Progress Report Series No. 76 *August*, 1959

AGRICULTURAL EXPERIMENT STATION
of The Alabama Polytechnic Institute, Auburn, Ala.
E. V. SMITH, Director

Roughages for Dairy Cows

L. A. Smith,[1] W. B. Kelley,[2] and George E. Hawkins[3]

Tracy sorghum produces good yields of forage and has created much interest as a silage crop for dairy cattle.

Also, Johnsongrass, a commonly grown forage in the Black Belt area of Alabama is used extensively as a hay for dairy cows.

To determine the comparative values of these crops to alfalfa as a roughage for dairy cows a test was conducted by the API Agricultural Experiment Station.

The objectives of the test were: (a) to determine the chemical composition, the digestibility, and the intake of alfalfa and Johnsongrass hays and of Tracy sorghum silage, and (b) to determine the amount of milk produced by cows fed these three forages.

EXPERIMENTAL PROCEDURE

The forges used in this study were cut at the stage of maturity recommended for each crop. Alfalfa was in approximately one-tenth bloom at cutting, whereas, the Johnsongrass was cut at the pre-bloom stage. Both forages were passed through a stem-crusher after cutting to speed up the field curing process. Tracy sorghum was cut with a forage harvester in the dough stage of maturity and ensiled in an upright silo. The silage was greenish in color and had a pleasant aroma.

Twenty-four dairy cows that had been in production 2 to 5 months and producing an average of 30.5 pounds of milk daily were used for this 5-week test. During the 2 weeks before the test all cows were fed all the alfalfa and Johnsongrass hays and Tracy sorghum silage they would eat. In addition they were fed 1 pound of concentrate for each 3 pounds of 4 per cent FCM (fat corrected milk) produced. At the start of the test the cows were placed in 8 groups of 3 each according to the level of milk production. Within these production groups the cows were assigned at random to 1 of the 3 test rations: (a) alfalfa hay and ground oat grain containing 1 per cent salt; (b) Johnsongrass hay and a concentrate mixture, and (c) Johnsongrass hay plus Tracy sorghum silage and a concentrate mixture. The concentrate mixture was 82.5 per cent ground oat grain, 16.5 per cent cottonseed meal, (41 per cent protein grade), and 1 per cent salt. During the experimental period the concentrate mixture and the oat grain salt mixture were fed at the same rate as during the pre-experimental period.

Cows were fed approximately 10 per cent more of their assigned roughage than they would eat. Thus, they had some selectivity in the forage consumed. As a result the refused Johnsongrass was mostly stems.

During the test, all cows on test were housed and fed in individual tie stalls. Water was available twice daily during exercise periods on a concrete-paved paddock.

Body weights were determined on two successive days at the start and end of the test.

Digestibility of the experimental forges was determined by a digestion trial with steers. In addition, composition of the forages was determined.

RESULTS

Alfalfa hay was superior to Johnsongrass hay and to Tracy sorghum silage in composition as indicated by crude protein and crude fiber contents, Table 1. However, on the dry matter basis, the TDN (total digestible nutrients) content of the Johnsongrass hay that was eaten was 6.5 per cent higher than that of alfalfa hay and 19.0 per cent higher than that of Tracy sorghum silage. During the digestion trial, steers on Johnsongrass hay refused 24.6 per cent of the amount fed, whereas, those on alfalfa hay refused 1.0 per cent of the amount fed. The refused Johnsongrass was mostly stems showing that the steers selectively ate the leaves. Therefore, the TDN value given for Johnsongrass hay is essentially the TDN value for Johnsongrass leaves. Also, the Johnsongrass hay fed in this test was green and leafy in appearance.

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[1]Superintendent Black Belt Substation.
[2]Deceased, former Superintendent, Black Belt Substation.
[3]Associate dairy husbandman.

TABLE 1. COMPOSITION AND DIGESTIBILITY OF TEST FORAGES, DRY MATTER BASIS

Component	Alfalfa	Johnsongrass	Tracy sorghum
	Per cent	Per cent	Per cent
TDN	58.8	65.0	46.0
DP	14.9	7.4	0.0
Crude prot.	20.4	11.7	6.6
Crude fiber	28.9	34.0	29.7
Ether ext.	1.3	1.4	2.9
NFE	42.6	45.6	55.4
Ash	6.8	7.3	5.4

The average intakes of hay or hay equivalent in the form of silage per 100 pounds of body weight by cows in the roughage groups were: (a) alfalfa hay, 2.55 pounds; (b) Johnsongrass hay, 2.34 pounds; and (c) Johnsongrass hay-Tracy sorghum silage, 2.16 pounds (Johnsongrass hay, 1.33 pounds and Tracy sorghum silage, 0.83 pounds). Average amounts of dry forage eaten by each group differed significantly. An evaluation of digestible nutrients eaten showed that cows on alfalfa ate 12.8 per cent more TDN than needed for body maintenance and milk production. In comparison, cows on Johnsongrass hay ate 22.7 per cent more TDN than needed, however, cows that received a combination of Johnsongrass hay and Tracy sorghum silage ate only 10 per cent more TDN than needed. Further evaluation of the nutrient intake data revealed that the digestible protein intake of cows fed the Johnsongrass and Tracy sorghum silage ration was only 95 per cent of the recommended allowance. In contrast, the digestible protein intakes of cows on the alfalfa hay ration and of those on the Johnsongrass hay ration were 187.6 and 125.4 per cent respectively of the recommended allowances.

Daily milk production (4 per cent fat corrected milk) of cows fed the alfalfa hay ration was 0.8 and 1.8 pounds higher than that of cows fed the Johnsongrass hay or the Johnsongrass hay-Tracy sorghum silage rations, respectively, Table 2. The 1.8 pounds difference in daily milk production per cow on the alfalfa hay and Johnsongrass hay-Tracy sorghum silage rations was significant and probably resulted from the shortage of the digestible protein itake (-0.095 pound per cow per day) by cows on the latter ration. Since cows require about 0.049 pound of digestible protein to produce a pound of 4 per cent fat corrected milk the protein shortage seems to account for the differences in milk production of the alfalfa hay ration and the Johnsongrass hay-Tracy sorghum silage ration groups.

TABLE 2. AVERAGE DAILY 4 PER CENT FAT CORRECTED MILK BY ROUGHAGE GROUPS

Roughage	Milk production
	Lb.
Alfalfa hay	27.6
Johnsongrass hay	26.8
Johnsongrass hay-Tracy sorghum silage	25.8

Cows on the alfalfa hay ration utilized 30.3 per cent of their digestible nutrients intake for milk production as compared to 26.5 and 29.9 per cent for cows on the Johnsongrass hay and those on Johnsongrass hay-Tracy sorghum silage rations, respectively. Therefore, the efficiency of utilization of digestible nutrients for milk production was slightly lower for cows fed the Johnsongrass hay ration than for those fed the other ration.

There were no differences in the body weight changes that could be attributed to the roughages fed.

SUMMARY

Johnsongrass hay fed in this study was about equal to alfalfa hay as a source of roughage for dairy cows as indicated by milk production of cows fed these forages. Milk production of cows on Johnsongrass hay as the only roughage was 97.1 per cent as much as that of cows on alfalfa hay. However, cows that were fed both Johnsongrass hay and Tracy sorghum silage roughages produced 6.5 per cent less milk than cows fed alfalfa and 4.0 per cent less than those fed Johnsongrass hay as the only roughage.

The portion of Johnsongrass hay consumed, which was mostly leaves, was more digestible than the alfalfa hay. However, when the refused Johnsongrass hay is taken into account it would be necessary to feed 20 per cent more Johnsongrass than alfalfa to obtain the same TDN intake. Also, alfalfa hay had a higher digestible protein content than the Johnsongrass hay. For this reason it was not necessary to use a protein supplement with alfalfa hay. Since Johnsongrass hay usually is low in digestible protein the concentrate mixture fed with this forage should include a protein supplement. Johnsongrass like most other forages drops in quality as it matures. Therefore, the results of this test would not be applicable to Johnsongrass cut after blooms appear.

Tracy sorghum silage was low in TDN content and the protein content of this forage was not digested to a measurable extent.