The Impact of Prepartum Supplementation Strategy on Cow-Calf Performance in May-Calving Mature Cows

Jacki A. Musgrave
Kacie L. McCarthy
J. Travis Mulliniks

Summary with Implications

Implementation of minimal supplemental protein strategies during late gestation may have the potential to minimize any negative postweaning progeny performance while decreasing feed costs. A 3-yr study was conducted to evaluate the effects of mid- to late-gestation supplementation strategies on reproduction, cow body weight, and calf performance in May-calving mature range cows grazing upland native range. Supplementation was provided 2x weekly with treatments being: 1) 0.5 lb per day of a 30% CP distillers-based supplement, 2) 1 lb per day of a 30% CP distillers-based supplement, 3) a negative control as a flexible supplementation strategy. The Flex strategy was developed to allow for brief and intermittent supplementation at 1 lb/d based on periods of acute environmental stress, such as snow cover, and is best described as flexible supplementation. Mid- to late-gestation supplementation strategy in May-calving cows had no effect on pregnancy rates or pre- and postnatal calf growth. Considering the cost for prepartum supplementation, feeding a protein supplement just during environmentally stressful periods during gestation appears to be a viable alternative to more conventional methods and reduces winter feed costs.

Introduction

Feeding accounts for a large portion of annual production costs in cow-calf production systems. Shifting from a spring to summer calving herd can decrease cost of supplementation and shifts timing of peak late gestation nutrient requirements and increased forage quality. May-calving beef cows in the Sandhills graze low-quality dormant forage during mid-gestation and calve on increased plane of nutrition. Due to the decreased forage quality and lower nutrient requirements, supplementation may be minimized to decrease winter prepartum supplementation costs in May-calving herds. Implementation of minimal supplemental protein strategies during late gestation may have the potential to affect postweaning progeny performance. Therefore, the objective of this study was to determine the impact of minimized protein supplementation by decreasing amount fed per day or the number of days fed on cow performance during late gestation, subsequent reproductive performance and subsequent offspring performance.

Procedure

This study was conducted over a three-year period (2019 to 2022) utilizing mature range beef cows from the May-calving herd at the University of Nebraska Gudmundsen Sandhills Laboratory (GSL) located near Whitman, NE. Cows (n = 315) were Husker Reds (5/8 Red Angus, 3/8 Simmental) and were stratified by cow body weight and BCS and assigned randomly to a prepartum supplementation treatment. Supplementation was initiated in December each year and terminated approximately 30-d prior to the start of the calving season in April. Supplementation was provided 2x weekly with treatments being: 1) 0.5 lb per day of a 30% CP distillers-based supplement (**Half**), 2) 1 lb per day of a 30% CP distillers-based supplement (**Pound**), or 3) a negative control (**Flex**). The Flex strategy was developed to allow for brief and intermittent supplementation at 1 lb/cow based on periods of acute environmental stress, such as snow cover, and is best described as flexible supplementation. The Flex strategy better reflects minimal practices that could be implemented by commercial operations in comparison with a no supplementation strategy that would rarely be found in extensive production settings. This Flex strategy relied on managerial discretion to supply protein supplementation when conditions were determined to be critical for cattle well-being, but the directive was to minimize usage. Supplementation rate, duration of supplemental feeding periods, total consumption, and supplemental costs are shown for each supplementation strategy by year for each prepartum treatment in Table 1.

Cow body weight (BW) and body condition score (BCS; 1 = emaciated, 9 = obese) by palpation were measured and recorded at weaning (December), pre-calving (April), and pre-breeding (July). After the termination of the prepartum treatments, all cows were managed similarly in a common pasture. Fertile bulls were introduced for natural service and removed on d 45 of the breeding season. Cow pregnancy diagnosis was detected via transrectal ultrasonography and rectal palpation at weaning each year.

After weaning, steers grazed subirrigated meadow with a dried distiller grain supplement or fed a background ration until May. In May, all steers grazed subirrigated meadow until Aug/Sept when steers were shipped to West Central Research and Extension Center (WCREC). Steers were placed in a GrowSafe feeding system approximately 2 weeks after arrival at WCREC. Following a 10-d acclimation period in the GrowSafe, steers were weighed 2 consecutive d and the average was the initial feedlot entry BW used in calculating feedlot performance. All steers experienced a 21d transition period to a common finishing diet of 48% dry rolled corn, 40% corn gluten feed, 7% prairie hay, and 5% supplement. All steers were implanted (Component TE-S, Elanco Animal Health) at feedlot entry. Each year, steers were slaughtered at a commercial facility (Tyson Fresh Meats, Lexington, NE) when estimated visually to have 0.5 inch fat thickness over the 12th rib as a group. Carcass data were collected 24 h post slaughter and final BW was calculated from HCW based on an average dressing percentage of 63%. Carcass

Table 1. Feeding rate, duration of supplemental period, total amount of supplement fed, and supplemental cost to cow receiving different prepartum supplements.

	Treatments[1]		
Measurement	Flex	Half	Pound
Year 1			
Cows, n	35	35	35
Rate, lb/d	1	0.5	1
Duration, d	0	112	112
Total fed, lb/cow	0	56	112
Supplemental cost, $/cow	0.00	8.40	16.80
Year 2			
Cows, n	35	35	35
Rate, lb/d	1	0.5	1
Duration, d	26	112	112
Total fed, lb	26	56	112
Supplemental cost, $/cow	4.23	9.10	18.20
Year 3			
Cows, n	35	35	35
Rate, lb/d	1	0.5	1
Duration, d	10	112	112
Total fed, lb	10	56	112
Supplemental cost, $/cow	1.75	9.80	19.60

[1] Supplementation was provided 2x weekly with treatments being: 1) 0.5 lb per day of a 30% CP supplement distillers-based supplement (Half), 2) 1 lb per day of a 30% CP supplement distillers-based supplement (Pound), 3) a negative control (Flex) on only fed during environmental stress periods.

Table 2. Effect of prepartum supplementation on cow performance

	Treatments[1]				
Measurement	Flex	Half	Pound	SEM	*P*-value
Cow BW, lb					
Weaning—on treatment	1118	1117	1124	12	0.88
Pre-calving	1077	1056	1107	17	0.11
Pre-breeding	1139	1118	1163	19	0.09
Weaning—off treatment	1104	1091	1118	22	0.69
Cow BW change, lb					
Weaning to pre-calving	-41[a]	-61[a]	-17[b]	11	0.05
Pre-calving to pre-breeding	62	62	56	13	0.82
Pre-breeding to weaning	-35	-27	-45	12	0.49
BCS					
Weaning—on treatment	5.2	5.2	5.3	0.2	0.89
Pre-calving	5.3	5.2	5.3	0.3	0.91
Pre-breeding	5.6	5.5	5.6	0.3	0.87
Weaning—off treatment	5.4	5.2	5.4	0.3	0.92
Pregnancy rate, %	91	92	91	4	0.91

[1] Supplementation was provided 2x weekly with treatments being: 1) 0.5 lb per day of a 30% CP supplement distillers-based supplement (Half), 2) 1 lb per day of a 30% CP supplement distillers-based supplement (Pound), 3) a negative control (Flex) on only fed during environmental stress periods.

data included HCW, marbling, yield grade, backfat, and LM area.

Data were analyzed as a randomized block design using the MIXED procedure (SAS Inst. Inc., Cary, NC, USA) with pasture as the experimental unit using the Kenward-Roger degrees of freedom method. Separation of least squares was performed by the PDIFF option in SAS when a significant ($P \leq 0.05$) effect was detected. Significance level was set at $P \leq 0.05$.

Results

At the initiation of the trial, cow BW was not significant ($P = 0.88$; Table 2) among prepartum supplementation treatments. In addition, prepartum supplementation strategy did not influence ($P \geq 0.11$) cow BW at pre-calving and at weaning the subsequent year. However, there was a tendency ($P = 0.09$) for cows on the Flex and Half treatments to be lighter at pre-breeding than their counterpart in the Pound treatment. Cows in the Pound treatment group did lose less ($P = 0.05$) BW from weaning to pre-calving than the Flex and Half groups. However, BW change from pre-calving to pre-breeding and pre-breeding to weaning was not influenced ($P = 0.49$) by the previous prepartum supplementation. In addition, BCS was not different ($P \geq 0.89$) at any time point of this study for the 3 different prepartum supplementation groups. Similarly, overall pregnancy rates were not influenced ($P = 0.91$) by previous prepartum supplementation. Prepartum dam supplementation did not influence ($P \geq 0.56$; Table 3) calf BW at birth, pre-breeding, or weaning. In addition, dam prepartum supplementation did not influence ($P \geq 0.45$) post-weaning steer performance or carcass characteristics through the finishing phase.

Conclusion

Mid- to late-gestation supplementation strategy in May-calving cows had no effect on pregnancy rates or calf growth and performance from birth throughout the finishing phase. Considering the cost for prepartum supplementation, feeding a protein supplementation just during environmentally stressful periods during gestation appears to be a viable alternative

Table 3. Effect of late gestation supplementation on subsequent offspring performance

	Treatments[1]				
Measurement	Flex	Half	Pound	SEM	P-value
Calf Pre-weaning BW, lb					
Birth	77	77	78	3	0.94
Pre-breeding	191	184	187	5	0.56
Weaning	484	477	485	7	0.76
Backgrounding BW, lb					
Jan	505	492	494	8	0.45
May	656	647	660	9	0.73
Feedlot BW, lb					
Entry (Sept)	991	983	987	9	0.76
Finishing (Jan)	1475	1480	1468	10	0.45
DMI, lb/d	30.2	30.3	29.7	3	0.66
ADG, lb/d	3.98	4.01	3.93	0.15	0.39
F:G	7.59	7.56	7.56	0.23	0.55
Carcass Characteristics					
HCW, lb	926	930	925	6	0.43
Choice or greater, %	88	87	90	4	0.86
Yield grade	2.82	2.69	2.83	0.22	0.69
LM area, in^2	15.13	15.33	15.09	0.25	0.73
Marbling score[2]	528	511	530	15	0.55
Backfat thickness, in	0.54	0.52	0.52	0.11	0.79

[1]Supplementation was provided 2x weekly with treatments being: 1) 0.5 lb per day of a 30% CP supplement distillers-based supplement (Half), 2) 1 lb per day of a 30% CP supplement distillers-based supplement (Pound), 3) a negative control (Flex) on only fed during environmental stress periods.

[2] Marbling score: 400 = Small^{00}, 450 = Small^{50}, 500 = Modest^{00}

to more conventional methods and reduces winter feed costs. Flexible supplementation strategies do require livestock producers to be more pro-active to environmental and livestock trigger points to intervene and start supplementing cows.

Jacki A. Musgrave, research technician.

Kacie L. McCarty, cow-calf extension specialist, Lincoln.

J. Travis Mulliniks, range nutritionist, West Central Research and Extension Center, North Platte.