Influence of Level of Daily Supplement Intake on Performance of Calves Grazing Rye-Ryegrass Pastures

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Summary

Fall-weaned calves were grazed on rye-ryegrass pastures to determine the influence of two levels of a corn-based supplemental feed on intake of ration and daily gain. The targeted levels of 2 lbs versus 4 lbs per head per day were successfully achieved using these two formulations. The 107-day average consumption was 2.32 and 4.05 lbs/day, respectively, for the two treatment groups. Calves receiving the 2 lbs and 4 lbs/hd/day rations gained 2.34 and 2.26, respectively, which was significantly (P<.07) more than those calves which grazed pasture without an energy supplement. The additional 2 lbs/hd/day (4 lbs total), therefore, had no positive effect on daily gain over that of the 2 lbs/day total. Steers gained 0.33 lbs/day more than heifers (2.37 versus 2.04).

Introduction

Research conducted previously at the Overton Center has documented the biological and economic benefits of supplementing a corn-based ration to stocker cattle grazing small grain-ryegrass pastures. The corn-based rations used were relatively effective in self-limiting calves to approximately 2 lbs/hd/day. The objectives of this study were to determine if a simple dilution of the base ration would be effective in limiting calves to 4 lbs daily; and to compare animal performance from rations that were consumed at 1X versus 2X rates.

Procedures

A total of 24 calves (1/2 Simmental x 1/4 Brahman x 1/4 Hereford), with an equal representation of steers and heifers, were allotted into six groups of four head each. These groups were then randomly assigned to replicates of the following three treatments: (1) winter pasture with free-choice mineral; (2) winter pasture plus a self-limiting corn-based supplement (1X); and (3) winter pasture plus a self-limiting corn-based supplement that would allow for a 2X consumption of ration. The targeted daily intake per animal was 2 lbs/day (1X) and 4 lbs/day (2X). A corn-based ration was selected which had been used in several previous trials in which cattle grazing winter annual grasses had group intake estimates of 2 lbs/hd/day. This ration, in the past, had contained 3 to 4 percent salt with other minerals and Rumensin to limit intake. Thus, the previously used ration with 4 percent salt was selected to provide 2 lbs/day intake and a ration which used one-half of the non-energy constituents were fed free-choice (Table 1). The rations were group fed in covered self-feeders with orts being measured at approximate 7-day intervals throughout the 107-day collection period (Feb. 21 to June 8). The total weekly consumption of each 4-head group was then used to calculate a daily intake per head.

TABLE 1. SELF-LIMITING SUPPLEMENTAL RATIONS FED TO CALVES GRAZING WINTER PASTURE

Ingredient	1X Ration	2X Ration
	% DM	
Ground corn	85.6	92.8
Salt	4.0	2.0
Limestone	2.0	1.0
Magnesium Oxide	1.0	0.5
Dicalcium Phosphate	7.0	3.5
Rumensin 60	0.15	0.075
Trace Mineral Pre-Mix	0.25	0.125

'Elbon' rye and 'Marshall' ryegrass were sod-seeded into bermudagrass pastures in early October 1988. The unseasonably dry fall prevented full-time grazing until mid-December. Calves were adjusted to pasture and rations before initiating the trial on January 4, 1989. The sudden, severe freeze in early February necessitated that animals be removed from all test pastures from February 6 to February 21, 1989. Thus, the daily intake data are shown only for the period of continuous grazing from February 21 to June 8, 1989. Pastures were stocked at approximately 1.8 calves per acre and adequate forage was available in all replicate groups to allow for *ad libitum*, selective intake of forage. Calves were weighed at approximate 28-day intervals throughout the duration of the trial.

Results and Discussion

The primary objectives of this trial were to feed two levels (1X and 2X) of a corn-based, self-limiting supplement and to evaluate: (a) the variability in intake of each group, and (b) the influence of supplemental feed on average daily gain (ADG). The weekly variation in ration intake among both replicate groups of each supplement level is shown in Table 2. With only minor exception, the 7-day period estimates of daily intake were similar within a ration level group throughout the trial. There were no clear indications that period had an effect on daily intake. Data are presented in

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TABLE 2. ESTIMATES OF DAILY INTAKE PER CALF ON A WEEKLY AND TRIAL-LONG BASIS FOR TWO SUPPLEMENT RATIONS

Date	No. Days	1X Ration			2X Ration		
		Rep 1	Rep 2	Average	Rep 1	Rep 2	Average
		lbs/day			lbs/day		
2-21 to 2-26	6	1.67	1.33	1.50	3.33	2.67	3.00
2-27 to 3-5	7	2.86	2.86	2.86	4.57	1.71	3.14
3-6 to 3-12	7	2.29	3.14	2.72	4.57	4.00	4.29
3-13 to 3-19	7	1.41	2.00	1.71	5.25	3.82	4.54
3-20 to 3-30	11	1.73	2.00	1.87	4.00	4.00	4.00
3-31 to 4-6	7	.98	2.29	1.64	2.29	2.13	2.21
4-7 to 4-12	6	2.67	2.67	2.67	5.33	2.67	4.00
4-13 to 4-18	6	2.46	3.43	2.95	5.33	2.67	4.00
4-19 to 4-25	7	3.43	3.43	3.43	6.86	4.57	5.72
4-26 to 5-3	8	2.50	1.50	2.00	5.59	6.06	5.83
5-4 to 5-10	7	2.11	2.29	2.20	3.54	4.07	3.81
5-11 to 5-17	7	2.25	2.57	2.41	1.04	5.14	3.09
5-18 to 5-24	7	2.29	2.29	2.29	4.57	6.86	5.72
5-25 to 6-1	8	2.00	2.00	2.00	4.00	2.00	3.00
6-2 to 6-8	6	3.00	3.00	3.00	3.50	5.33	4.42
Totals/Averages	107	2.22	2.42	2.32	4.25	3.87	4.06

Table 3 which shows the mean intake of both rations over time. The potential impact of climate and forage quality have not been assessed, but these two factors, along with body size, may be causal factors for differences in daily intake. Even though the daily intake of calves often exceeded the targeted rate by as much as twofold, the 107-day group average showed that these two rations successfully limited intake to 2.32 and 4.05 lbs/hd/day, respectively. Other trials (unpublished data) concerned with limiting the intake of feed on pasture would indicate that the relatively low level of salt used in this trial was successful in limiting intake because of the combination of other minerals and Rumensin. Previous research has shown that in the event that the minerals and Rumensin are omitted, significantly higher levels of salt than those used in this trial are necessary to limit intake to 2 lbs/hd/day.

The average daily gain of the 650-lb, spring-born-fall-weaned steers and heifers was 2.01 lbs/day from the winter pasture (Table 4). The magnitude of gain advantage for steers versus heifers (2.37 versus 2.04 lbs/day) was 0.33 lbs and was similar to the gain advantage obtained from those calves that received supplemental energy versus those calves which received only winter pasture. There was no advantage to feeding calves 4 lbs/hd/day (2X) over those calves which received 2 lbs/hd/day while grazing winter pasture. Both groups gained about 2.3 lbs/hd/day although there was a slight numerical, but not statistical, advantage for those calves which received 2 lbs/hd/day. Calves that initiated the

TABLE 3. AVERAGE INTAKE OF BOTH RATION TREATMENTS BY PERIOD

Period	Date	Average Daily Intake
6	3-31 to 4-6	1.92 d[1]
1	2-21 to 2-26	2.25 cd
14	5-25 to 6-1	2.50 bcd
12	5-11 to 5-17	2.75 bcd
5	3-20 to 3-30	2.93 bcd
2	2-27 to 3-5	3.00 bcd
11	3-20 to 3-30	3.00 bcd
4	3-13 to 3-19	3.12 abcd
7	4-7 to 4-12	3.34 abcd
8	4-13 to 4-18	3.47 abc
3	3-6 to 3-12	3.50 abc
15	6-2 to 6-8	3.71 abc
10	4-26 to 5-3	3.91 ab
13	5-18 to 5-24	4.00 ab
9	4-19 to 4-25	4.57 a

[1]Means followed by the same letter do not differ significantly at P<.05 (LSD).

TABLE 4. PERFORMANCE OF CALVES GRAZING WINTER PASTURE AND RECEIVING SUPPLEMENTAL FEED

Item	Initial Weight	Average Daily Gain	P<.05	P<.07
Supplement Treatments	(lbs)	(lbs/day)		
Pasture Only	654	2.01	b	b
Pasture + 1X Ration	653	2.34	a	a
Pasture + 2X Ration	656	2.26	ab	a
Sex			P<.01	
Steers	669	2.37	a	
Heifers	639	2.04	b	

winter pasture plus supplement treatments at 650 pounds in early January finished the grazing trial weighing 1,010 pounds on June 8. At P<.07, both of the supplement treatment groups had greater ADG than the group assigned to only winter pasture. The extra gain in this trial was 0.3 lbs from a 2-lb daily ration, or a feed:gain conversion of nearly 6:1. In previous trials, the conversion ratios have been about 2.5 to 3:1. Some of this discrepancy may be attributed to the shorter length of the 1988-89 trial due to the severe freeze in early February.

Another noteworthy portion of this trial was that the additional 2 lbs/hd/day (2X ration) was used in a substitutive role rather than an additive fashion. And, the economic incentives would favor using the 2 lbs/hd/day ration over either pasture only or pasture plus 4 lbs/hd/day ration. With $140/ton ration for example, the 0.3 lbs/day extra gain would cost about $0.40/lbs with the 2 lbs/hd/day ration. An extra pound of gain using the 2X ration would cost double that amount, or about $0.80/lb. Thus, only in unique pricing and margin situations would the 2X ration provide a positive economic return. In summary, the gain responses and feed conversions obtained in this trial would suggest that only small daily quantities (0.025%± of body weight) of an energy supplement may be cost effectively used on winter pasture. And, further, that if supplement cannot be limited by ration formulation, management decisions should be made to consider limit-supplementation by hand-feeding the desired daily levels of energy supplement on winter pasture. The end weight of the supplemented calves (>1,000 lbs) may allow these cattle to have a shorter residence time in the feedlot as compared to non-supplemented cattle. The overall size of the cattle used in this trial (650 initial and >1,000 lbs final weight) certainly affects the stocking rate and eventual gain per acre. Thus, several management factors are necessary to consider prior to adopting this approach to stocker grazing.