Coastal Bermudagrass Utilization: Soilage vs. Continuous Grazing[1]

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For the past two centuries agriculture of the Southeast has been associated with row crops, particularly cotton, peanuts and tobacco. Recently major changes have taken place in the southeastern states. In 1959 (Georgia Crop Reporting Service) livestock and poultry accounted for 52.3 percent of Georgia's agricultural income. Only 30 years earlier livestock and poultry accounted for only 14.6 percent of the farm income.

Other changes have been equally large. Today open ranges are disappearing. Poor quality low yielding forage plants are being replaced by higher yielding crops that are more responsive to management. As late as 1936 Starr (1936) stated that increased yields of common Bermudagrass *(Cynodon dactylon* (L.) Pers.) were needed if that plant was to be of much value to the livestock farmer. Since that time the new and much superior hybrid Coastal Bermudagrass has been developed and widely distributed. To secure answers to some of the problems associated with economical utilization of this plant the research reported in this paper was conducted in the summer of 1958.

Review of Literature

Most of the published data concerning Coastal Bermudagrass utilization concerns its use as a grazing crop or as hay or silage.

The advantages of Coastal Bermudagrass in the Coastal Plains were reported by Burton (1954). Adams and Stelly (1958) demonstrated its superiority over common Bermudagrass in the Piedmont.

In the final analysis, any forage is judged by its conversion into animal products, meat or milk. Baird *et al.* (1958) reported that Coastal Bermudagrass hay was unpalatable and very inefficient for beef produc-

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[2] *Johnson, J. C., unpublished data. Georgia Coastal Plain Experiment Station, Tifton, Georgia.*

tion. Southwell *et al.* (1956) found average quality Coastal Bermudagrass hay to be inferior to poor quality corn silage on the basis of feeding trials. Langford (1958) reported beef cattle gains of 1 to 1.2 pounds per day from grazing common or Coastal Bermudagrass or Pensacola Bahiagrass. He further reported that 2/3 of the gain was in the first half of the grazing season. Johnson[2] found Coastal Bermudagrass hay to be nearly as good as alfalfa hay for milk production. Knox *et al.* (1958) reported a TDN value of 67 to 69 percent for Coastal Bermudagrass hay while Morrison (1948) lists 56 percent as the TDN value of high quality alfalfa hay. Several tests have shown alfalfa to be generally superior to other roughages Snapp (1952) and Baird *et al.* (1958).

Ittner *et al.* (1954) and Lofgren *et al.* (1956) reported no difference in rates of gain with steers receiving alfalfa as pasture or soilage. However, soilage resulted in nearly twice the total gain per acre as from pasturage. The mowing and feeding of forage in the green state is an old practice but has not been widely used largely because of the expense involved. Kildee *et al.* (1925) reviewed the literature on soilage and quoted several reports of greater carrying capacity and production of three to five times as much TDN per acre from soilage as from conventional grazing.

Procedure

At the Americus Plant Materials Center, Americus, Georgia, an area of established Coastal Bermudagrass was divided into four paddocks of one acre. During the season each paddock received one and one-half tons of lime, 50 pounds of a mixture of trace elements, 500 pounds of nitrogen as NH_4NO_3 and 3,000 pounds of 0-10-20. The nitrogen was applied in 5 equal applications of 100 pounds on April 3, May 14, June 13, and July 15 and August 16. The 0-10-20 was applied in three equal applications on April 3, June 13, and August 16. All areas were irrigated when 50 percent of the available moisture had been removed. The test was initiated May 13 and terminated on September 17. Two treatments were tested, (A) continuous grazing and (B) soiling. Treatments were duplicated. Animals were allowed to graze continuously at will on the assigned paddocks. Animals receiving soilage were fed in the morning at approximately 9:30 to 10:00 and again in the afternoon between 5:00 and 6:00. At the time of feeding, 3 to 5 weeks old forage was harvested by means of a conventional mowing machine equipped with a pan to catch the cut forage. The area harvested was measured, the material weighed, a sample obtained and the forage then placed in a feed bunk for the animals to consume. An excess of forage was provided. Residue in the feed bunks from previous feedings was removed periodically. Forage produced in excess of that fed as soilage was harvested as hay. All such material was weighed and sampled. Samples were dried at 105°C. All samples were identified and composited weekly for further study. Shade for all lots of animals was the same. Water and minerals were provided uniformly.

Stocking rates varied depending on forage production (table 1). In each continuously grazed paddock, six quadrats, 10 ft. by 10 ft. were established to study fecal contamination at bi-weekly intervals. Animals were weighed on three consecutive days at the beginning and at the end of the experiment. These weights were then averaged for starting and ending weights. Animal weights were determined every 14 days throughout the trial.

At the initiation of the experiment, all animals were weighed in the morning starting at 8:00. At the third weighing period this procedure was changed. Animals on soilage apparently realized that fresh soilage would be available soon and stopped eating grass from the trough. The animals on continuous grazing started grazing early in the morning and were filled before 9 a.m. Weighing in the early morning thus weighed the continuously grazed animals full and the animals on soilage empty. The weighing time was changed to 2 p.m. At that time both the conventionally grazed animals and the soilage fed animals were usually in the shade.

Results and Discussion

Animal performance data in table 1 show that the steers fed soilage gained 784 pounds and

Table 1 Coastal Bermudagrass Utilization: Continuous Grazing Compared to Soiling. May 13 to September 17, 1958.

	Utilization	
	Conventional grazing	Soilage
Acres of replication	1	1
Average Grazing days per acre	735	685
Average beginning wt. (lbs.)	575.7	560.5
Average final weight (lbs.)	652.1	691.2
Average daily gain (lbs.)	0.62	1.14
Feed/gain ration		12.9
Beef produced (Acre)	457	784
Excess grass harvested:		
as hay		83*
fed but not consumed		81*
Total Beef Equivalent	457	948

L.S.D. .05 0.16 lb.
.01 0.22 lb.
C.V. 30.34%
* Converted by 12.9/1 ratio

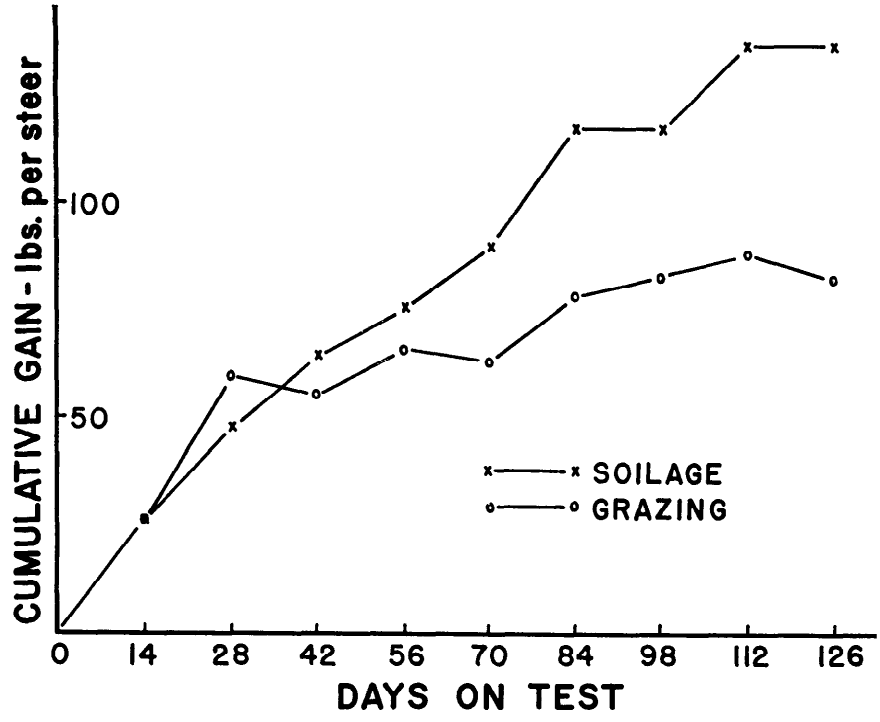

FIGURE 1. Cumulative weight gains per animal for steers on Coastal Bermudagrass as soilage and conventional grazing.

excess grass was equal to 164 pounds of beef for an acre total of 948 pounds. Animals continuously grazed gained 457 pounds per acre. This difference was significant (0.01). For the first 28 days gains on both treatments were almost equal (Figure 1). However, after that time gains of animals on continuous grazing were irregular, while the gains of animals being fed soilage continued (Figure 1). Average daily consumption of 2.35 lbs. D. M. per day per 100 lbs. body weight by the animals fed soilage produced an average daily gain of 1.14 lbs.

The continued gains of animals fed soilage indicate that the supposed lower quality of continuously grazed Coastal Bermudagrass is a management rather than a plant physiological problem. This interpretation is supported to a degree by the data in figure 2. The area of actual fecal contamination was only one-half of one per cent at the end of the first two weeks and increased to some two-and-one-half per cent by the end of six weeks. While the actual area covered by the fecal material was small, the area left ungrazed by the animals was several times larger and by the end of six weeks 35 per cent of the area was covered by so-called "halo spots." Fecal contamination caused by animals walking through the grass with soiled feet was not measured but was no doubt important.

Daily gains of animals grazed continuously were not consistent and after four weeks fell to half or less of animals fed soilage. Examination of the grass growing in the field showed that for the first four weeks of the test it was growing vegetatively and new leaf growth was available for the animals to graze during that time. At about 4 weeks after the initiation of grazing, new grass growth had ceased and the entire area was covered with

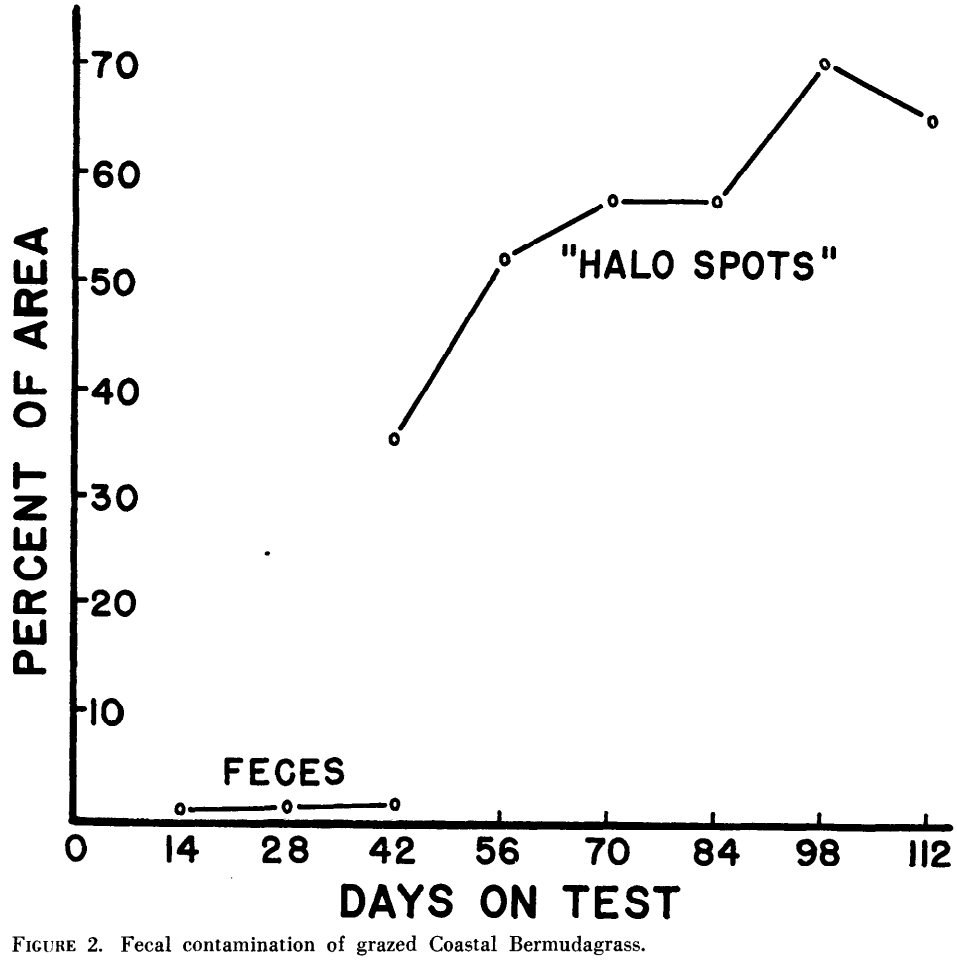

FIGURE 2. Fecal contamination of grazed Coastal Bermudagrass.

Bermudagrass stems 8 to 9 inches high. This is thought to explain the sharp decline in gain of animals on continuous grazing. The tall, stemmy, mature forage shaded the ground to such an extent that no new bud primordia initiated growth. As the animals consumed this mature and stemmy forage their rate of gain decreased. When the old growth had been grazed back to a height of 3 to 5 inches, new grass growth started from buds at the base of the plant. The new growth produced on the grazed spots was succulent and consequently these spots were overgrazed; the result being the livestock overgrazed a portion of the area and undergrazed or did not graze a considerable part.

At the end of the grazing season forage on the grazed areas averaged 4 to 5 inches in height. However, as is shown in figure 1 animals grazing this material were not gaining weight, and the forage was considered to have little or no value.

This experiment was not designed to answer grazing management problems but it is probable that rotational grazing followed by mowing the excess stemmy forage would correct part of the forage quality problem. It is believed that the continued rate of gain of animals fed soilage demonstrated that reduced animal performance of continuously grazed animals during the period from late June to early August was not due to the lack of potential forage quality. Accumulation of mature plant parts that must be removed before new grass growth can occur and/or fecal contamination are thought to be the major factors responsible for the poor performance of animals grazed continuously. Fecal contamination aggravated the condition of insufficient high quality forage brought about by mature grass accumulations.

No effort was made to determine the influence parasites had on steer performance.

Summary

1. Animals consuming Coastal Bermudagrass as soilage continued to gain weight until early September while animals conventionally grazed performed erratically after the first 28 days.
2. Per acre beef production of Coastal Bermudagrass was 948 pounds when fed as soilage and 457 pounds when grazed continuously.
3. Low summer gains of animals grazed continuously was probably due to fecal contamination of the forage and accumulation of mature forage.

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