Progress Report Series No. 37 *November 1947*

AGRICULTURAL EXPERIMENT STATION
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MILK PRODUCTION from a YEAR AROUND FEED and FORAGE CROPPING SYSTEM in the PIEDMONT and UPPER COASTAL PLAIN AREAS*

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$52.42 worth of milk per acre per year! --- that is the average yearly production in 1945 and 1946 from an experimental cropping system on upland soil at the Main Station, Auburn.

The experiment is one of a number conducted by the Agricultural Experiment Station in which adapted crops are combined into systems of year around growing of feed and forage for meat and milk production.

In the experiment reported here, five crops are used. These were chosen because (1) they are adapted to upland soils, and (2) they can be fitted into a system to furnish grazing and feed throughout a 12-month period.

Two years' results from this experiment, how the crops are grown, and how the crops are used are given in this report.

CROPS USED in SYSTEM

The cropping system includes lespedeza sericea, kudzu, oats, manganese bur clover, and grain sorghum. The latter two crops are grown in rotation. The experiment involves a total of 13 acres of these crops for year around feed and forage production for four good grade Jersey cows, or 3¼ acres per cow The acreage per cow of each of the crops is as follows:

¾ acre lespedeza sericea
1 acre kudzu
1 acre oats
½ acre manganese bur clover followed by grain sorghum

No feed was bought. The system provided ample grazing and feed. In fact, it produced a surplus of feed each year.

FEEDING and GRAZING SCHEDULE

The feeding and grazing schedule used during each of the 2 years is about as follows:

Nov. 15 to Feb. 15 - Grazed oats and fed Kudzu and grain sorghum stover when needed.

Feb. 15 to April 15 - Grazed manganese bur clover and fed grain sorghum stover and Kudzu hay when needed.

April 15 to June 7 - Grazed lespedeza sericea.

June 8 to June 18 - Grazed kudzu (kudzu was not grazed in 1946, cows remained on sericea from April to November).

June 18 to Oct. 2 - Grazed lespedeza sericea.

Oct. 2 to Nov. 15 - Grazed lespedeza sericea and kudzu.

USE of CROPS

Oats. The cows were grazed on oats from the middle of November to the middle of February. They were then transferred to a manganese bur clover area. In February the oats were top dressed with 200 pounds of nitrate of soda and were later cut for hay and fed to work stock.

Manganese bur clover. The cows were grazed on manganese bur clover only 3 or 4 hours each day. This was enough time for the cows to get all of the green feed desired without serious damage to the clover. Grazing the manganese bur clover was continued until the middle

* *Two-year report, 1945 and 1946.*

of April, when the cows were removed in order to allow the clover to make seed.

The clover plants died down in May, leaving a heavy seed crop on the ground. The dead plants were removed with a hay rake. The seed were collected in small piles with rakes or yard brooms, and were hauled to the barn for storage. Enough seed were left on the ground for reseeding. (Harvested seed might be used to expand the acreage of this crop.)

Lespedza sericea. The cows were transferred April 15 from the bur clover to the lespedeza sericea. Weather conditions in 1945 made it necessary to relieve the sericea area. For 10 days in June, the cows were pastured on the kudzu and then returned to the sericea where they remained until November 15. However, the next year, it was not necessary to graze the kudzu in June, because moisture conditions were much more favorable.

In both years the sericea grazing in the fall was supplemented with kudzu, from October 2 to November 15.

It has been frequently pointed out by some people that cattle do not like sericea. While they evidently like some crops better, no difficulty was experienced in getting the cows to graze sericea. In this experiment it was found that it was important to start cattle on the sericea early in the spring when the young shoots were 3 to 4 inches high. The rate of grazing is also important, in order to prevent the plants from becoming coarse and woody. One cow per acre appeared to be about the best rate of stocking, though at this rate it was necessary at times to mow the sericea in 1946.

Kudzu. The kudzu was used for temporary grazing and for hay. During dry periods in the summer and just before and just after frost, the kudzu was pastured in order to lighten the grazing of the sericea. When the kudzu was used as a temporary grazing crop in the summer, it was cut for hay just before frost, October 1 to 15; otherwise, it was cut in June. The cured kudzu hay was fed in the winter with grain sorghum.

Hegari (high-gear) grain sorghum. When the grain was mature in September, the crop was cut with a corn binder. This crop may also be cut with a mower or combine. The crop was left in the field to dry for 10 days to 2 weeks and was then hauled to the feed lot and stacked around a pole, with the heads turned in to protect the grain from weather and damage from birds. The stack was capped with hay. Removal of the grain and stover from the field was necessary, because the same area would be in a volunteer crop of bur clover.

The grain sorghum was fed from the stack (grain and stalk) as dry grain and stover. This and the kudzu hay were fed to the animals during the fall, winter, and spring.

The winter ration for the cows, beginning November 15, was 20 pounds of grain sorghum and stover and 20 pounds of kudzu hay per head per day when weather or soil conditions prevented grazing the oats or manganese bur clover Less amounts of these two dry feed were used daily when a limited amount of grazing was available. With an abundance of grazing no dry feed was fed. In all, an average of 1,700 pounds each of kudzu hay and grain sorghum were used for each cow during the winter period.

SUBSTITUTE CROPS

Substitute crops that might be used in this system are:

½ acre of alfalfa for 1 acre of kudzu.

1 acre of improved permanent pasture for ¾ acre of sericea.

½ acre of reseeding crimson clover for ½ acre of manganese clover.

½ acre of Johnson grass hay or sudan grass for ½ acre of grain sorghum.

RESULTS and CONCLUSIONS

Four dairy cows received all of their feed during the 2-year period from crops grown on the 13 acres of land. In addition, some surplus feed was grown on this land and was used to feed workstock and other animals. The surplus feed each of the 2 years included approximately 4 tons of oat hay, 3 tons of kudzu hay, and over 2 tons of grain sorghum stover.

The grain sorghum yielded 38 bushels of grain per acre or 6,272 pounds of stalk and grain combined.

The yield of kudzu hay was 3,300 pounds per acre and the estimated yield of oat hay was 1 ton per acre. Both of these crops were grazed as well as harvested for hay.

It is noted that 3 acres of sericea pasture furnished all of the feed eaten by the four cows for a period of approximated 6 months each year.

The production record of the four cows on this grazing and feeding schedule (Figure 1) for the 2-year period January 1, 1945, to December 31, 1946, averaged per year 5,242 pounds (605½ gallons) of milk per cow (Table 1). The price of grade B milk during this period was $3.25 per hundred pounds. Thus, on the average each cow produced $170.38 worth of milk per year.

The crops grown on the 13 acres of land used in the system yielded $681.52 worth of milk. This did not include the value of surplus feed. The out-of-pocket cost was $104 for fertilizer.

A four- or five-cow dairy unit with a cropping system such as this should prove profitable on many family-sized farms. Such a unit should be regarded not as a substitute for cotton, but as a supplement to cotton. The average farm family could produce just about as much cotton and corn as usual and at the same time operate this unit. In such a case the cotton should be planted on the better lands and the feed and grazing crops grown on the less productive acres.

ADVANTAGES of this SYSTEM

Important among a number of advantages are:

(1) The cows do much of the harvesting, thus saving labor.

(2) The system provides grazing and roughage for the cows 12 months of the year.

(3) The system reduces erosion to a minimum, because most of the land is protected by crops much of the year.

(4) Three of the five crops are legumes, which improve soil fertility.

HOW to GROW CROPS USED in SYSTEM

Oats. Best results are obtained from oats sown in early September on a well prepared seedbed. From 3 to 4 bushels of seed per acre is the recommended seeding rate. About 500 pounds per acre of a 4-10-7 fertilizer should be worked into the seedbed before planting. As soon as

FIGURE 1. ANNUAL GRAZING AND FEEDING SCHEDULE BY MONTHS

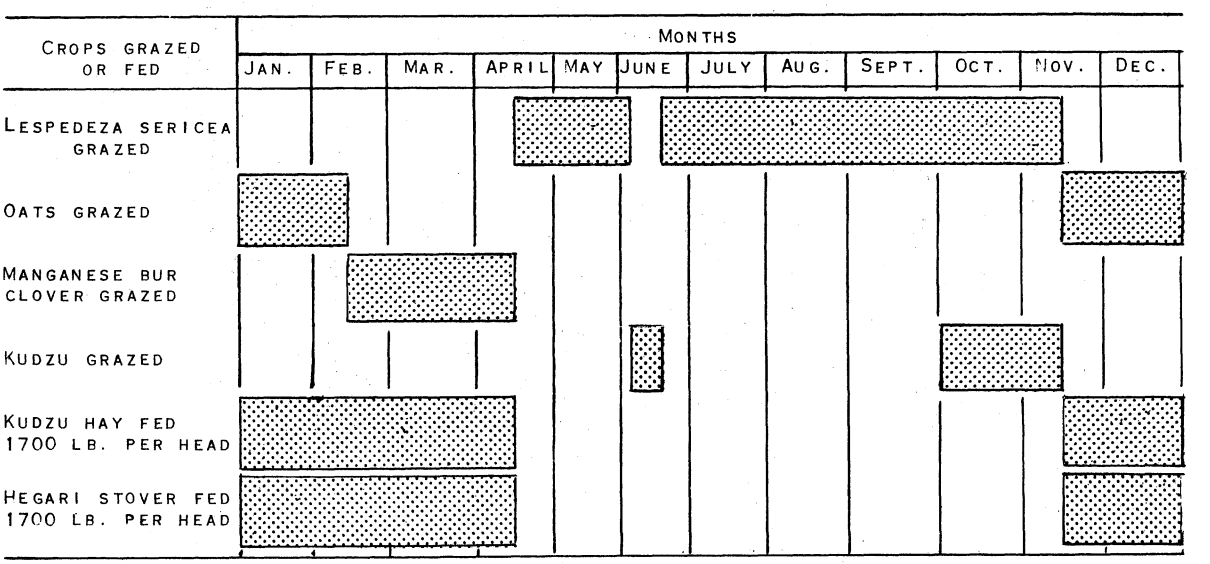

TABLE 1. MONTHLY PRODUCTION RECORDS OF COWS ON FEED AND FORAGE CROPPING SYSTEM, MAIN STATION, 1945 - 1946

Cow No.	Year	Pounds of Milk Produced Monthly												Annual Totals	Two-Year Av.
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.		
189[1]	1945	Dry	Dry	373.0	818.0	809.0	657.0	645.0	585.0	504.0	412.0	313.0	228.0	5,344	5,386
	1946	Dry	307.5	862.7	802.9	643.0	616.0	602.1	557.1	401.6	241.2	222.4	171.6	5,428	
124[2]	1945	33.0	Dry	454.0	652.0	670.0	640.0	571.0	552.0	512.0	431.0	423.0	349.0	5,287	5,609
	1946	384.3	375.1	476.5	452.5	54.1	Dry	261.1	893.0	852.1	650.5	662.2	870.0	5,931	
285[3]	1945	596.0	680.0	705.0	540.0	515.0	480.0	510.0	443.0	363.0	80.0	Dry	167.0	5,079	5,333
	1946	658.7	607.3	625.6	586.0	497.7	527.9	523.7	521.1	417.4	283.6	286.5	51.4	5,587	
147[4]	1945	Dry	Dry	Dry	Dry	424.0	578.0	696.0	748.0	740.0	500.0	403.0	345.0	4,434	4,642
	1946	358.3	356.9	236.8	600.3	446.3	470.8	487.6	501.9	407.9	326.9	321.1	335.3	4,850	
Monthly Totals.	1945	629.0	680.0	1532.0	2010.0	2418.0	2355.0	2422.0	2328.0	2119.0	1423.0	1139.0	1089.0	20,144	20,970
Monthly Totals	1946	1401.3	1646.8	2201.6	2441.7	1641.1	1614.7	1874.5	2473.1	2079.0	1502.2	1492.2	1428.3	21,796	

1/ Cow 189: Dry at start of experiment; freshened March 10, 1945; dry December 25, 1945 and freshened February 12, 1946; dry December 27, 1946.

2/ Cow 124: Dry January 9 and freshened March 6, 1945; dry May 7, and freshened July 10, 1946.

3/ Cow 285: Dry October 7, and freshened December 12, 1945; dry December 6, 1946.

4/ Cow 147: Dry at start of experiment (heifer with first calf) freshened April 20, 1945; dry March 21 and freshened March 24, 1946.

the oats are up to a good stand, they are top-dressed with 125 pounds of nitrate of soda or 60 or 70 pounds of ammonium nitrate applied broadcast. If the oats are to be cut for hay or grain, the animals should be removed about the middle of February and the oats should be top-dressed again with 250 pounds per acre of nitrate of soda or 125 pounds of ammonium nitrate.

Manganese bur clover. Preparation of a good seedbed is the first step toward success with bur clover. This is begun in July by turning the land. Fertilizer and lime are worked into the soil in August at the per-acre rate of 400 pounds of superphosphate, 100 pounds of muriate of potash, and 1 ton of ground limestone. If available, manure should also be used at the rate of 4 to 5 tons per acre. The crop is seeded by broadcasting at the rate of 100 pounds per acre of seed in the bur. No covering is necessary.

Bur clover matures seed in late May or early June and dies down. If seed are desired, the dead vines are raked off and the seed are swept up with yard brooms. Usually enough seed are left on the ground to reseed the crop. The land is then broken for planting sorghum or other summer crop. After the sorghum is harvested in the fall, the volunteer bur clover is fertilized at the rate of 400 pounds of superphosphate and 100 pounds of muriate of potash per acre.

Lespedeza sericea. Success with sericea begins with getting a good stand. Common causes of failure to get and to keep a stand are: (1) planting on a poor seedbed and (2) competition from weeds. Seedbed preparation must start several weeks ahead of seeding. The land to be seeded to lespedeza should be broken in February or early March and harrowed one or more times to firm the soil and kill weeds. The fertilizer is worked into the soil during the harrowing operations at the rate of about 400 pounds of superphosphate and 100 pounds of muriate of potash per acre. The best method of seeding is to roll the soil with a corrugated roller just before seeding and then broadcast the seed without covering them. If a corrugated roller is not available, the next best method is to harrow the field just before seeding with a spike-toothed harrow and then plant without covering the seed.

About 30 to 40 pounds of scarified seed per acre is the recommended rate of seeding. Time of seeding is usually about April 1, though later seedings often result in good stands.

The crop should be allowed to become well established before it is grazed. For this reason, grazing is not recommended until the second year. After the crop is established, annual applications of 400 pounds of superphosphate and 100 pounds of muriate of potash per acre are made in early March.

Kudzu. The land is turned in February or March and kudzu crowns are set in rows 5 to 6 feet apart in the row. The recommended rate of fertilizer the first year is 400 pounds of superphosphate and 100 pounds of muriate of potash per acre, which is applied in the soil before the plants are set. Thereafter, the same amounts per acre of superphosphate and muriate of potash are broadcast annually. The kudzu is cultivated the first year in order to keep down weeds.

Hegari (hi-gear) grain sorghum. Following the harvesting of manganese bur clover seed, the ground is disked with a disk harrow. Rows are laid off 3 to 5 feet apart, and the Hegari (high-gear) is planted in mid-June at the rate of 6 to 8 pounds per acre. No fertilizer is used, since the sorghum crop follows bur clover that has received liberal applications of phosphate and potash, and since the bur clover furnishes an abundance of nitrogen in the soil.