

A COMPARISON of Starr Millet, Sweet Sudangrass, Johnsongrass As Dairy Forages

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STARR MILLET and sweet Sudangrass are widely used for temporary summer pasture by Alabama dairymen. In some sections of the State, Johnsongrass is important as a summer grazing crop.

Each of the three grasses has advantages. Although Starr millet is not as palatable as sweet Sudan, it is bothered less by diseases. Sudan grows off faster and provides earlier grazing, but the millet makes more growth after being grazed.

A big advantage of Johnsongrass is that it does not require annual land preparation and seeding as do the two annuals. And, it has been well liked by cows at the Black Belt Substation during several years' use.

EXPERIMENTAL PROCEDURE

Three tests were made to compare the grasses: (1) Johnsongrass, Sudan, and millet were grazed continuously at the Black Belt Substation, Marion Junction, in 1956; (2) all three of the forages were cut and fed to cows at the Main Station, Auburn, in 1956-57; and (3)

* Deceased

sweet Sudangrass and Starr millet were used in rotation grazing at the Main Station in 1956-57. Five cows were fed each forage in each test.

These studies were made to compare the forages under identical management, not to compare the different methods of use. Records were kept on bodyweight changes, amounts of milk produced, and amounts of concentrate fed.

Continuous Grazing Test. Johnsongrass, Starr millet, and sweet Sudangrass top-dressed with 50 pounds of nitrogen per acre were grazed continuously. Samples of each grass were analyzed for chemical composition each week of the 28-day test. Cows were fed concentrates at the rate of 1 pound for each 5 pounds of 4 per cent milk produced, Table 1.

Forage Cut and Fed Green. In this 15-day test, five cows were fed Johnsongrass, five Starr millet, and five sweet Sudangrass. The grasses were cut and fed fresh each day. Each cow was fed 50 pounds per day for the first 4 days and 60 pounds per day

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TABLE 1. DESCRIPTION OF EXPERIMENTAL PASTURES USED IN CONTINUOUS GRAZING TEST, BLACK BELT SUBSTATION, 1956

Item	Johnsongrass	Sweet Sudangrass	Starr millet
Pasture size, <i>acres</i>	4.25	4.25	4.25
Date seeded.....	1955 ¹	6-19-56 ²	6-19-56 ³
Seeding rate per acre, <i>pounds</i>	25	29	17
Start of test, <i>date</i>	7-18-56	7-18-56	7-18-56
Forage height at start, <i>inches</i>	8-10	15-20	10-15

¹ A cutting of ½ ton of hay was removed July 3.

² Seeded June 19 except for 8/10 acre that was seeded June 25.

³ One acre with a poor stand was reseeded July 12.

during the last 11 days. In addition to the green feed, cows were given enough concentrate to meet nutrient needs.

All three grasses had some seed heads when the test was begun. Because of dry weather, the grasses matured fast. At the end of the test, most of the seed were in the late milk to dough stage.

Samples of each grass were analyzed for chemical composition, and digestibility of each was determined.

Rotation Grazing. Two sweet Sudangrass and two Starr millet pastures were used in this 35-day test. During the first, second, and fifth weeks of the test, the cows grazed pasture No. 1 of each grass. Pasture No. 2 of each was grazed during the third and fourth

TABLE 2. DESCRIPTION AND TREATMENT OF ROTATION GRAZED PASTURES, MAIN STATION, 1957

Item	Starr millet	Sweet Sudangrass
Pasture 1		
Date seeded.....	4-23-57	4-23-57
Seeding rate per acre, <i>pounds</i>	20	25
Ammonium nitrate per acre, <i>pounds</i>	250	250
Stage of maturity....	pre-bloom	early bloom
Pasture size, <i>acres</i> ...	1.57	1.73
Pasture 2¹		
Stage of maturity....	half bloom	full bloom
Pasture size, <i>acres</i> ...	0.90	1.15

¹ Date and rate of seeding and fertilization same as for Pasture 1.

weeks. Information about the pastures is given in Table 2.

In addition to grazing, the cows were fed 1 pound of concentrate for each 3 pounds of 4 per cent milk produced.

RESULTS and DISCUSSION

Composition and Digestibility. Average chemical analyses of the grasses grazed and fed green are given in Table 3.

Grasses grazed during the continuous grazing test were high in protein. However, protein content dropped during every week of the test. Trends in cellulose contents were: Johnsongrass — dropped each week; sweet Sudangrass — no major change; and Starr millet — increased. The trends in cellulose content were related to quality of the grasses. At the end of the test, the Johnsongrass pasture was short and mostly new growth; the sweet Sudangrass had new leaves on the old stems; and the Starr millet was mostly old growth about 15 inches high. The main difference among the grasses was in their nitrogen-free extract (mostly sugar and starch) content, which indicated that the sugar content of Johnsongrass and sweet Sudangrass was higher than that of Starr millet.

Digestibility of the forages cut and fed green was measured with six steers. Johnsongrass was more digestible than sweet Sudangrass or Starr millet. In another study, however, the digestibility of Johnsongrass ranged from 53 to 64 per cent, which is lower than

TABLE 3. DIGESTIBLE NUTRIENTS¹ AND AVERAGE COMPOSITION² OF EXPERIMENTAL FORAGES, DRY MATTER BASIS

Forage	Digestion coefficient of protein	Total digestible nutrients	Average composition					
			Protein	Fat	Fiber	Cellulose	Nitrogen-free extract	Mineral matter
	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.	Pct.
Johnson-grass	76	73	16	3	28	32	45	9
Sweet Sudangrass	65	58	17	2	28	32	44	9
Starr millet	59	63	24	4	28	33	36	9

¹ Determined only on forages cut and fed green.

² Averages of forages continuously grazed and those cut and fed green.

Sudan and millet (dry matter basis). Therefore, the average digestibility of Johnsongrass probably is similar to that of sweet Sudangrass and Starr millet.

Milk Production. The average daily milk production of cows on the three forages are given in Tables 4, 5, and 6. Results of the three experiments are summarized in Table 7. Production is given as 4 per cent fat corrected milk.

Milk production of cows on sweet Sudangrass increased during the first week, Table 4. Otherwise, the trend in milk production, persistency of pro-

duction, and average production for the test were similar for all three grasses.

During the test in which the grasses were cut and fed green, average daily milk production of cows fed the three grasses was: (a) Johnsongrass, 26.0 pounds; (b) sweet Sudangrass, 26.3; and (c) Starr millet, 24.0, Table 5. With the exception of a 2.9-pound drop in milk during the first 5 days by cows on Starr millet, the trends in milk production from all three grasses were similar. The early production decrease by cows on Starr millet resulted from cows eating less of this grass than did those on sweet Sudangrass and Johnsongrass.

TABLE 4. DAILY MILK PRODUCTION AND PERSISTENCY OF PRODUCTION, CONTINUOUS GRAZING TEST, BLACK BELT SUBSTATION, 1956

Period of test	Average production of cows on each forage		
	Johnson-grass	Sweet sudan-grass	Starr millet
	Pounds	Pounds	Pounds
Before test	26	24	25
1st week	25	25	25
2nd week	24	23	24
3rd week	22	20	21
4th week	21	19	19
Average ¹	22.0	23.0	21.9
Persistency of production, per cent ²	79	80	76

¹ Average production is adjusted for differences between groups before test.

² Production of the last week as a percentage of that during the week before the test. The lateness in gestation of cows in the test accounts for the low persistency.

TABLE 5. DAILY MILK PRODUCTION AND PERSISTENCY OF PRODUCTION, GREEN FEEDING TEST, MAIN STATION, 1956

Period of test	Average production of cows on each forage		
	Johnson-grass	Sweet Sudan-grass	Starr millet
	Pounds	Pounds	Pounds
Before test	25	27	25
1st 5 days	24	27	23
2nd 5 days	26	28	24
3rd 5 days	26	28	24
Test average ¹	26.0	26.3	24.0
Persistency of production, per cent ²	102	103	95

¹ Adjusted for differences in production before test.

² Milk production during third 5-day period divided by production before test.

TABLE 6. DAILY MILK PRODUCTION AND PERSISTENCY OF PRODUCTION, ROTATION GRAZING TEST, MAIN STATION, 1957

Period of test	Average production of cows on each forage	
	Sweet Sudangrass	Starr millet
	Pounds	Pounds
Before test.....	20	23
1st week.....	23	25
2nd week.....	21	23
3rd week.....	19	24
4th week.....	17	23
5th week.....	20	26
Test average ¹	21.0	22.4
Persistence of production, per cent ²	101	113

¹ Adjusted for differences in production before test.

² Average production for fifth week divided by average production before test.

TABLE 7. DAILY MILK PRODUCTION OF COWS ON FORAGES TESTED, SUMMARY OF THREE TESTS, 1956-57

Forage	Average production ¹
	Pounds
Johnsongrass.....	23.0 ²
Sweet Sudangrass.....	24.1
Starr millet.....	23.5

¹ Adjusted to take into account differences in average daily production of cows at start of tests.

² Average for two tests.

Results of the rotation grazing test, Table 6, show the importance of high quality pasture. During the first week of this test, both pastures were high in quality and milk production of cows on both increased 12 to 13 per cent. Both of the grasses grazed during the second week were similar in quality and the changes in milk production were about the same. However, sweet Sudangrass grazed during the third and fourth weeks was more mature than the Starr millet. This difference in quality during the third and fourth weeks resulted in a change in milk production. Cows grazing Starr millet increased in production, whereas production of cows on sweet Sudangrass pastures dropped. During the fifth week, cows grazing millet and Sudangrass produced 13 and 17 per cent more

milk, respectively, than during the fourth week. Average daily milk production for the test was 21.0 pounds for sweet Sudangrass and 22.4 pounds for Starr millet.

A summary of milk production on Johnsongrass, sweet Sudangrass, and Starr millet for all tests, Table 7, shows that the three grasses are about equal as feed for dairy cows.

SUMMARY

Chemical composition of the Johnsongrass, Starr millet, and sweet Sudangrass grazed at the Black Belt Substation and fed green at the Main Station was determined. Composition of all three was similar except that Starr millet was highest in fat and lowest in nitrogen-free extract (sugar and starch) content.

Under proper management, Johnsongrass, sweet Sudangrass, and Starr millet are high quality forages for dairy cows. Proper management means keeping the pastures about 15 inches high and leafy. This can be done by: (1) Waiting until the pastures are 15 to 18 inches high before turning the cows onto them; (2) adding dry cows when the pastures are making fast growth; (3) having two or three pastures and changing at 10-day to 2-week intervals when growth is slow; and (4) by staggering the planting dates of the two annuals — sweet Sudangrass and Starr millet. The acreage needed to supply good grazing throughout the summer months will vary from farm to farm. Natural fertility of the soil, amount of fertilizer applied, and amount of rainfall determine acreage needed.

At similar stages of growth, Johnsongrass, sweet Sudangrass, and Starr millet were about equal as feed for milking cows. The stage of maturity at which these three grasses were grazed was more important than the grass species. For this reason, any one or a combination of these three grasses that is best suited to a farm can be used to provide forage for milking cows during the summer months in Alabama.