1988

Effect of Late Season Supplementation on Performance of Yearling Steers Grazing Mixed Native Range or Cool Season, Russian Wildrye Pastures

J.J. Wagner
South Dakota State University

P.S. Johnson
South Dakota State University

G. Bennett
South Dakota State University

EFFECT OF LATE SEASON SUPPLEMENTATION ON PERFORMANCE OF YEARLING STEERS GRAZING MIXED NATIVE RANGE OR COOL SEASON, RUSSIAN WILDRYE PASTURES

J. J. Wagner[1], P. S. Johnson[1] and G. Bennett[2]
Department of Animal and Range Sciences

CATTLE 88-8

Summary

Seventy-six yearling, black-baldy steers were utilized in a grazing experiment to study the effect of level of late summer, early fall protein supplement (1 versus 2 lb, 40% all natural) and type of fall pasture (mixed native range versus Russian wildrye) on average daily gain. Cattle were purchased in May as part of a larger group and gained at the rate of 1.4 lb per head daily prior to initiation of the study on September 1, 1987. Average daily gain was not affected by pasture type. Steers grazing native range and Russian wildrye gained .81 and .72 lb per head daily, respectively, during September and October. Daily gain was significantly ($P<.05$) greater for steers receiving 2 lb of supplement than for steers receiving 1 lb (1.01 vs .515 lb per head daily, respectively). Providing 2 lb of a 40% all natural protein supplement improved range utilization for growth.

(Key Words: Yearling Steers, Protein Supplementation, Native Range, Russian Wildrye.)

Introduction

Thousands of yearling cattle graze ranges and pastures in western South Dakota each summer. Performance by these cattle is related to several factors, including growth potential of the cattle, forage quality and availability, and type and level of supplementation.

Cattle performance is typically greatest early in the grazing season and markedly lower during late summer and early fall. This reduction in performance is due to an increase in the energy requirements of the cattle combined with a decline in forage quality and/or availability.

Rangeland vegetation in western South Dakota can be divided into two categories: native and introduced. Native pastures are typically a mix of warm and cool season grasses, with the cool season components increasing as range condition improves. Introduced pastures are commonly a monoculture of cool season grasses, primarily crested wheatgrass or Russian wildrye. Native pastures produce forage in both the cool (spring and fall) and warm (summer) seasons, although cool season production is generally the most limiting. Introduced cool season pastures are extremely productive in spring and fall, given adequate moisture, but provide no new forage in summer. Cool season production in introduced pastures is typically greater than that of native pastures even when the cool season component of the native pasture is very high.

Forage quality is largely determined by the type of grass available to the grazing animal and the season in which it is consumed. Quality is always highest during the season of active growth and declines as the grasses mature and/or become dormant. Warm season grasses produce large quantities of relatively good quality forage during summer but show a sharp decline in quality as the grasses mature in late summer and early fall. Growth of cool season grasses occurs principally in the spring. However, they may also produce good quantities of green forage in fall if moisture is adequate. Growth during a dry fall is minimal or nonexistent, leaving only the less nutritious mature forage for the grazing animal.

It has been shown that cattle grazing cool season grasses in a fall with sufficient moisture for plant growth outperform cattle grazing warm season pastures in the same season. This advantage is likely reduced during a dry

---

[1]Assistant Professor.
[2]Herdsman, Range and Livestock Research Station, Philip.

fall. Studies in Oklahoma and Kansas have shown that limited amounts of protein supplement provided during late summer and early fall to cattle grazing warm season grasses improved both forage digestibility and intake and thus performance. It is not clear, however, whether protein supplementation of cattle grazing cool season grasses in fall would result in similar improvements in performance. Nor do we know the relative effects of providing protein supplements to cattle on warm and cool season grass pastures during relatively dry or wet seasons.

The objectives of this research were to (1) compare performance of cattle grazing either native mixed pasture (having both warm and cool season grass components) or Russian wildrye (a cool season grass) in late summer and fall, (2) determine differences in cattle performance due to different levels of protein and energy supplementation in late summer and fall for cattle grazing native mixed and cool season pastures and (3) determine differences associated with wet and dry fall growing conditions. The data presented in this paper represent only the first year of this ongoing study.

Materials and Methods

This study was conducted at the Range and Livestock Research Station (RLRS) near Philip, South Dakota. Seventy-six yearling, black-baldy steers were randomly allotted to four native and four Russian wildrye pastures in fall 1987. These steers were purchased in western South Dakota as part of a larger (125 head) group in early May at an average weight of 585 lb. The cattle had grazed experimental native range pastures during summer 1987, with an average gain of 1.4 lb/day.

The number of steers in each fall pasture varied from 6 to 12 depending on pasture size and forage production. Stocking rates were very light in order to avoid limiting forage availability during the study. Cattle in two of the native and two of the Russian wildrye pastures were fed 1 lb of a 40% all natural protein supplement per head daily. Cattle in the remaining native and Russian wildrye pastures were fed 2 lb of the same 40% supplement daily. Cattle in each pasture were fed the daily supplement allotment as a group in feed bunks. Cattle were weighed at the beginning of the study (September 1), at 30 days and again at 62 days following an overnight withdrawal of feed and water.

The experiment was a completely randomized design having a 2 x 2 factorial arrangement of treatments. Pastures were used as experimental units and the variable of interest was average daily gain.

Results and Discussion

During the summer grazing season all cattle gained an average of 1.40 lb per head daily. Late summer, early fall gains averaged .52 and 1.01 lb per head daily for the cattle receiving 1 and 2 lb of supplement, respectively (Table 1). Differences in gain between cattle grazing native and Russian wildrye pastures were not significant. Interactions between supplement level and pasture type were not significant.

Late summer and fall of 1987 were particularly dry at the Station. As a result, fall growth of Russian wildrye and native cool season grasses was limited. Most of the available forage in the Russian wildrye pastures represented growth that had occurred in the spring. This forage was dormant during the summer and of lower quality than what is typically available from Russian wildrye pastures in the fall. Forage available in native pastures was a combination of herbage produced in spring and summer and of relatively low quality during this study. It is likely, then, that supplemental protein improved digestibility and intake of Russian wildrye and the native warm and cool season grasses. During years of adequate fall rainfall, however, the level of improvement in weight gains in response to supplementation may not be observed.

Energy intake required for the observed level of performance was calculated using net energy relationships (NRC, 1984, Table 2). Cattle fed 2 lb of supplement achieved .495 lb per head greater daily gains than those fed 1 lb. This additional gain should require an additional .28 Mcal of net energy for maintenance (NEm) and an additional .98 Mcal net energy for gain (NEg). Assuming the energy content of the supplement was approximately .76 Mcal/lb NEm and .51 Mcal/lb NEg, 2.29 lb of additional supplement would be required to provide the additional energy. Feeding an additional 1 lb of supplement could not account for the observed performance increase from an energy perspective. Clearly, the additional pound of supplement must have increased forage digestibility and/or intake.

TABLE 1. LATE SEASON PERFORMANCE OF YEARLING STEERS[a]

Range type	Level of supplement 1 lb	2 lb	Average[b]
Native	.45	1.16	.81
Russian wildrye	.58	.86	.72
Average[bc]	.52	1.01	

[a] Average daily gain, lb.
[b] Standard error of the mean = .067.
[c] 1 lb vs 2 lb (P<.05).

TABLE 2. NET ENERGY REQUIRED FOR OBSERVED PERFORMANCE

Range type	Level of supplement 1 lb	2 lb	Average
Native	6.36[a]	6.70	6.53
	.71[b]	2.12	1.42
Russian wildrye	6.40	6.62	6.51
	.95	1.51	1.23
Average	6.38	6.66	
	.83	1.81	

[a] Net energy for maintenance requirement, Mcal/day.
[b] Net energy for gain requirement, Mcal/day.

The observed level of performance for cattle offered 2 lb per head daily would amount to 30 lb additional gain over the cattle fed 1 lb of supplement. If 850-lb yearling cattle were worth $70.00/cwt and the supplement cost $350/ton, an additional $10.15/head could be earned by feeding 2 lb of protein supplement per day over 1 lb (Table 3). Information in Table 3 applies only to forage conditions and relative performance differences observed in this study. Caution should be exercised when applying these results to other sets of conditions.

TABLE 3. INCREASE IN RETURNS WHEN PROTEIN SUPPLEMENT IS INCREASED FROM 1 TO 2 LB DAILY[a]

Supplement cost, $/ton	Sale price, $/cwt 60.00	65.00	70.00	75.00	80.00
250	10.25	11.75	13.25	14.75	16.25
300	8.70	10.20	11.70	13.20	14.70
350	7.15	8.65	10.15	11.65	13.15
400	5.60	7.10	8.60	10.10	11.60

[a] Per head return based on 62-day supplementation period.

It is unclear whether feeding 1 lb of supplement and maintaining ownership of the cattle for 62 additional days would be profitable, since no unsupplemented group was available. If interest costs and costs associated with feeding supplement (fuel, labor, repairs and feed bunks) are sufficiently high, the additional 62-day grazing season may not be economical. To estimate potential returns for the additional 62 days on grass, assume an interest rate of 12% and a purchase price of $90.00/cwt. Interest expense on 62 days of additional grazing would be $10.73/head [(585x$0.90x0.12)/365]x62. At a sale price of $70.00/cwt, an additional 15.3 lb/head (10.73/.70) gain or .247 lb/head daily is needed over the last 62 days to pay the additional interest expense. If it cost $1.50 per head to feed the supplement to the cattle for 62 days plus 62 lb of supplement at $.175/lb, an additional 17.6 lb/head ([1.50+(62x.175)]/.70) gain or .285 lb/head daily would cover supplementation costs. Total gain needed to cover supplementation plus interest costs would be 32.9 lb/head (15.3+17.6) or .532 lb/head daily. Cattle fed 1 lb of supplement only gained .515 lb/head daily. Based on the above assumptions, a net loss of $.73/head ([.515x62x.70]-[10.73+1.50+10.85]) would have been realized.

Feeding 2 lb of supplement per head daily would cost an additional $.175/head daily. Costs such as fuel, labor, repairs and feed bunks would probably not be any more for the 2 lb regimen than for 1 lb. Total gain needed to cover the costs associated with feeding 2 lb of supplement daily would be 48.4 lb/head (32.9+[.175x62/.70])or .781 lb/head daily. If cattle are grazing under similar conditions, it seems appropriate to increase protein supplementation to 2 lb/head daily.