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Supplemental Undegradable Intake Protein for Stocker Cattle Grazing Bermuda Pasture During Spring and Early Summer

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Story in Brief

An 84-d grazing trial was conducted on four eastern Oklahoma ranches to determine the effectiveness of supplemental undegradable intake protein to increase weight gain of stocker steers during early summer grazing. Three hundred forty-one cattle were used with average initial weight of 507 lb. Treatments were a monensin containing free choice mineral (CON), 2 lb per head per day of an energy supplement with monensin (EN), or EN formulated to provide an additional 60 g/d of undegradable intake protein from blood meal (UIP). Mineral consumption for CON was inadequate to provide equal monensin intake compared with EN and UIP. Both supplemented groups gained at a faster rate compared with CON. Weight gain of UIP supplemented cattle was slightly less than that of cattle supplemented with EN. This data suggests that microbial protein supply from the rumen was adequate to maintain animal performance in EN supplemented cattle.

(Key Words: Undegradable Intake Protein, Supplementation, Stockers.)

Introduction

Studies from several states have shown that a small amount of supplemental energy (Caton and Dhuyvetter, 1997) and undegradable intake protein (UIP) (Anderson et al., 1988; Kerley and Williams, 1995) improves weight gain in stocker cattle grazing summer pasture. Metabolizable protein (MP) supply may limit growth of cattle gaining greater than 1.5 lb per day when grazing lush cool season forages (Anderson et al., 1988). One study indicated performance may be improved when UIP is supplemented to cattle grazing summer and fall bermuda grass pasture (Morrison et al., 1994). No information is available regarding supplemental UIP for stocker cattle grazing bermuda grass pasture in spring and early summer. The objective of this study was to determine spring and early summer performance of stocker cattle grazing bermuda grass and supplemented with energy or energy plus 60 g additional UIP.

Materials and Methods

Three hundred forty-one crossbred steers and heifers with initial weight of 513 $\pm$ 65 lb were used in a completely random design to study the effect of energy and UIP supplementation on early summer weight gain. Treatments were free choice mineral with monensin (CON), 2 lb/hd/d of digestible fiber energy supplement with monensin (EN), and 2 lb/hd/d EN formulated with 10% (as fed) ring dried blood meal (UIP). Each treatment was replicated at four farm locations and supplement amount was prorated for 6 d per week feeding. The study was initiated on April 15, 1997 and continued through July 8, 1997 for a total of 84 d.

Cattle were weighed, individually identified and randomly assigned to treatment. Weights were taken every 28 d and cattle were rotated among pastures on weigh days at each location.

Mineral consumption was monitored and made available free choice to CON cattle at all times. EN and UIP groups were fed at approximately the same time each day in feed bunks with adequate bunk space available to each animal.

Results and Discussion

Table 1 shows calculated nutrient intake for each of the treatment groups. Undegradable intake protein supplement provided 60 g of additional escape protein and similar amounts of degradable intake protein, energy, calcium, phosphorus and potassium compared with EN.

Due to lower than expected mineral intake (average = 1.7 oz per head per day), monensin intake was significantly lower for CON compared with UIP and EN supplemented cattle.

Total gain was greater for both supplemented groups compared with control (P<.05). However, EN supplemented cattle gained more weight during the 84-d trial compared with UIP supplemented cattle. Evidently MP supply was not limiting for these cattle grazing bermuda pasture during spring and early summer. An explanation for reduced gains from EN supplementation is unclear. Excess nitrogen from the UIP supplement may have effectively reduced the net energy value of the diet slightly, due to the cost of converting excess nitrogen to urea.

The 1996 Beef NRC model was used to predict metabolizable protein supply for each treatment group. Animal, management, environment and diet inputs were adjusted to reflect actual data where available or estimated using tabular values when actual data were not available. Microbial efficiency was assumed to be 13% of TDN intake. Tabular values for degradable (DIP) and undegradable (UIP) protein fractions of spring bermuda forage were not available. However, 85% DIP is suggested for mature bermuda grass and 85% or higher is suggested for spring grass pasture in NRC (1996).

Control. Forage intake was assumed to be that predicted by the model. Forage digestibility was adjusted until predicted weight gain was identical to actual weight gain of Control cattle, resulting in forage digestibility of 63%. Even though monensin intake was lower than desired for Control cattle (89 g/d), weight gain and dry matter intake was adjusted for implanted cattle receiving an ionophore. When 85% DIP and 12% crude protein was used, the model predicted a 123 g/d excess of DIP and an 81 g/d deficiency of metabolizable protein. In this simulation, response from the ionophore may be overestimated, which would result in underestimated forage digestibility and underestimated MP supply.

EN and UIP. Actual supplement dry matter and tabular supplement digestibility was included in the model. Supplement dry matter averaged .3% of body weight. This amount of digestible fiber energy supplement would not be expected to influence forage digestion, but might be expected to reduce forage intake. Consequently, the same forage TDN value was used for EN treated cattle (mean = 63%). Forage intake was adjusted until predicted and actual gain were identical. Using 85% DIP and 12% crude protein, the model predicted a DIP excess of 128 g/d and a MP deficiency of 78 g/d. However, because the cattle did not respond to supplemental UIP, protein from microbial origin along with forage and supplement UIP was adequate to meet MP requirement. When the model forage protein fractions were adjusted to indicate adequate MP (DIP fraction reduced and UIP fraction increased), the NRC model suggested that the bermuda grass forage DIP fraction may be 70% or lower.

Literature Cited

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Table 1. Calculated nutrient supply from mineral and supplements.

	Treatment		
Item	Control	EN[a]	UIP[b]
Dry matter, g/d	50	808	808
TDN, g/d	9	580	581
Crude Protein, g/d	1.4	113	182
DIP, g/d	.9	75	84
UIP, g/d	.5	38	98
Ca, g/d	5.2	6.8	6.9
P, g/d	3.1	4.5	4.5
K, g/d	.3	10.6	10.0
Monensin, mg/d	89	150	150

[a]Energy supplement with monensin.
[b]Undegradable intake protein from blood meal.

Table 2. Least squares means for initial weight and weight gain.

	Treatment		
Item	Control	EN[a]	UIP[b]
Number of cattle	114	114	113
Initial weight, lb	508	509	504
Period 1 gain, lb[c]	60.1[d]	66.3[e]	67.9[f]
Period 2 gain, lb[c]	62.0[d]	74.5[e]	69.7[f]
Period 3 gain, lb[c]	37.1[d]	47.4[e]	39.0[f]
Total gain, lb	159.2[d]	188.1[e]	176.7[f]
ADG, lb	1.90[d]	2.24[e]	2.10[f]

[a]Energy supplement with monensin.
[b]Undegradable intake protein from blood meal.
[c]Period 1 = d 1 to d 28; Period 2 = d 28 to d 56; Period 3 = d 56 to d 84.
[d,e,f]Means within a row with different superscripts are different (P<.05).

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