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Effect of supplement strategy on intake and digestion of prairie hay by beef steers

Abstract

The effects of supple mental corn (4 lb/day), rumen-protected methionine (4.25 grams DL-methionine per day), or a cooked molasses block (1 lb/day) on intake and digestion of prairie hay were measured i n beef steers. Steers that consumed the cooked molasses block ate more forage than control steers, whereas forage intake was decreased by supplemental corn. Total tract organic matter digestion, expressed as a percent of intake, was numerically greatest for steers consuming the cooked molasses block. Digestible organic matter intake, a rough estimate of energy available to the steers, was unaffected by methionine but was increased by supplementation of either corn or the cooked molasses block. Digestible organic matter intake tended to be greater for the block than for corn. Providing protein in a more concentrated form (block) tended to be more beneficial, because the negative effects of starch (corn) on forage intake were avoided.

Keywords

Cattlemen's Day, 1997; Kansas Agricultural Experiment Station contribution; no. 97-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 783; Beef; Steers; Forage; Intake; Digestibility

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EFFECT OF SUPPLEMENT STRATEGY ON INTAKE AND DIGESTION OF PRAIRIE HAY BY BEEF STEERS

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Summary

The effects of supplemental corn (4 lb/day), rumen-protected methionine (4.25 grams DL-methionine per day), or a cooked molasses block (1 lb/day) on intake and digestion of prairie hay were measured in beef steers. Steers that consumed the cooked molasses block ate more forage than control steers, whereas forage intake was decreased by supplemental corn. Total tract organic matter digestion, expressed as a percent of intake, was numerically greatest for steers consuming the cooked molasses block. Digestible organic matter intake, a rough estimate of energy available to the steers, was unaffected by methionine but was increased by supplementation of either corn or the cooked molasses block. Digestible organic matter intake tended to be greater for the block than for corn. Providing protein in a more concentrated form (block) tended to be more beneficial, because the negative effects of starch (corn) on forage intake were avoided.

(Key Words: Steers, Forage, Intake, Digestibility.)

Introduction

Intake of dormant forage often is limited by nutrient deficiencies. Degradable intake protein often is the most limiting nutrient. Deficiencies of degradable intake protein can reduce forage digestion and intake, thereby reducing the energy available for maintenance and growth of cattle grazing dormant forages. To increase available energy, supplements based on grains or on more concentrated sources of protein often are fed. Differences have been noted in the ability of these supplements to increase available energy to cattle.

Methionine is thought to be the first limiting amino acid in microbial protein. Supplying that amino acid to cattle may improve performance with low levels of total supplement.

Another aspect of supplementing cattle grazing dormant forages is the time and cost associated with supplementation. Blocks can be used to supplement cattle with less time expenditure than hand-feeding supplements. With these points in mind, our objective was to investigate the effects of supplementation strategy on forage intake and digestion.

Experimental Procedures

Twelve British and British cross steers (average BW = 820 lb) were used in three, 4 × 3 incomplete Latin squares to evaluate the effect of supplement strategy on forage intake and digestion. Steers were penned individually in an open-front barn and provided ad libitum access to water and prairie hay (5.7% crude protein, 67.6% NDF (dry basis).

Treatments were: 1) control, no supplement, 2) 4 lb/day (as fed) of supplemental corn (.31 lb crude protein per day), 3) 5 grams/day of Smartamine-M®, a rumen-protected methionine product that provided 4.25 grams/day of DL-methionine, and 4) 1 lb/day of a cooked molasses block (.31 lb crude protein per day). All steers received 20 grams of salt daily. Smartamine-M was mixed with the salt.

The experimental periods were 21 days with a 14-day adaptation period followed by a 7-day intake and total fecal collection period. Orts

and fecal samples were collected daily in the morning, after which supplements and forage were offered.

Results and Discussion

One animal assigned to the cooked molasses block refused to consume his daily supplement; data from this steer were deleted from our analyses. Forage organic matter (OM) intake increased (P<.05) with cooked molasses block supplementation, but decreased with corn supplementation; rumen-protected methionine did not improve intake or digestion of forage (Table 1). Because animals assigned to the corn treatment received more supplemental OM than steers assigned to the other treatments, total OM intakes were similar between steers receiving corn and those receiving the cooked molasses block. This illustrates the substitution effect on intake of corn for forage. Organic matter digestibility was numerically highest for steers consuming the cooked molasses block. Corn did not affect digestion of the total diet, probably indicating that forage digestion was decreased when the highly digestible corn was included. Digestible OM intake, an indicator of energy available for maintenance and(or) growth, was increased by supplementation with either block or corn but tended to be higher for the block than for corn (P=.06).

In conclusion, supplemental corn increased digestible OM intake because the highly digestible starch more than offset its negative effect on forage intake. Digestible OM intake increased when animals received the cooked molasses block, because the additional protein (without extra starch) increased forage digestion, which subsequently increased forage and energy intake. Rumen-protected methionine was ineffective in stimulating forage intake or digestion by steers fed prairie hay.

Table 1. Intake and Digestion of Prairie Hay by Steers Fed Different Supplements

		Supplement			
Item	Control	Corn	Methionine	Block	SEM
Forage OM intake, lb/day	13.7[a]	12.1[b]	13.0[a]	15.3[c]	.24
Supplement OM intake, lb/day	.0	3.4	.0	.7	
Total OM intake, lb/day	13.6[a]	15.5[b]	13.1[a]	16.0[b]	.25
Digestible OM intake, lb/day	6.8[a]	7.9[b]	6.4[a]	8.6[b]	.25
OM digestibility, % of intake	49.6	50.3	49.6	53.5	1.2

[a,b,c] Means within rows without common superscript differ (P<.05).