marbling, and 12^{th} rib fat. Market prices for weights at weaning and slaughter were based on the 3 yr average and actual creep feed costs were utilized.

Cows were removed from the study for failure to wean a calf or become pregnant and were not replaced. Therefore, the number of cows decreased throughout the 3 yr study. Year 1 started with 120 cows, yr 2 with 95 and yr 3 with 86. Additional cows external to the experiment were introduced into pastures to maintain constant stocking rates during the experiment.

Cows assigned to the same winter supplement, CIDR and creep treatment within winter pasture served as the experimental

Table 1. Effects of winter supplement[1], post-partum progesterone administration[2], and calf access to creep feed[3] on cow and steer progeny productivity

	Supplement				Progesterone		Calf feed		SE[4]	*P*-value		
	DM0	DM1	JM1	JM2	CIDR	No CIDR	Creep	No Creep		Supp	Progest	Creep
Cow BW, lb												
Initial (Dec)	1,056	1,089	1,065	1,056	1,060	1,074	1,063	1,063	9	0.35	0.37	0.63
Calving (Mar)	983[b]	1,118[a]	1,067[ab]	1,078[a]	1,063	1,060	1,049	1,074	12	0.06	0.95	0.03
Breeding (May)	957[b]	1,030[a]	990[ab]	981[ab]	990	999	988	1,000	9	0.04	0.49	0.34
Weaning (Nov)	1,058	1,102	1,078	1,074	1,071	1,085	1,085	1,071	10	0.37	0.41	0.42
Cow BCS[5]												
Initial (Dec)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	0.1	0.88	0.76	0.81
Calving (Mar)	4.6[b]	5.0[a]	4.9[a]	5.1[a]	5.0	5.0	5.0	5.0	0.1	0.03	0.88	0.76
Breeding (May)	4.5[b]	4.8[a]	4.6[ab]	4.8[ab]	4.6	4.7	4.6	4.7	0.1	0.09	0.62	0.46
Weaning (Nov)	5.3	5.2	5.3	5.4	5.3	5.3	5.3	5.3	0.1	0.75	0.75	0.53
Calving date[6], d	83	86	84	83	83	86	86	83	3	0.79	0.10	0.13
Calved in 21 d[7], %	81	74	85	84	82	80	76	86	7	0.45	0.65	0.04
Calving rate[8], %	98	98	99	98	99	97	96	100	3	0.96	0.33	0.08
Weaning rate[9], %	91	95	93	94	91	95	93	93	4	0.71	0.23	0.85
Pregnancy rate[10], %	79	93	93	85	88	87	90	85	7	0.23	0.88	0.11
Calf BW, lb												
Birth (Mar)	75	79	75	77	77	77	77	75	1	0.27	0.64	0.16
Breeding (May)	161	163	159	165	163	161	159	165	3	0.75	0.43	0.11
Weaning (Nov)	527	527	527	536	527	531	551	507	7	0.80	0.50	<0.01
Live Weight	1,318	1,307	1,284	1,315	1,312	1,300	1,328	1,284	21	0.65	0.53	0.04
HCW, lb	830	823	809	828	827	819	836	809	13	0.65	0.53	0.04
12th rib fat, in	0.55	0.52	0.57	0.56	0.53	0.57	0.59	0.51	0.03	0.68	0.24	<0.01
Marbling[11]	459	466	474	475	457	480	474	463	29	0.93	0.25	0.59
LM, in	14	13	14	14	14	14	14	14	.39	0.60	0.34	0.31
USDA Yield Grade	2.9	2.9	3.0	3.1	2.9	3.0	3.1	2.8	0.17	0.69	0.53	0.06

[1]DM0: 0 lb/ (cow • d) Dec 1 to Mar 1; DM1: 1 lb DM/ (cow • d) Dec 1 to Mar 1; JM1: 1 lb DM/ (cow • d) Jan 15 to Mar 1; JM2: 2 lb DM/ (cow • d) Jan 15 to Mar 1 supplement (32% CP DM).
[2]CIDR: controlled internal drug release device (containing 1.38 g of progesterone; Zoetis, Parsippany, NJ) for 7d and PGF_{2a} administered on d 7 from May 28 to June 4.
[3]Creep: unrestricted access by the calf to creep feed which contained an intake limiter from July 15 to Nov 1.
[4]Standard error of the least squares mean (SE is the highest of all three treatments).
[5]Scale of 1 (emaciated) to 9 (extremely obese).
[6]Day of yr calving occurred where January 1 = d 1.
[7]Cows calving within 21 d calculated as difference between birth date and breeding date and subtracting from 285.
[8]Calving rate calculated by dividing the number of cows to calve by the number of cows at the beginning of the production yr.
[9]Weaning rate calculated by dividing the number of cows to wean a calf by the number of cows at the beginning of the production yr.
[10]Pregnancy rate calculated by dividing the number of cows determined pregnant by the number of cows at the beginning of the production yr.
[11]Marbling: Small^{00} = 400, Small^{50} = 450, Modest^{00} = 500.
[abc]Within a row, means lacking a common superscript letter differ ($P < 0.05$).

unit. Replicated treatment means within yr were used for analyses of cow and calf response variables and carcass evaluation. Model fixed effects included winter supplement treatment, CIDR treatment, creep treatment, and all interactions. Year and residual error were included in the model as random effects. Effects of treatment were considered significant when $P < 0.05$.

Results

All supplemented groups (DM1, JM1, JM2) increased in BW from beginning of study to calving, whereas DM0 tended to decrease in BW ($P = 0.06$). Cows assigned to DM0 treatment had the greatest differences in BW after winter treatment to weaning. Even with this difference, they had similar BW at weaning as the beginning of winter treatment. This is most likely due to a compensatory gain. The greatest loss in BW occurred between precalving (March) to start of breeding (May) for all 4 treatments. Other than calving BW, cows fed supplement maintained or increased in BW. Differences in BW among supplement treatments were most evident at the beginning of the breeding season where DM0 cows weighed the least ($P < 0.05$), JM1 and JM2 cows intermediate, with DM1 cows having the greatest BW. Some of the BW loss is due to calving and some of the gain from Dec. to Mar. is conceptus, therefore BCS is more indicative on nutritional status. Cow BCS was lower ($P < 0.03$) at the art of the calving season for cows not supplemented compared with DM1 and JM2 cows, with JM1 cows being intermediate. Despite decreased BCS over the winter treatment period for DM0 and loss in BCS for all groups from calving to breeding, all groups had similar weaning BCS. Differences in BW and BCS caused by the supplementation treatment did not affect measures of reproductive efficiency such as calving date, calving rate, weaning rate, or pregnancy rate ($P > 0.20$). Supplement treatments did not affect calf birth, breeding, or weaning BW ($P \leq 0.80$).). Late gestation supplementation to cows also did not affect ($P > 0.5$) steer carcass characteristics. Previous research at the same location has demonstrated decreased weaning BW of calves born to cows not fed supplement grazing dormant winter range. Further research with a greater number of observations may be necessary to obtain definitive conclusions.

Progestin treatment did not affect ($P > 0.13$) BW, BCS, reproductive measures, or calf traits. Reproductive measures may not have been affected due to the fact the herd already had acceptable reproductive performance. Exogenous progesterone was not expected to affect cow BW or BCS. Potential increased calf age and therefore, increased weaning BW as a result of earlier conception in the breeding season due to progesterone administration did not occur ($P = 0.65$). Access to creep feed increased ($P < 0.01$) calf BW at weaning by 44 lbs. Total average amount of creep that disappeared from feeder was 3.77 lb DM/ (calf • d). Creep feeding calves did not affect ($P > 0.06$) yield grade, LM area, or marbling. There was still a significant increase on ($P < 0.04$) live weight, ($P < 0.04$) HCW, ($P < 0.01$) yield grade and 12th rib fat ($P < 0.01$) from creep feed. Efficiency of creep feed to added gain was 8.41 lb of creep feed for each additional lb of gain. The total cost of creep feed per calf was $64.09, additional value of added weight at weaning was $91.96 and $63.80 at slaughter. When considering the price slide for heavier calves at weaning, the value of added gain realized was similar to the cost of creep feed. Average market prices will have a great effect on the value of creep feed. These prices should be considered in a cost of gain/ benefit analysis. It is important to understand that this analysis is based only on added costs of feeding creep feed and no other additional costs such as labor and added equipment.

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