

## **Bermuda Grass and Prairie Hays for Wintering Beef Cattle**

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The use of bermuda grass for summer grazing, as well as for the production of hay, has increased sharply in Oklahoma. An advantage for bermuda grass is its ability to withstand heavy grazing and to respond to heavy fertilization where rainfall is adequate. Increased amounts of bermuda grass hay are now available, and chemical analyses indicate a high protein content (9 to 13%) depending on the stage of growth when harvested and soil fertility.

Despite its high protein content, experiments to date show that bermuda grass hay can be improved for wintering cattle by feeding a supplement. As a roughage, bermuda grass appears to differ considerably from prairie hay. Experiments have been conducted during the past three years to determine the best supplement (protein or energy) needed to increase the value of bermuda grass hay. Digestion trials have been conducted to determine the availability of the protein and carbohydrate fractions of the roughage. Wintering trials with beef cows have been conducted to determine the need for additional protein with prairie hay as the roughage.

### **Results of Previous Tests**

In a preliminary trial, conducted in 1960-61, weaner calves were fed bermuda grass hay containing 13% crude protein. They failed to gain as well as those fed prairie hay plus 1.4 lb. of cottonseed meal per head daily (51 lb. less in 87 days). When calves were fed the bermuda grass hay supplemented with 1.4 lb. cottonseed meal, gains were improved. This indicated that additional supplement was required, despite its high protein content.

In a further test conducted in 1961-62, bermuda grass and prairie hays were again compared. Calves fed prairie hay were supplemented with 1.25 lb. cottonseed meal per head daily, while those on bermuda hay were either given no supplement, or fed 1.25 lb. ground corn per head daily for additional energy. In a 93-day test, calves fed prairie hay plus cottonseed meal gained an average of 66 lb., vs. only 23 lb. for those on bermuda grass hay alone. However, when 1.25 lb. ground corn was added as a daily supplement to the bermuda grass hay, gains were increased to 67 lb. per head. The data from this trial suggest that bermuda grass hay can be effectively supplemented with energy-rich feeds, and it is then equal to prairie hay plus a protein supplement.

### **Results of Current Trials**

Growth and digestibility trials have been conducted with bermuda grass hay, supplemented with protein and energy, as compared to prairie hay and the same supplements. Digestion trials with steers have

been conducted to study the availability of nutrients in prairie hay from fertilized and unfertilized meadows, and from bermuda grass hay. In addition, two lots of beef females have been wintered on prairie hay, at two different levels of protein supplement.

**Trial I.** Sixty, weaner, Hereford heifer calves were allotted to six groups of 10 calves each on the basis of shrunk weight and source. They were fed either prairie or bermuda grass hays, *ad lib.*, in small traps, with the following supplements per head daily:

**Prairie Hay:**

Lot 1—No supplement

Lot 2—1.25 lb. cottonseed meal per head daily

Lot 3—1.25 lb. ground corn per head daily

**Bermuda Grass Hay:**

Lot 4—No supplement

Lot 5—1.25 lb. cottonseed meal per head daily

Lot 6—1.25 lb. ground corn per head daily

The amount of cottonseed meal added to the ration of calves fed prairie hay in Lot 2 was calculated to meet the requirement for digestible protein. An energy-rich supplement (ground corn) was used in Lots 5 and 6, since previous studies suggested a benefit from additional energy as well as protein with bermuda grass hay. All calves had access to a mineral mixture of 2 parts salt and one part steamed bone meal, free choice. The chemical composition of the two hays are shown in Table 1.

Unfortunately, the amount of bermuda grass hay was sufficient for only a 68-day trial. At this time, final weights were taken on the bermuda grass hay lots, while those on prairie hay were continued on test. Calves on the prairie hay rations were continued on test for 139 days to gain further information on the relative effects of protein and energy supplements with this roughage over a longer period.

**Trial II.** Twelve, yearling Hereford steers were selected from the Experiment Station herd and used in digestion trials. A 7-day collection period, preceded by a 14-day preliminary period, was followed with 6 observations on each of the following treatments:

Ration A—Prairie hay, unfertilized, cut in late June

Ration B—Prairie hay, from fertilized meadow (40 lb. N per acre), cut in late June

Ration C—Prairie hay, unfertilized, cut in late June plus S.B. meal

Ration D—Bermuda hay fertilized (40 lb. N per acre), cut in July

Complete results of the digestion trial are not available, but the digestion coefficients for crude protein have been determined.

**Trial III.** Two groups of beef females, each containing 14 mature cows and 7 bred yearling heifers, were placed in small traps at the Lake Carl Blackwell Experimental range and fed prairie hay, *ad lib.* The females were allotted to test in early November on the basis of body



weight, age and source. Females in Lot 1 received 1.0 lb. cottonseed meal per head daily up to calving (Feb. 16) and 2.0 lb. per head thereafter until April 2. Females in Lot 2 received no supplement to calving, and 1.0 lb. per head daily to April 2. Data obtained include winter gain or loss of body weight to calving, birth date and weights of calves, and spring weights of cows taken on April 2.

### Results

Chemical composition of the prairie and bermuda grass hay used in heifer feeding trials at Lake Blackwell is shown in Table 1. As in past years, the bermuda grass hay analyzed much higher than prairie hay in crude protein (10.22 vs. 4.18%). Assuming a 60% digestibility, it is apparent that such hay should meet the minimum digestible protein requirement of 450 lb. heifer calves, if 10 lb. per day were consumed (0.6 lb. per day from the hay vs. a requirement of 0.7 lb.)

Results of the heifer feeding trial utilizing the two hays are summarized in Table 2. Unfortunately, sufficient hay was not available to conduct a complete trial with bermuda grass, and it was necessary to terminate this phase of the test after 68 days.

With prairie hay as the roughage, the deficiency of protein was striking when no supplement was fed. Calves fed the unsupplemented hay consumed 3.0 lb. less hay per head daily, and lost 115 lb. from fall to spring (139 days). Supplementing this roughage with 1.25 lb. cottonseed meal resulted in 43 lb. average gain. Supplementing with an energy-rich feed, such as 1.25 lb. ground corn per head daily, was of only slight value when protein was lacking. Prairie hay supplemented with 1.25 lb. of cottonseed meal resulted in a digestible protein intake approaching the minimum requirement for calves of this weight.

Results from supplementing bermuda hay were less clear cut. Both corn and cottonseed meal appeared to give a slight increase in gain; the best performance was obtained when 1.25 lb. of cottonseed meal was fed. However, even the protein supplemented bermuda grass hay was not equal to the prairie hay plus cottonseed meal. From this limited comparison and results of earlier tests, it appears that supplementing bermuda grass with cottonseed meal gives less response than with prairie

Table 1.—Chemical Composition of Hays Used in Feeding Trials (%).

	Prairie Hay	Bermuda grass Hay
Dry matter	92.00	91.00
Ash	8.47	8.32
Crude protein	4.18	10.22
Ether extract	1.90	1.84
Crude fiber	30.01	30.49
N-free extract	55.44	49.13

Table 2.—Growth Trials With Weaner Heifer Calves Fed Prairie or Bermuda Grass Hays.

Ration fed	Prairie Hay			Bermuda Hay		
	No Supple.	1½ lb. CSM	1¼ lb. Corn	No Supple.	1¼ lb. CSM	1¼ lb. Corn
No. heifers per lot	10	10	10	10	10	10
68-day results (lb.):						
Av. initial wt.	448	448	448	448	448	448
Av. final wt.	418	490	415	443	468	452
Total gain	-30	+42	-33	-5	+20	+4
Av. hay intake/day				8.1	8.1	8.1
139-day results (lb.):						
Av. final wt.	333	483	356			
Total gain	-115	+35	-92			
Av. hay intake/day	8.9	11.9	8.9			

hay. This would be logical if the protein in bermuda grass meets the minimum requirement of the calves.

Results of the digestion trial are incomplete, but coefficients of digestibility for crude protein have been calculated. These are:

Unfertilized prairie hay (no supplement) = 41.2%

Fertilized prairie hay (no supplement) = 47.6%

Unfertilized prairie hay plus 0.85 lb. S.M. Meal = 53.3%

Bermuda grass hay (no supplement) = 63.8%

It is apparent that both nitrogen fertilization and the addition of a small amount of soybean meal improved the digestion of crude protein in prairie hay rations. However, unsupplemented bermuda grass hay had the highest digestion coefficient for crude protein of any of the rations compared. This is further indication of less need for additional protein when bermuda grass hay is fed, and helps explain the response obtained from the corn supplement.

Results shown in Table 3 with beef heifers wintered on prairie hay, and supplemented at two levels with cottonseed meal, again demonstrate the advantage for a small amount of additional protein. A sharp weight loss (56 lb. per head to calving) resulted when pregnant heifers were fed prairie hay with no protein supplement. In contrast, the addition of only 1.0 lb. of cottonseed meal per head daily to the prairie hay ration of Lot 2 increased hay consumption by 7.0 lb per head, and resulted in a gain of 57 lb. to calving.

The "appetizing" effect from feeding a protein supplement with low quality roughage is well illustrated in these data. In terms of energy (TDN) intake, the small amount of cottonseed meal, by virtue of the TDN it supplied and the improved feed intake which resulted, increased the daily TDN per heifer by nearly 4 lb. This beneficial effect from adding a protein supplement to a deficient diet emphasizes the importance of balancing such rations for this nutrient. By virtue of a



Table 3.—Two Levels of Protein Supplement to Prairie Hay for Wintering Pregnant 2 &amp; 3-Year-Old Heifers

Supplement	Lot 1 None to calving, 1 lb./day to spring	Lot 2 1 lb./day to calving 2 lb./day to spring
No. heifers per lot <sup>1</sup>	21	21
Average weights, lbs.		
Initial, 11/9/62	777	782
To calving, 2/16/63	720	840
To spring, 4/2/63 <sup>2</sup>	634	782
Average gain to calving, lbs.	-56	+57
Average loss, calving to spring <sup>2</sup>	86	58
Average birth date, March	3/16	3/18
Average birth weight	67	69
Average hay intake/day, lbs.	11.4	18.4

<sup>1</sup>Each lot contained 14 two-year-old and 7 yearling bred heifers.

<sup>2</sup>Includes only those heifers that had calved by April 2 (9 in each lot).

small amount of protein supplement, hay intake was increased from approximately 1.4 lb. to 2.0 lb. per 100 lb. of body weight. This results from an increased bacterial activity in the rumen, a faster breakdown of the fibrous feed and more rapid clearance from the rumen. Such effects have recently been demonstrated in British studies using hays of different qualities.

Results available to April 2 for heifers that had calved show a further advantage for increasing the level of cottonseed meal to 2.0 lb. per head daily after calving in Lot 2. Prairie hay, with about 4% crude protein, is therefore inadequate for the young beef female. It can be calculated to supply only .24 lb. per head daily of digestible protein, as compared to a requirement of 0.8 lb. daily. The intake of digestible protein from a combination of prairie hay and 1.0 lb. cottonseed meal up to calving, and 2.0 lb. after calving, proved adequate. Both values are slightly below presently accepted standards.

### Summary

Earlier trials have indicated that weaner calves on bermuda grass hay respond to both protein and energy supplements. Results of digestion trials show that the bermuda grass hay (which analyzed nearly 10% crude protein) had a higher digestibility of crude protein (64%) than unsupplemented prairie hay (41%), nitrogen fertilized prairie hay or prairie hay supplemented with soybean meal. Results of winter feeding trials with weaner heifers and pregnant young cows show a distinct need for additional protein prairie hay. Bermuda grass hay appears to respond slightly to both protein and energy supplements (cottonseed meal and corn), but is not equal to prairie hay supplemented with additional cottonseed meal. It appears that lack of available protein is not the limiting factor in improving bermuda grass hay for beef cattle.