Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 1011

1987

Effect of supplemental protein:ratio on the intake, digestibility, fill, and turnover of dormant bluestem range-grasses

T. DelCurto

R.C. Cochran

K.A. Jacques

See next page for additional authors

Recommended Citation

DelCurto, T.; Cochran, R.C.; Jacques, K.A.; Harmon, D.L.; Towne, G.; Avery, T.B.; and Vanzant, E.S. (1987) "Effect of supplemental protein:ratio on the intake, digestibility, fill, and turnover of dormant bluestem range-grasses," *Kansas Agricultural Experiment Station Research Reports*: Vol. 0: Iss. 1. https://doi.org/10.4148/2378-5977.2414

Effect of supplemental protein:ratio on the intake, digestibility, fill, and turnover of dormant bluestem range-grasses

Abstract

Feeding a low crude protein (12%) supplement depressed dormant bluestem range-grass fiber digestibility, whereas moderate (27%) and high (41 %) protein supplementation maintained forage digestibility and encouraged intake. Increased intake for moderate and high protein groups appeared to be associated with increased rumen dry matter and indigestible fiber fill.

Keywords

Cattlemen's Day, 1987; Kansas Agricultural Experiment Station contribution; no. 87-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 514; Beef; Protein:Energy ratio; Intake; Digestibility; Fill; Bluestem

Authors

T. DelCurto, R.C. Cochran, K.A. Jacques, D.L. Harmon, G. Towne, T.B. Avery, and E.S. Vanzant

Effect of Supplemental Protein:Energy Ratio on the Intake, Digestibility, Fill, and Turnover of Dormant Bluestem Range-Grasses

T. DelCurto, R.C. Cochran, K.A. Jacques, D.L. Harmon, G. Towne[1], T.B. Avery[2], and E.S. Vanzant

Summary

Feeding a low crude protein (12%) supplement depressed dormant bluestem range-grass fiber digestibility, whereas moderate (27%) and high (41%) protein supplementation maintained forage digestibility and encouraged intake. Increased intake for moderate and high protein groups appeared to be associated with increased rumen dry matter and indigestible fiber fill.

Introduction

Narrow profit margins for cow-calf producers necessitate optimizing both animal performance and native forage utilization. Protein supplements have been reported to increase dry matter intake (DMI) and digestibility (DMD) of poor quality forage. In contrast, energy supplements frequently have been reported to depress DMI and DMD. However, information on such responses for winter bluestem is limited. Therefore, we evaluated the influence of protein:energy ratio in supplemental feeds on intake and digestibility of dormant, bluestem range forage.

Experimental Procedures

Sixteen ruminally-fistulated yearling steers were allotted at random to four treatments: (a) control (no supplement); (b) low (12%) crude protein supplement; (c) moderate (27%) CP supplement, and (d) high (41%) CP supplement. The supplements were mixtures of rolled milo and soybean meal fed at approximately 2.2 lbs/hd/day (.5% of body weight).

Dormant native range forage was cut in January (1986), stored, and fed at approximately 15% above the average intake. Predominant species were big bluestem, little bluestem, indiangrass, and sedge. Kentucky bluegrass, sideoats grama grass, and switchgrass were minor constituents.

Steers were allowed 2 weeks (Jan. 15 to 31, 1986) to adjust to supplements and forage, then intake was measured for 7 days (Feb. 1 to 7). Steers were fitted with fecal bags, and fecal output was measured and sampled for the next 8 days (Feb. 7 to 14) to determine digestibility. Ruminal fill of indigestible fiber was determined by emptying the rumen, weighing and subsampling contents, and analyzing samples for indigestible acid detergent fiber. On Feb. 15, the steers were dosed with CoEDTA, and rumen samples were collected 0, 3, 6, 9, 12, and 24 hours after feeding to measure rumen fluid volume and liquid dilution rate.

[1]Dept. of Agronomy.
[2]Dept. of Surgery and Medicine.

Results and Discussion

Moderate (27%) and high (41%) protein supplements increased (P<.05) the intake of dormant range forage (Table 28.1). Forage intakes of steers receiving the low protein supplement were similar (P>.10) to those receiving no supplement. Dry matter digestibility of the total diet was enhanced by all three protein supplements. However, the low protein supplement depressed (P<.05) plant cell wall (NDF) digestibility. Calculated estimates of forage digestibility followed the same trend as measured cell wall digestibility. Rumen dry matter and indigestible fiber fills were larger (P<.01) for steers fed moderate and high protein supplements (Table 28.2). Intake response appears to be positively related to fiber fill. In contrast, liquid and indigestible fiber passage rates were not well related to intake. According to this study, improving the diet's nitrogen status stimulates consumption and improves utilization of low quality, bluestem range forage.

Table 28.1. Influence of Protein:Energy Ratio in Supplemental Feed on the Intake and Digestibility of Dormant, Bluestem Range Grasses

Item	No Supplement	Low Protein	Moderate Protein	High Protein	SE[a]
Forage intake (% body weight)[b]	.88	.85	1.36	1.22	.15
Supplement intake (% body weight)[b]	--	.50	.50	.50	--
Total dry matter intake (% body wt)	.88	1.35	1.86	1.71	.15
Dry matter digestibility (%)[c]	35.3	44.8	48.4	48.8	1.97
Plant cell wall (NDF) digestibility (%)[d]	37.9	29.9	39.9	38.6	2.17
Calculated forage digestibility (%)[d]	35.5	24.1	36.7	33.6	2.12

[a]SE = standard error, (n=4).
[b]Linear response to increasing protein level (P<.10).
[c]Quadratic response to increasing protein level (P<.10).
[d]Cubic response to increasing protein level (P<.10).

Table 28.2. Influence of Protein:Energy Ratio in Supplemental Feed on the Fill and Passage Rate of Dormant, Bluestem Range Grasses

Item	No Supplement	Low Protein	Moderate Protein	High Protein	SE[a]
Rumen dry matter contents (lbs)[b]	5.17	7.03	11.30	9.64	1.00
Indigestible fiber fill (lbs)[b]	2.11	2.50	4.74	3.81	.28
Indigestible fiber fill (% body weight)[b]	.92	1.04	1.90	1.62	.08
Indigestible fiber passage (%/hr)[b]	2.14	3.11	2.02	2.42	.27
Liquid dilution rate (%/hr)[b]	2.69	5.71	5.22	5.60	.42

[a]SE = standard error, (n=4).
[b]Cubic response to increasing protein level (P<.10).