MILLET FOR SUMMER GRAZING
in Eastern North Carolina

H. DOUGLASS GROSS, BEECH F. HOLLON

DEPARTMENT OF FIELD CROPS,
ANIMAL INDUSTRY AND SOILS
NORTH CAROLINA STATE COLLEGE
MILLETT FOR SUMMER GRAZING IN EASTERN NORTH CAROLINA


Introduction

Maintenance of milk flow is one of the problems which confront dairy farmers each summer. Several perennial pasture species permit grazing during the mid-summer slump, but rarely is this forage of sufficient quality to carry high-producing milk cows at a desirable production level. Consequently, summer annuals have been widely used, particularly in the sandy areas of the Coastal Plain.

One of the popular summer annual grasses in the past has been Sudangrass. Recently, interest in millet has been increasing because this plant is well adapted to the area and has the distinct advantage of being free of prussic acid. In clipping trials at Willard and near Raleigh, several varieties of pearl (cattail) millet (Pennisetum glaucum) have consistently outyielded the best varieties of Sudangrass. In addition, Starr, a new variety of pearl millet, has shown a much higher degree of leafiness than the other varieties. Consequently, it appeared that Starr millet might be preferable for milk production, even though it usually yields a little less dry matter than common pearl. It seemed desirable, therefore, to evaluate some of these varieties under grazing conditions. This progress report contains the results of two years' grazing trials of adapted millet and Sudangrass varieties, using dairy animals.

**a**Res. Ass't. Prof., Field Crops and Agent (Agronomist), FC, ARS, USDA; Agent (Dairy Husbandman), DH, ARS, USDA; Res. Inst., Dairy Husbandry and Prof., Soils, respectively.
Procedure

In 1955 and 1956, grazing trails were conducted at the Coastal Plain Research Station, Willard, North Carolina, to evaluate several millet varieties and Sweet Sudangrass for mid-summer milk production.

First Year (1955). Twelve acres were planted to three strains of summer annuals; common pearl and Starr millets, and Sweet Sudangrass. Each variety was seeded on three separate 1.3-acre paddocks in late May. Three separate areas (replicates) were used in order to minimize the effects of varying soil conditions. The millet at 20 pounds, the Sudan at 30 pounds, as indicated by soil test, and three hundred pounds of 6-6-12 per acre were drilled in the area, which had previously been in small grain-crimson clover pasture. The millets were later topdressed with 66 pounds of nitrogen, in two applications, and the Sudan received 33 pounds of nitrogen per acre in one top-dressing. The Sudangrass had obviously decreased its growth rate much earlier in the season; therefore, it was felt that additional nitrogen would be of little benefit.

Eighteen milking Jersey cows were grazed on these pastures for the season. Records of weight change, milk production and days on pasture were kept on these "tester" animals. To prevent spotty grazing altering the quality of the forage, heifers were added to remove any excess growth which accumulated. The stocking rate on each paddock was regulated at two-week intervals in order to maintain what seemed to be good forage. Concentrate was fed at 1 pound for each 4 pounds of 4 percent fat-corrected milk (FCM), using prior production as a base, and was reduced 5 percent for each four weeks on trial.
Second Year (1956). Because Sweet Sudangrass was decidedly inferior in 1955 (table 1), three millet varieties were compared in 1956. The varieties common and Starr were continued from 1955, and a new experimental variety, presently called Georgia Hybrid No. 1, was added. This hybrid had shown up well in previous plot-tests, and it was included for comparison with Starr millet. As in 1955, each variety was sown on three 1.3-acre lots. Planting was started on May 22 and, delayed by rain, was finished on May 28. In 1956, the crops were seeded at 10 pounds per acre in 38-inch rows. This system has advantages in that it reduces seeding rates, facilitates weed control, and permits much cleaner grazing with less fouling and trampling of the forage. The area, previously in oats-crimson clover for grazing, received 300 pounds of 6-6-12 per acre as suggested by soil test. The pastures were cultivated twice prior to grazing, which began when the plants were about 14 inches high. After this no further cultivation was necessary to keep the rows, and middles, essentially weed-free. On July 24, 50 pounds nitrogen per acre was applied in liquid form. The stocking system, rate of concentrate feeding and records kept were the same as that of 1955.

Results and Discussion

First Year (1955). As indicated in table 1, Starr millet was grazed longer than either of the other strains tested. Pearl millet actually had the highest carrying capacity, 2.2 cows per acre, but for only 39 days. All varieties were affected by drought. The paddocks were clipped and top-dressed in mid-season to even up spotty grazing and delay heading. After this clipping, recovery was extremely poor.
Table 1. Mean Values for the Three Forages, 1955

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Millet</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starr</td>
</tr>
<tr>
<td>1. Days grazed</td>
<td>45</td>
</tr>
<tr>
<td>2. Carrying capacity</td>
<td>2.01</td>
</tr>
<tr>
<td>3. Lb. FCM/acre (pasture + concentrates)</td>
<td>2543</td>
</tr>
<tr>
<td>4. Lb. TDN/acre (pasture only)</td>
<td>2080</td>
</tr>
</tbody>
</table>

Total milk production per acre is shown in line 3 of the table. The results indicate that there was a marked difference in the productive capacities of the two millets as compared to Sweet Sudangrass. However, the difference in milk production between the two millet varieties is not significant and cannot be ascribed to actual varietal differences. In line 4, the gross productivity of the varieties is indicated. The total digestible nutrient (TDN) figure takes into account not only the nutrients required for milk production, but also those necessary for body maintenance and for the changes in body weight which took place. It is in this category that Starr evidences its superiority. Statistically, the difference between the two millet varieties and Sweet Sudan is highly significant, as is the difference between Starr and Pearl millet.

The total productivity of a given variety is not the only consideration. The forage distribution during the season is of extreme importance if one is to carry a herd of a given size for any length of time. This seasonal trend in yield of the three varieties is shown in Figure 1. As indicated in this graph, Sweet Sudangrass was not only a relatively low-yielding crop, but its yield was distributed uneventfully over the grazing season. The yield trend of Starr
Figure 1
Seasonal Trends in Yields of TDN per Acre
1955

Starr Millet

![Bar chart showing seasonal trends in yields of TDN per acre for Starr Millet.](image)

Pearl Millet

![Bar chart showing seasonal trends in yields of TDN per acre for Pearl Millet.](image)

Sweet Sudangrass

![Bar chart showing seasonal trends in yields of TDN per acre for Sweet Sudangrass.](image)

Time - 2-week Intervals
is much more even, recovery is better, and the peaks come later in the season, rather than during the first two week period. Grazing a forage of this type, a farmer could stock heavier initially and carry his herd longer. If he wanted to ensile some of the millet he would need fewer acres to fill the silo and also would have more leeway in the time when he undertook the operation.

It is apparent from these 1955 data that the millets now on the market hold promise for mid-summer milk production. When compared to a currently popular variety of Sudangrass adapted to this area they display greater capacity for milk and TDN production and have a more even distribution of yield.

Second Year (1956). Because of the results of the 1955 test, in 1956 no Sudangrass variety was used. Instead, common pearl, Starr and a new variety, called Hybrid in this paper, were seeded. The results of this comparison are shown in tables 2 and 4.

Table 2. Mean Values for Three Millet Varieties, 1956

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starr</td>
</tr>
<tr>
<td>1. Days grazed</td>
<td>56</td>
</tr>
<tr>
<td>2. Carrying capacity</td>
<td>2.67</td>
</tr>
<tr>
<td>3. Lb. FCM/acre (pasture + concentrates)</td>
<td>2239</td>
</tr>
<tr>
<td>4. Lb. TDN/acre (pasture only)</td>
<td>2972</td>
</tr>
</tbody>
</table>

In 1956, the difference among the varieties in days grazed was negligible. All varieties were influenced favorably by the better growing conditions of 1956 as compared to 1955. The carrying capacity of the three millet strains were comparable, as was production in terms of both TDN and FCM per acre.
The seasonal distribution for 1956 is shown in Figure 2. It is apparent that common pearl had the most even distribution through August 20, but after this date the yield of TDN fell off markedly. For the entire grazing season one would have little choice between Starr and the Hybrid on the basis of yield distribution. Visual estimates of quality indicated that the two new varieties were both of more desirable quality than common pearl which was in head and rather coarse by the last week of August.

Both Years (1955-1956). In table 3 the results of the 1955 and 1956 seasons were averaged for the two millet varieties, common and Starr, which were grown in both years. The data indicate that Starr maintained some advantages over common pearl in both years, particularly in terms of TDN per acre.

Table 3. Mean Value for Two Millet Varieties, 1955-1956

<table>
<thead>
<tr>
<th>Criterion</th>
<th>Variety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Starr</td>
</tr>
<tr>
<td>1. Lb. FCM/acre (pasture + Concentrates)</td>
<td>2391</td>
</tr>
<tr>
<td>2. Lb. TDN/acre (pasture only)</td>
<td>2526</td>
</tr>
</tbody>
</table>

Other Considerations: It might be suggested that the above figures are not the best estimates of forage quality for milk production. Varying lengths of grazing periods would have a considerable effect on total production. In order to better evaluate the forage quality, the average daily milk production per cow while actually grazing millet was calculated. To make this test more precise, the average daily production during the days grazed was adjusted for the production level of the cows just prior to the start of grazing when all cows were on the same feeding regime.
Figure 2

Seasonal Trends in Yields of TDN per Acre

1956

Starr Millet

Pearl Millet

Hybrid Millet

Time - 2-week Intervals
The three varieties tested in 1956 did not differ significantly in the adjusted FCM production on a per-cow basis. The available forage from these three varieties appears to support milk production equally well.

A factor which is difficult to evaluate, but worthy of note, is the silage production of the varieties tested in 1956. At the time of topdressing (July 24), the plots were clipped to even up the growth. The yields for this clipping, and the silage removed at the end of the grazing season are shown in table 4. The high yields of all varieties are of considerable interest when considered in the sense of aftermath forage (removed after being grazed for several weeks). It is apparent that the hybrid had a greater yield potential than the other varieties. It would have been desirable, perhaps, to continue to graze this material. Two factors preclude this: the land was needed for seeding small grain, and the common pearl had headed to such an extent that it was poor quality pasture though still in good condition for ensiling.

Table 4. Harvested Yield of Three Millet Varieties

<table>
<thead>
<tr>
<th>Variety</th>
<th>Starr (lbs. green weight per acre)</th>
<th>Pearl</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clipping (7/24)</td>
<td>780</td>
<td>590</td>
<td>3,490</td>
</tr>
<tr>
<td>Silage (9/5)</td>
<td>16,055</td>
<td>16,399</td>
<td>17,454</td>
</tr>
</tbody>
</table>

Harvested from previously grazed plots.

The availability of seed of new varieties is often a deterrent in farmer acceptance. In the case of the three millet varieties now being considered, Starr and common pearl should be readily available in most seed stocks during the 1957 season. The newer Georgia Hybrid No. 1 is not generally available at this time, but if proven satisfactory over a large area, should be in ample
supply through normal commercial channels within the next few years.

The data presented in this report are to be considered of a preliminary nature. The value of millet for summer pasture in the Coastal Plain is not questioned. However, the relative values of the varieties mentioned need further investigation before more positive recommendations may be made.

Conclusions

1. Pearl millet varieties now available commercially are superior to Sudan-grass for summer pasture for dairy herds in the Coastal Plain.

2. Because of higher yields of TDN and better distribution of yield, Starr millet, now commercially available, has some advantage over common pearl. If no great price difference exists, Starr would seem to be the better choice.

3. New varieties, still in the seed-increase stage, may surpass Starr for dairy pasture.

Acknowledgments

These studies were conducted cooperatively by the Departments of Field Crops, Soils and Animal Industry, Dairy Husbandry Section, along with the U. S. and North Carolina Departments of Agriculture.

Drs. D. S. Chamblee and W. W. Woodhouse, Departments of Field Crops and Soils respectively, carried on all of the earlier work which led to the evaluation of the crops with grazing animals. Dr. Woodhouse also initiated the grazing experiment in 1955. Mr. Jesse W. Sumner, Superintendent of the Coastal Plain Research Station, and his staff gave freely of time and effort in making facilities available for this work conducted at his station.