Utilization of field pea and sunflower meal as dietary supplements for beef cows. - Progress Report -

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Summer calving cows can be managed on stockpiled perennial forages in southwestern North Dakota. Weight loss during grazing can be reduced with supplementation. Supplemental energy appeared to be the first limiting nutrient for beef cows grazing this type of forage. Field pea and sunflower meal appear to be effective feed ingredients in the formulation of supplements for beef cows grazing stockpiled perennial forage in late fall and early winter.

Summary

The objectives of this study were to determine if 1) field pea and sunflower meal can be used effectively as dietary supplements and 2) energy or protein is the first-limiting nutrient for beef cows grazing stockpiled perennial forage in the late fall/early winter. Twenty-one summer-calving cows grazed a pasture of stockpiled predominately native range in western North Dakota from November 14, 2001 until January 23, 2002. Stockpiling refers to the practice of allowing forage to accumulate in the absence of grazing for use at a later time. Cows were randomly allotted into four groups and groups were then assigned one of four supplemental treatments. Treatments included an unsupplemented control (CON) and three supplemented groups. Supplemental treatments were a barley (BAR)-, field pea (PEA)- and sunflower meal (SFM)-based pellet provided to individual cows in respective treatments three times a week. At the end of grazing, all cows were combined into one group and managed similarly for 28 days. Body weight (BW) did not differ among treatments throughout the trial. With the exception of days 28 and 42, body condition score (BCS) did not differ consistently among treatments. Treatment did not affect BW loss on day 14. On this day, cows had lost an average of 126 lb. Supplementation reduced BW loss compared to CON on days 42 and 70. Overall, supplementation reduced weight loss during grazing by 63 lb. BCS loss was reduced by supplementation on day 42. Under common management for 28 days post-grazing, overall BW, BW change, BCS and BCS change did not differ among treatments. In general during late fall and early winter, BW increased 75 lb and BCS decreased .3 units with 70 days of grazing and 28 days of recovery. Cattle grazing stockpiled perennial forages in southwestern North Dakota from mid November to late January lost body weight and condition score. Weight loss during this grazing period was reduced with supplementation. Energy appeared to be the first limiting nutrient and source of supplemental energy (barley, field pea or sunflower meal) did not affect body weight change. Most of the body weight and condition lost during grazing had been recovered by 28 days post-grazing.

Introduction

Narrow profit margins in the cow/calf sector of the beef industry require careful attention to production costs and associated levels of output. Extended grazing periods have been shown to decrease winter feed costs (a major component of overall cow/calf expenses). Management of precalving cow weight and condition change can enhance overall reproductive efficiency. Nutritional supplementation regimes may be necessary to manage cow weight and condition during extended fall/winter grazing periods. Dietary protein has been suggested to be the first-limiting nutrient in cattle grazing winter range. There are alternative crops and processing co-products that are higher in crude protein than typical feed grains that might be used effectively in protein supplements formulated for cattle grazing stockpiled perennial forage.

Objectives

- Determine whether field pea and sunflower meal can be used effectively as dietary supplements for beef cows grazing stockpiled perennial forage in the late fall/early winter.
- Determine whether either energy or protein is the first-limiting nutrient for beef cows grazing stockpiled perennial forage in late fall/early winter.

Materials and Methods

Twenty-one summer-calving cows (BW = 1386 ± 142 lb; BCS = 6.8 ± .64 units) grazed a pasture of stockpiled predominately native range in western North Dakota from November 14, 2001 until January 23, 2002. Stockpiling refers to the practice of allowing forage to accumulate in the absence of grazing for use at a later time. Cows were randomly allotted into four groups and groups were then assigned one of four supplemental treatments. Treatments included an unsupplemented control (CON; six head) and three supplemented groups (five head/group). Supplemental treatments were a barley (BAR)-, field pea (PEA)- and

sunflower meal (SFM)-based pellet. Supplemental treatments were chosen to supply additional energy and gradient levels of rumen-degradable protein (Table 1). Supplements were provided to individual cows in the supplemental treatments three times a week. Supplemental intake was limited to 3.0 lb/hd per day or 7.0 lb/hd per feeding. Adjustments to supplement delivery based upon adverse environmental conditions were not necessary in this year.

Cows were weighed (BW) and condition scored (BCS; Encinias and Lardy, 2000) at 14-day intervals throughout the course of the winter grazing period and at 28-d post-grazing. Herbage available for grazing was also sampled at 14-day intervals to detect changes in dry matter available for grazing. For sampling purposes the pasture was divided into two halves (east and west) and 5 sample sites were chosen per pasture half to represent major range types. Two .25 m^2 areas were clipped per site per sampling date. At clipping, forage was physically separated into grasses (G) and others (forbs; F). All forage was dried (55° C) to a constant weight. Dry weights of G and F were then used to calculate forage production per acre. Total forage available for grazing (T) was the sum of G and F.

At the end of grazing, all cows were combined into one group and managed similarly. Cows were moved to an unharvested corn field that had been previously grazed by beef heifers and supplied with approximately 23 lb/head per day of dry hay. Cows remained at this facility until grazing commenced the following spring.

Animal data were analyzed utilizing a completely random design with four treatments replicated across cows. Treatment represented a fixed effect and animal within treatment served as the experimental unit. Means were separated using orthogonal contrasts. Specific contrasts include 1) CON vs supplemental treatments, 2) BAR vs PEA and SFM and 3) PEA vs SFM. Forage yields were analyzed utilizing a randomized complete block design where pasture half was the blocking factor and sampling date was the main effect.

Results

Body weight and BCS are depicted in figures 1 and 2, respectively. Live weight did not differ among treatments ($P > .30$) throughout the trial. With the exception of days 28 and 42, BCS did not differ among treatments ($P > .20$). On day 28 ($P < .10$) and 42 ($P < .05$), PEA reduced BCS compared to SFM. Also on day 42 ($P = .01$), CON reduced BCS compared to other treatments.

Supplemental treatment ($P > .30$; Table 2) did not affect BW loss on day 14. On this day, cows had lost an average of 126 lb. Supplementation reduced BW loss compared to CON on days 42 ($P = .10$) and 70 ($P < .01$). Overall, supplementation reduced weight loss during grazing by 63 lb.

Loss of BCS ($P < .10$; Table 3) was reduced by supplementation on day 42. Among supplemental treatments, BCS loss tended to be reduced by SFM compared to PEA on day 42 ($P < .15$) and by BAR on day 70 ($P < .15$) (Table 3).

Under common management for 28 days post-grazing (day 96), overall BW and BCS and BW and BCS change did not differ among treatments ($P > .15$). In general during late fall and early winter, BW increased 75 lb and BCS decreased .3 units with 70 days of grazing and 28 days of recovery (Tables 2 and 3).

Forage available for grazing (T), grass (G), and nongrass (F) yield and change in yield was not affected by grazing date ($P > .15$; data not shown). Nonetheless, yields of T, G, and F were numerically reduced 368, 301 and 67 lb/ac, respectively, over the grazing season.

Conclusion

Cattle grazing stockpiled perennial forages in southwestern North Dakota from mid November to late January lost body weight and condition score. Weight loss during this grazing period was reduced with supplementation. Energy appeared to be the first limiting nutrient and source of supplemental energy (barley, field pea or sunflower meal) did not affect body weight change. Most of the body weight and condition lost during grazing had been recovered by late February.

Literature cited

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Table 1. Composition of total digestible nutrients (TDN), crude protein (CP) and ruminally degraded crude protein (DIP) in stockpiled perennial forage, barely, field pea and sunflower meal.

	Forage	Barley	Field Pea	Sunflower meal
TDN (% DM)	53	84	87	74
CP (% DM)	4.9	13	25	45
DIP (% DM)	-	10.3	19.5	34.2
DIP (% CP)	-	79	78	76

Sources: NRC, 1984, 1985; Hicking, 1994; Transtrom, et al., 2002.

Table 2. Effect of supplementation treatment on body weight change (lb).

Day of	Treatment[a]					Probability[b]		
trial	CON	BAR	PEA	SFM	SE	1	2	3
14	-128	-132	-140	-102	29.4	.90	.76	.37
42	-182	-102	-135	-106	35.9	.10	.68	.57
70	-164	-110	-97	-95	24.0	.03	.63	.96
96	65	64	95	76	22.1	.59	.44	.55

[a] Treatments included an unsupplemented control (CON) and three supplemented groups. Supplemental treatments were a barley (BAR)-, field pea (PEA)- and sunflower meal (SFM)-based pellet.
[b] Probability of a significant orthogonal contrast. Specific contrasts include 1) CON vs supplemental treatments, 2) BAR vs PEA and SFM and 3) PEA vs SFM.

Table 3. Effect of supplementation treatment on body condition score change.

Day of	Treatment[a]					Probability[b]		
trial	CON	BAR	PEA	SFM	SE	1	2	3
14	-.3	-.4	-.6	-.4	.24	.62	.74	.56
42	-1.2	-.6	-1.0	-.4	.25	.08	.74	.11
70	-1.0	-.4	-1.0	-.8	.27	.37	.14	.60
96	-.3	0.0	-.4	-.4	.26	.81	.23	1.00

[a] Treatments included an unsupplemented control (CON) and three supplemented groups. Supplemental treatments were a barley (BAR)-, field pea (PEA)- and sunflower meal (SFM)-based pellet.
[b] Probability of a significant orthogonal contrast. Specific contrasts include 1) CON vs supplemental treatments, 2) BAR vs PEA and SFM and 3) PEA vs SFM.

Figure 1. Effects of supplemental treatment and grazing days on body weight (BW). Supplemental treatments were an unsupplemented control (CON) and a barley (BAR)-, field pea (PEA)- and sunflower meal (SFM)-based pellet.

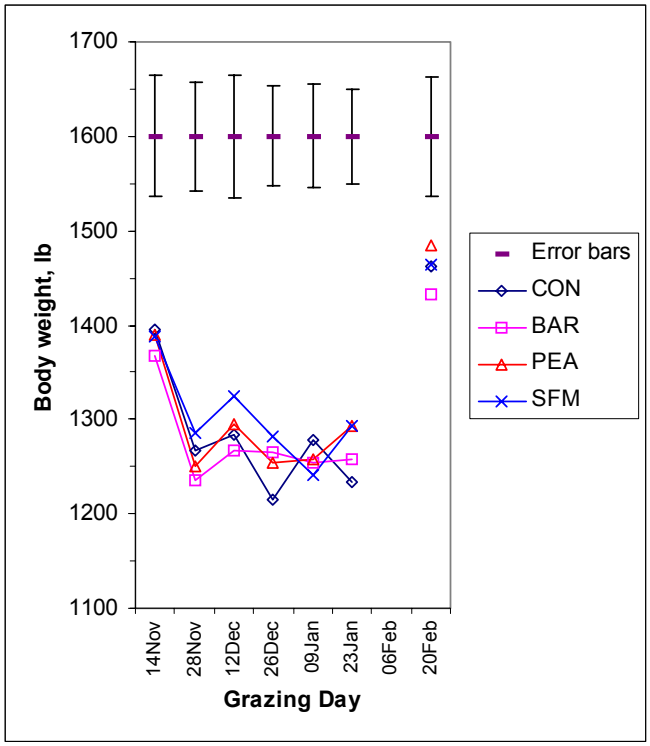

Figure 2. Effects of supplemental treatment and grazing days on body condition score (BCS). Supplemental treatments were an unsupplemented control (CON) and a barley (BAR)-, field pea (PEA)- and sunflower meal (SFM)-based pellet