

Steer Diets in Southeastern Colorado

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Highlight: Hereford steers having continuous access to seeded, native, and old field pastures selected over 96% of their diet from six species of grasses and forbs. Changes in species preferences due to availability and maturation of plants caused shifts in summer grazing use made on the different pastures. A grazing proposal based on diets and the periods when steers preferred different forage species is to use old field pastures from mid-spring to early summer, seeded pastures in mid-summer, and native pastures in late summer through fall.

Cattle production in southeastern Colorado is an economically important industry. Gross income from the sale of cattle grown on pastures and rangelands has increased annually for the past decades (Guellow and Jones, 1961). Lands on which the grazing industry depends support three vegetation types: native, seeded, and old fields. Much of the land that was cultivated from the 1880's to the 1930's was abandoned after the drouth and economic depression of the latter decade. Thousands of hectares of this formerly cultivated land have been used for grazing since abandonment (Underwood, 1944; U.S. Bureau of the Census, 1972). Part of this former cropland is in various successional stages (old field pastures) while the remainder has been reseeded with native grasses. Other lands not cultivated have been used continuously for grazing since the area was first settled.

The purpose of this study was: (1) to determine dietary habits of grazing steers having access to either seeded, native or old field pastures during the growing season; and (2) to propose a grazing scheme from the dietary information which will allow more efficient use of available forage.

Study Area and Procedures

Research was conducted on three 16-ha pastures on the Southeastern Colorado Branch Experiment Station, located 16 km southwest of Springfield, Baca County, Colorado. Data were collected from May 1 to October 15, 1967, and from July 1 to October 15, 1968. Each pasture represented one of the three vegetation types commonly found in the area: seeded, native, and old field. The seeded pasture in this study had been reseeded to sideoats grama (*Bouteloua curtipendula*) and blue grama (*B. gracilis*) in 1961. The three pastures were adjacent with no intervening fences. Eight yearling Hereford steers used for observations were free to graze in all pastures. Stocking rate was 2.5 acres per steer month, which allowed light to moderate use of the pastures.

The general area is characterized by climatic and biological factors typical of the Central and Southern Great Plains

regions. The climate is a semiarid, temperate, continental type; irregular rainfall patterns characterize the seasons and the year. The average annual precipitation for the past 12 years from the U.S. Weather Station located 5 km northeast of the study pastures (station headquarters) is 37 cm. About 80% of the annual precipitation falls during the growing season. Winter snows are infrequent and contribute little to soil moisture. Evaporation from a freewater surface averages 170 cm from April 1 to October 31 (Table 1). The average temperature since 1957 is 11.6°C with an annual maximum near 38°C and the minimum near -22°C. The period between frosts is approximately April 15 to September 30. However, the length of the growing season is dependent upon moisture availability rather than temperature.

During the 1967 and 1968 growing season, the plant composition in each pasture was determined by a variation of the step-point method proposed by Evans and Love (1967). Sampling was in mid-growing season and nearly all plant species growing on the pastures were detected. Most plants growing on the pastures were perennials, and little difference in composition was noted between years. Therefore, composition data for each pasture were averaged for both years.

Steer diets were determined by counting the number of bites a steer ate of each plant species. Steers were observed almost every morning and evening on 5 continuous days every other week throughout the two summers. Generally, only one steer was observed for any observation period, and all steers were observed at least once in a sampling week. Observation periods usually lasted 75 minutes. The morning period started a few minutes after sunrise, and the evening period was completed while a few minutes of sunlight remained.

Steers were observed from a pickup truck which did not visibly influence the movements of the steers as they grazed. Identification of plant species being eaten was aided by using 7 X 35 mm binoculars. To aid identification of plants being grazed, the pastures were mowed to a 4-inch stubble each

Table 1. Precipitation (cm) and evaporation (cm) data for Southeastern Colorado Branch Experiment Station, Springfield, for the growing seasons of 1967 and 1968.

Months	1967 ¹		1968 ²	
	Precip.	Evap.	Precip.	Evap.
April	2.3	28.0	1.0	20.9
May	2.3	24.1	5.8	22.6
June	12.2	24.2	2.3	35.3
July	4.7	25.0	10.1	32.2
August	5.2	24.0	2.8	27.1
September	2.8	19.5	0.5	24.2
October	0.4	18.9	0.2	19.3
Total	29.9	163.7	22.7	175.1

¹ Precipitation = 0.18
Evaporation

² Precipitation = 0.13
Evaporation

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spring to remove old growth. Removal of old growth also allowed steers to graze more selectively.

The bites selected from each plant species were recorded as some fraction of a bite (air-dry basis) of sand dropseed (*Sporobolus cryptandrus*). This comparison was made for each observation week by handplucking samples of plant species most abundant in steer diets. The mean dry weight for a handpluck of each plant species was calculated as a fraction of the mean dry weight for a handpluck of sand dropseed. This produced constants which were multiplied times the number of bites eaten of each respective plant species. This computation allowed a comparison of bites eaten from various sized plant species. The percent that each plant species contributed to diets was averaged for all three pastures for each month of observations. Diets for both summers, being very similar on a month-to-month basis, were averaged.

Grazing time on each pasture was recorded during observation periods. The percent of time steers spent grazing on each pasture was similar for both years, and was averaged for both years into 2-month segments.

Results and Discussion

Plant Composition of Pastures

Each pasture had two perennial grasses which comprised at least 65% of available herbage (Table 2). The two most common grasses on the seeded pasture were sideoats grama and blue grama. The most frequent grasses on the native pasture were blue grama and buffalograss (*Buchloe dactyloides*); on the old field pasture sand dropseed and buffalograss were most abundant. Other grasses besides blue and sideoats grama found on the old field pasture comprising 2% to 12% of the vegetation were three-awns (*Aristida* spp.), western wheatgrass (*Agropyron smithii*), and tumblegrass (*Schedonnardus paniculatus*). Kochia (*Kochia scoparia*) and lambsquarter (*Chenopodium album*) were the most common forbs present on all three pastures. Other forbs were present in trace amounts and were occasionally eaten by the steers. Common forbs included within this group were slimflower scurfpea (*Psoralea tenuiflora*), scarlet glovemallow (*Sphaeralcea coccinea*), fetid marigold (*Dyssodia papposa*), common sunflower (*Helianthus annua*), and Russian thistle (*Salsola kali*).

Aerial plant cover on all pastures averaged over 80% with the seeded pasture having slightly less than the other two. Most plant species were perennial in nature, thus, only slight variations were found in species composition between years.

Diets

Steer diets in southeastern Colorado were comprised of nearly all plants present on seeded, native, and old field

Table 2. Average botanical composition (%) by step-point frequency on three pastures in 1967 and 1968.

Species	Pastures			
	Seeded	Native	Old field	Average
Grasses				
Blue grama	13.2	37.6	3.4	18.1
Buffalograss	5.2	41.0	27.4	24.5
Sand dropseed	4.4	8.4	38.2	17.0
Sideoats grama	65.3	1.2	2.2	22.9
Forbs				
Kochia	4.3	3.9	5.4	4.5
Lambsquarter	0.4	1.8	1.4	1.2
All others	7.2	6.1	22.0	11.8

pastures. This agrees with findings of others, including Springfield and Reynolds (1951), who found cattle selected a wide variety of plants when given free choice. Steers ate the more common plants in both summers: blue grama, buffalograss, sand dropseed, sideoats grama, kochia, and lambsquarter (Table 3). Dominant grasses on each pasture made large contribution to steer diets although seasonal changes in preference were evident. Sand dropseed was important in May and June and then declined during the remainder of the season, although still dominant in July and August (Table 3). Blue grama made up 20% to 25% of the diets until late season when it became dominant. Sideoats grama and sand dropseed are similar in appearance and growth form, and both initiate growth earlier than either blue grama or buffalograss. Since steers appeared to seek green forage after eating dry winter feed, sand dropseed and sideoats grama contributed considerably to spring diets. Sand dropseed was preferred over sideoats grama by the steers, even though more of the latter was available on all 3 pastures. After blue grama and buffalograss started growing, the steers ate more of these two species, possibly because the steers preferred new green growth, or because sand dropseed and sideoats grama were becoming less palatable due to maturation.

Buffalograss consumption was not related to availability (Fig. 1). Dwyer (1961) observed that cattle ate very little buffalograss on "shallow sites" in northern Oklahoma even though it comprised over 57% of the vegetation on this site. In the present study, buffalograss contributed little to diets throughout 1967 and in early 1968, but in October, 1968, over 45% of forage selected from native pasture was buffalograss. The reason for the difference between the 2 years was that luxuriant forage of many species was available to the steers in 1967, whereas in 1968 the vegetation was drier and, during the latter part of the season, the lower half of buffalograss plants was essentially the only green forage

Table 3. Average botanical composition (%) of diets of steers having free access to seeded, native, and old field pastures in 1967 and 1968.

Species	Month						Average
	May ¹	June ¹	July	August	September	October	
Grasses							
Blue grama	26.0	19.9	26.3	17.3	36.0	46.6	29.1
Buffalograss	8.8	5.1	3.2	1.1	6.0	18.2	8.1
Sand dropseed	37.3	48.2	29.1	34.1	22.7	11.7	31.2
Sideoats grama	23.0	17.7	18.9	17.2	4.5	6.5	16.4
Forbs							
Kochia	1.4	7.4	19.7	28.3	15.5	10.6	10.2
Lambsquarter	—	1.0	1.5	0.5	14.2	4.9	2.9
All others	3.5	0.7	1.3	1.6	1.1	1.6	2.1

¹ 1967 data only.

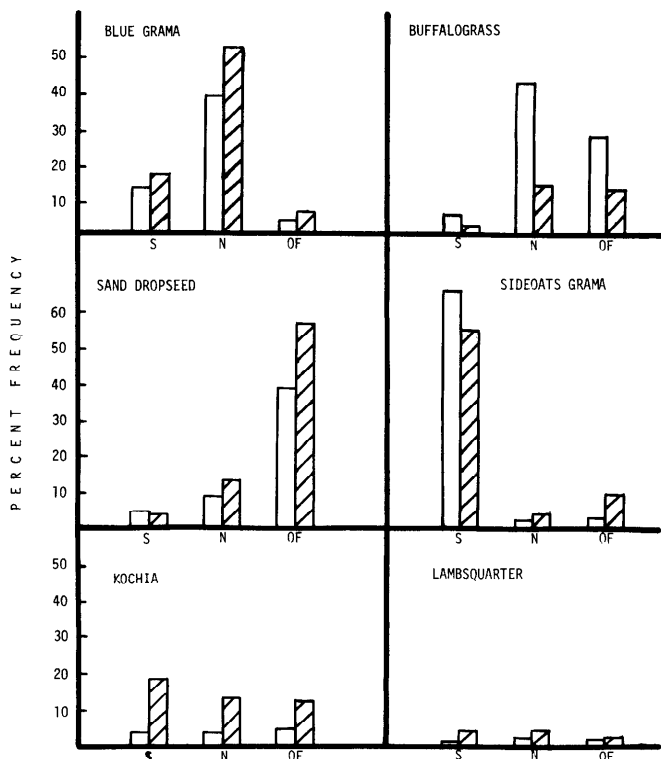


Fig. 1. Frequency of six key forage species in steers' diets (crosshatched bar) and that available on seeded (S), native (N), and old field (OF) pastures (open bar).

available. Buffalograss does not appear to be an important forage plant during the growing season in this area. However, ranchers who live in the area report that it is readily eaten by cattle during the fall and winter.

Forbs were important in steer diets on all three pastures. Kochia and lambsquarter were the most abundant forbs and were eaten readily when available. Kochia became important in the diet when it attained 8 to 10 cm in height, which usually occurred about 1 month after sufficient soil moisture was available for growth. Thereafter, plants of kochia were sought and eaten with relish during all stages of growth on all three pastures.

In 1967 lambsquarter was eaten while immature, and again after seed maturity. Steers would wrap their tongues around the lambsquarter plants and pull upward, taking in seed and any leaves present. In 1968 lambsquarter was scarce and never comprised over 2% of the diets. According to Hoehne et al. (1968), luxuriant growth of lambsquarter depends on average or above-average rainfall during the growing season in western Nebraska. During this study, precipitation in 1967 was near the long-time average, and in 1968 it was 13 cm below the long-time average. The shortage of moisture available in June, 1968, may have been partially responsible for the scarcity of lambsquarter, and may explain why it was not abundant in steer diets that year. The steers ate many other forbs, including Russian thistle, fetid marigold, common sunflower, scarlet globemallow, and slimflower scurfpea, but not in a regular pattern nor in any large quantities.

Steer preference for plant species was affected by phenological stage. Nearly all species of plants were eaten while young and growing. When flowering started, some species were no longer eaten while others became preferred. Steers ate the culms and inflorescences of blue grama,

buffalograss, sand dropseed, and sideoats grama when these were encountered, but generally grazed on regrowth from plants of grass grazed previously. After grasses matured, steers tried to find plants that were partially green. In contrast, when forage was lush, steers appeared to purposely select dry, mature plants after eating a considerable quantity of lush forage. When dry plants were wet from either dew or rain, the steers did not exhibit any preferences among the plants they selected to eat. Similar observations have been reported by Springfield and Reynolds (1951) and Dwyer (1961).

Time spent grazing on each pasture was quite similar for both years. Time spent on the old field declined from 50% in May and June to 24% in September and October (Fig. 2). Grazing time on the native pasture increased as the season progressed, which correlates directly with seasonal changes in steer diets. Animals never grazed seeded pasture as long as the other pastures. The seeded pasture was farthest from water, being 400 m away, but distance from water was not regarded as the reason for the lesser amount of grazing on this area. Steers may have slighted this pasture because of the predominance of sideoats grama and the lack of other preferred plants. Most sideoats grama present was yellow-green in color, and steers appeared to prefer dark-green plants. All the sideoats grama plants on the native and old field pastures were dark green and were highly preferred by the steers. Steers utilized yellow-green plants on the seeded pasture only during the last few weeks of both summer grazing seasons. Dwyer et al. (1964) reported that cattle did not utilize yellow plants of sideoats grama and attributed color difference between plants to the differing amounts of soil nitrogen.

Grazing Program

Results of this study indicate that successful grazing programs for this area should be based only on perennial plants; any annual plants are a luxury to cattle diets. This is exemplified by the amount of lambsquarter available as forage between the two summers. Based on the steer's selection of predominant perennial grasses (Table 3) and time spent grazing on a particular pasture (Fig. 2), the following proposal should benefit cattle and pastures:

Old field pastures—late April to early July
Seeded pastures—early July to mid-late August
Native pastures—late August to late fall.

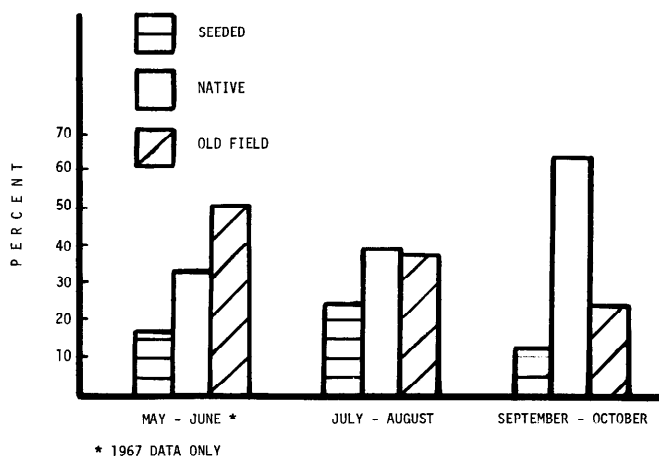


Fig. 2. Mean percent grazing time steers spent on either seeded, native, or old field pastures in 1967 and 1968.

