

Energy Supplementation for Cattle Grazing Native Meadows

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Native flood meadows of Harney Basin are classified as seasonally wet because of the early spring snowmelt. Meadows are generally wet from April through June and control of flooding is minimal, which often prevents harvesting of forage at a point when quality is optimal. Grazing during May and June is an alternative management practice which is becoming more common. This strategy can provide excellent weight gains during late spring and early summer; however, performance is sometimes depressed when forage is immature. Actively growing immature forage often lacks the energy needed by animals to adequately digest the forage and produce positive weight gains. At other locations, small amounts of energy supplements have been shown to increase the efficiency of digestion and help put the animal in a positive energy balance. Thus, the objective of this study was to evaluate the effects of energy supplementation on intake, digestibility, digestive kinetics, and performance of heifers grazing native flood meadows.

MATERIALS AND METHODS

This study was conducted at the Eastern Oregon Agricultural Center (EOARC) located approximately 7 miles south of Burns, OR. The 55-acre pasture selected for the study was dominated by meadow foxtail, along with saltgrass, reed canarygrass, quackgrass, and Nevada bluegrass.

Two experiments were simultaneously conducted from May 3 until July 14, 1993. The first experiment, a performance trial, utilized 84 Hereford x Angus heifers (average beginning wt 598 pounds). Heifers were weighed, and randomly assigned to one of the following treatments (21 heifers/treatment): 1) Control (CON, grazing only); 2) Low (LOW, grazing plus 1.1 pounds cracked corn/head/day); 3) Medium (MED, grazing plus 1.65 pounds cracked corn/head/day); 4) High (HI, grazing plus 2.2 pounds cracked corn/head/day). Heifers were weighed every 14 days throughout the 72-day trial.

The second experiment utilized 10 ruminal cannulated Hereford x Angus steers (average beginning wt 609 pounds). Steers were weighed and randomly assigned to either CON or MED treatment groups (five steers/treatment). Steers were allowed to graze with the heifers, and were used to determine intake, diet digestibility, and digestive kinetics. Digestive kinetics were estimated using an external marker technique. Intake was then calculated from fecal output and diet digestibility.

RESULTS AND DISCUSSION

Nutrient composition of diets (Table 1) consumed by steers showed no differences ($P>.10$) between supplemented- and non-supplemented groups. Diet crude protein (CP) was 19.4 and 20.6 percent for supplemented and non supplemented steers respectively. In vitro organic matter digestibility (IVOMD) was not different between groups and averaged 73 percent.

Intake estimates were measured using IVOMD (digestibility of the diet) coupled with fecal output estimates (intake = fecal output/portion of diet not digestible), and expressed on an organic matter basis (adjusted for water and mineral content of forage). Organic matter intake was similar between groups (Table 2; $P > .10$), and averaged 12.6 pounds forage/day or 1.88 percent of body weight (BW) across treatments.

Although supplementation had no effect on forage intake estimates, digestive kinetics were influenced by supplementation. Particulate passage rate (%/hour) through the digestive tract was increased (Table 2; $P < .05$) from 2.7 percent for non-supplemented animals to 3.3 percent for animal receiving supplement. Rumen retention time (hours; total amount of time required for digestion or breakdown of forage as to allow passage from rumen to lower digestive tract) was decreased with supplementation (CON = 45.1, MED = 35.9; $P < .05$). Likewise, supplementation also decreased gastrointestinal mean retention time from 56.5 to 45.7 hours ($P > .01$). Gastrointestinal fill (pounds; total amount of organic matter "substance" in the digestive tract from rumen to rectum) was depressed with supplementation ($P < .05$). Supplemented animals had 4.23 pounds of fill compared to 5.26 pounds for non supplemented animals.

In vivo digestibility estimates are based on an in situ nylon bag that contains a preweighed sample of grazed forage. Nylon bags are then suspended in the rumen for various amounts of time. Extent of forage dry-matter disappearance, or the percent of forage digested from the nylon bag after 72 hours, was not effected by supplementation (Table 3; $P > .10$). Likewise, rate of forage dry-matter disappearance, or the percent-per-hour digested from the nylon bag, was not affected by supplementation (Table 3; $P > .10$; CON = 6.8, MED = 5.9).

Final heifer weights for the 72-day trial were similar across all treatments with a final average weight of 781 pounds (Table 4). Likewise, average daily gain (ADG) was also similar among treatments, and heifers gained approximately 2.2 pounds/day (Table 4).

CONCLUSION

Although some differences were noted in digestive kinetics; diet quality, rate of digestion, and intake estimates were all similar. Moreover, at the end of 72 days, no differences in weight or rate of gain were noted between supplemented and non-supplemented heifers. When the bottom line is pounds of gain and the cost of those pounds, under the conditions of this study it was not economically feasible to provide these animals with energy supplementation.

Table 1. Nutrient composition of diets consumed by steers grazing meadow forage during late spring, and receiving 0, or 1.65 pounds cracked corn.

Item ^a	Treatment	
	1.65	0
OM, %	83.7	82.8
NDF, %	55.7	55.5
ADF, %	31.1	30.3
CP, %	19.4	20.6
IVOMD, %	73.2	72.2

^aOM = organic matter; NDF = neutral detergent fiber, ADF = acid detergent fiber, N = nitrogen, IVOMD = in vitro organic matter digestibility.

Table 2. Organic matter intake, and digestive kinetic variables for steers grazing high-quality meadow vegetation and supplemented with 0 or 1.65 pounds cracked corn.

Item	Treatment	
	.75	0
Forage OM Intake, lbs	12.3	12.9
Particulate passage rate, %/h ^a	3.3	2.7
Rumen retention time, h ^a	35.9	45.1
Gastrointestinal mean retention time, h ^b	45.7	56.5
Gastrointestinal fill, lbs ^a	4.23	5.26

^aRow means differ (P<.05).

^bRow means differ (P<.01).

Table 3. Dry-matter disappearance of forage consumed by steers grazing meadow forage and receiving 0, or 1.65 pounds cracked corn.

Item	Treatment	
	1.65	0
Forage DM Disappearance		
72 h, %	86.3	88.0
Rate, %/h	6.8	5.9

Table 4. Average final weight (pounds) and average daily gain (pounds per day) of heifers grazing meadow forage and receiving cracked corn supplement during a 72-day trial.

Item	Corn Supplement (lbs/d)			
	0	1.1	1.65	2.2
Avg. weight, lbs	774 ± 75	774 ± 66	790 ± 68	785 ± 64
Avg. daily gain, lbs	2.2 ± .2	2.2 ± .2	2.4 ± .2	2.4 ± .2