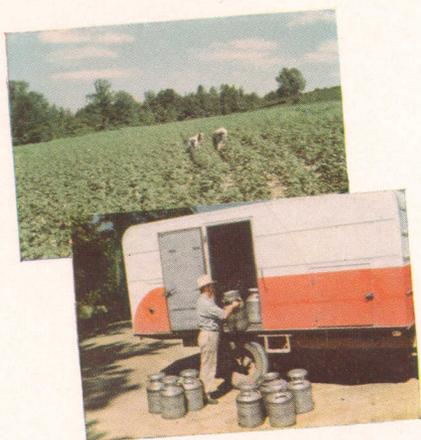


Brd

CIRCULAR No. 111

DECEMBER 1952



COTTON-DAIRY FARMING *in* *Alabama's Piedmont*

An account of how dairying
added to cotton growing more
than doubled cash income of a
195-acre farm in 5 years of
operation, 1947-51

AGRICULTURAL EXPERIMENT STATION
of the ALABAMA POLYTECHNIC INSTITUTE

E. V. Smith, *Director*

Auburn, Alabama

CONTENTS

	<i>Page</i>
LAND, PEOPLE, AND YEARS.....	3
THE PROBLEM — LOW FARM INCOME.....	5
WHAT CAN BE DONE.....	5
OPERATION OF COTTON-DAIRY UNIT.....	6
Beginning Year, 1946.....	6
First Year of Operation, 1947.....	7
Second Year of Operation, 1948.....	9
Third Year of Operation, 1949.....	10
Fourth Year of Operation, 1950.....	11
Fifth Year of Operation, 1951.....	15
HIGHLIGHTS OF FIVE YEARS' PROGRESS.....	17
HERD MANAGEMENT.....	20
HOW CROPS WERE GROWN.....	20
Row Crops.....	20
Grazing and Hay Crops.....	21
FAMILY LIVING.....	22
APPENDIX.....	23

COTTON-DAIRY FARMING *in* *Alabama's Piedmont*

E. L. MAYTON, *Superintendent*
Piedmont Substation

KENNETH B. ROY, *Agricultural Editor*

THIS IS A STORY about a farm-scale experiment at the Piedmont Substation near Camp Hill, Alabama, aimed at methods by which farm income in the Piedmont might be improved.

The experiment, begun in 1946 by the Agricultural Experiment Station of the Alabama Polytechnic Institute, is on a 195-acre farm. To add to the income from cotton, milk is produced and sold for manufacture. Practically the entire dairy operation part of the farm is supported by grazing crops and hay.

But before going on with our story, let's see what has taken place in farming in the Piedmont of Alabama.

LAND, PEOPLE, and YEARS¹

A few venturesome pioneers emigrated to Alabama's Piedmont before the War of 1812. They came from the Carolinas, Virginia, and Georgia, and settled in what was later to become Tallapoosa County.

Dudleyville, one of the first Piedmont settlements on record, was founded in about 1800. Other early settlements were made at Youngville (later Alexander City), Dadeville, and Emuckfaw. There were others who settled in areas that were later to be created as Chambers, Coosa, and Randolph counties. Some came to farm, others to carry on a brisk trade with the Indians.

But for the most part, settlement of the Alabama Piedmont was slow. The Creek Indians had no love for the white man. They were known to pillage and burn settlements. So, it was not until after the Creek War that settlers came in numbers.

Another bar to emigration of farmers was the public land law. Under this federal act, settlers could not purchase less than a section of land. Few immigrants had that kind of money. When the second law was amended to permit buying as little as 160 acres, land purchase increased.

¹ Historical discussion based on "History of Alabama and Her People" by Albert Benton Moore; "Alabama" by W. Brewer; "History of Alabama" by Albert J. Pickett; and "History of Randolph County," graduate thesis, Alabama Polytechnic Institute, by Eugenia Elizabeth Smith.

Chambers, Coosa, Randolph, and Tallapoosa were created as counties in 1832. The total population of the four counties in 1840 was 23,909 whites and 11,829 Negro slaves. The other counties in Alabama's Piedmont were not established until after the War Between the States.

The Piedmont in general is hilly, with elevations of 700 to 1,000 feet. Through it flows a number of rivers fed by a great many streams. Because the region was "well watered," numbers of veterans of the Creek War returned to the Piedmont to take up farming.

In the main, the soils are sandy or clay loams with red or dark brownish-red subsoils. By nature these soils are strong. But, to get good yields requires care and management.

At first the Piedmont was thickly forested with pines and hardwoods. Early settlers found little open land. What they did find had been cleared by the Indians for growing corn and beans.

Farming in the region began with clearing the first bottoms, which in most cases were quite narrow. As the early farmer needed more crop land, he cleared more and more timber up the hills from his bottom land. Thus, farming moved up the slopes of the Piedmont, with trees giving way to the plow.

Crops grown in these early years were cotton, corn, oats, wheat, tobacco, beans, peas, potatoes, other vegetables, and fruit. Cotton, however, was the important cash crop. There was a goodly number of both meat and dairy animals. The settlers had found the region to be designed by nature for livestock raising. There was ample water, and the area abounded in native grasses and buffalo clover.

But the settlers' idea about the Piedmont as a livestock area evidently was lost in the passage of time. Cotton became the big income producer and continues to be despite the decline of cotton economy in the last 20 years.

Bench terraces, still to be seen, are landmarks of Piedmont farmers' early efforts to stop soil losses on slopes, dating back more than 100 years. The Piedmont today is marked by severe erosion, gullies, and abandoned farms. Despite these, the region offers great opportunities for further development because most of its soils respond to good treatment. Agricultural Experiment Station results show that these soils in time can be made to produce good yields of cotton, corn, small grains, legumes, and other crops by using good soil management and cultural practices.

The **PROBLEM—Low Farm Income**

The foremost problem of the Piedmont is low farm income. Bearing on this but beyond control of the farmer are: (1) downward trend in demand for cotton, and (2) unstable prices. Other factors affecting farm income about which the farmer can do something are: (1) too much idle land per farm; (2) not enough land used to grow food crops, and feed and forage for production of livestock and livestock products; and (3) low yields resulting from not applying good farming practices.

In 1950, there were 11,115 fewer farms in Alabama's seven Piedmont counties than 40 years ago. However, farms were over a third larger, increasing in size from an average of 80 acres in 1910 to 114 in 1950.

The number of tenants declined from 13,488 in 1930 to 5,461 in 1950, while sharecropper numbers dropped from 7,071 to 1,699 in the region. These figures indicate the shift that has taken place in the Piedmont — from farming to other income opportunities.

Cotton acreage in the seven counties in 1950 was 77 per cent less than it was in 1910. Acreages of corn, oats, wheat, soybeans, and cowpeas also have dropped decidedly.

On the brighter side, cattle numbers have increased. In 1950, there were over 25,000 more head of beef and 2,700 more head of dairy cows in the region than there were in 1930. Hay acreage totaled nearly 47,000, or four times the acreage in 1930. In that same 20-year period, land in pasture and grazing increased from 178,734 to 266,764 acres — a gain of nearly 50 per cent.

These gains indicate trends — that perhaps after 125 years the Piedmont may become the livestock area once envisioned by the early settlers.

WHAT CAN BE DONE

Now let's get on with our story about the cotton-dairy farm unit at the Piedmont Substation.

Production of milk for manufacture as a supplement to cotton income in the Piedmont Region appeared to offer good possibilities. Here was our reasoning:

- (1) A market was available.
- (2) The soils of the region by nature were strong.
- (3) There was abundant water available.
- (4) Dairying would offer additional employment opportunity for farm labor, and fuller use of land.
- (5) Capital needed would be modest for the farm owner who would grow into the dairy business.

However, successful establishment of such an enterprise would be dependent upon the solution of several problems. These included:

1. Establishment of grazing and hay crops.
2. How to maintain such crops for best production.
3. Need for and production of supplementary feed crops.
4. Management of dairy herd.

So, with these in mind, we started the farm-size experiment to find practical answers that would be helpful to you.

On the Piedmont Substation, we set aside four adjoining 40's for the cotton-dairy experiment. At the time we acquired the land, the 160-acre place was an abandoned farm.² There were 10 acres of bottom land and 6 acres of kudzu on a hillside. About two-thirds of the remaining acres were open or partly open land. Some 30 to 40 acres had been in cultivation in recent years.

We visited farmers who during 1941-44 had farmed portions of the Substation. According to their recollections, they averaged about one-half bale of cotton per acre, or 3½ bales per plow. Practically all said that cotton had been their only source of income and that they sold almost no livestock or livestock products.

The labor force on the farm consists of two full-time men. Extra labor for chopping and picking cotton is hired. This would be the same if you as owner worked and hired a man, or if you and your family worked the place.

On this farm, we hired a tractor and equipment to prepare land for forage and pastures, and for cultivation of corn. In the case of cotton, we planted and cultivated with mule-drawn equipment.

OPERATION *of* COTTON-DAIRY UNIT

Beginning Year, 1946. In 1946 we were getting ready for next season's production. At the start of the year, all that was on the farm were 6 acres of kudzu and some old fencing. We managed to salvage about three-fourths of a mile of old wire.

During this year we planted 28 acres in forage and hay crops, making 34 with the old kudzu area. The new plantings included 3 acres of kudzu and 16 acres of sericea lespedeza seeded in the spring, and 9 in fall-planted oats. (See section "How Crops Were Grown," page 20, for seedbed preparation, fertilizers and amounts used, and rate of seeding per acre.)

To help build up soils of the areas we expected to put in row

² An additional 35 acres was added in 1948.

crops, we have planted each fall some acreage in winter legumes. In this year, we seeded 18 acres to vetch and Austrian winter peas. These were to be turned next spring and followed by row crops.

In the summer of 1946, we started building a barn, two houses, and a milk shed. Twelve tons of kudzu hay was stored in the new barn the following October.

Nine cows and a heifer were bought late in the year. While two were unregistered purebreds, eight were average grade animals obtained from local cattle dealers. We picked what we judged to be good producers. The 10 animals cost \$938. Why did we buy mostly grade animals? Because we wanted to make our start with the same type of cows as available to any Piedmont farmer going into the dairy business. We wanted to begin with typical grade cows available in the area and build up our herd. This we expected to do by breeding the cows to proven bulls and by raising heifers for replacement of cows culled for one reason or another, and for increasing the milking herd.

We purposely limited the milk animals bought to a number that we could care for with 34 acres in hay and forage this first year. However, we did expect to buy more grade cows the next year so that we would have a fairly good volume of milk to sell the year around.

By the end of the first 12 months' operation we had invested:

\$3,200	in 160 acres of land
1,500	in a barn
5,000	in two houses
400	in a milk shed
53	in tools
938	in nine milk cows and a heifer
100	in one mule
33	in milk cans
95	in six shoats and baby chicks (home use)
175	in workstock equipment

\$11,494 total

Over three-fourths of the total money invested was for land and buildings. If you had owned your farm and had a house, a good barn, workstock, and equipment, it would have cost you about \$1,400 to set up this unit.

First Year of Operation, 1947. We began our first year of operation in 1947. Acreages planted to row crops were cotton 11, corn 8, and grain sorghum 4.

By the end of the year, we had increased our total hay and forage crop acreage to 45, or 11 more than the year before. An 8-acre field of Bermuda, Dallis, and carpet grass was disced, fertilized, and over-seeded with white Dutch clover. This pasture would be used to graze producing cows and calves during the summer. Nine acres were planted to crimson clover and ryegrass that fall. We rented 16 acres of fall oats for grazing.

Fifteen acres were seeded to vetch for turning under next spring and to be followed by row crops.

In the fall we bought 10 more cows, one having a heifer calf at side. We lost one cow at calf birth. These were not as good animals as we bought before. There were fewer cows to choose from and out-of-state buyers were also in the market. As a result we paid more per head than we did on our first purchase. Thus, we ran into one of the problems that faces a farmer when he attempts to buy cows to go into the dairy business.

That fall we picked 7 bales of cotton (315 pounds per acre), gathered 300 bushels of corn ($37\frac{1}{2}$ bushels per acre), and harvested 2 tons of grain sorghum stover. We also put $10\frac{1}{2}$ tons of kudzu hay in the barn for winter feeding when weather would not permit grazing.

In those first 12 months of full operation, we milked an average of 11 cows. Milk production totaled 49,609 pounds, or an average of 4,510 pounds per cow. Production per acre of hay and forage used was 1,055 pounds of milk. We sold to the milk plant 42,810 pounds, and about 6,800 pounds was for home use and for feeding calves dropped during the year.

To take out the drudgery of hand milking, we invested \$265 in a milking machine late in the year.

Cotton and seed brought \$1,497 and milk \$1,808. We also sold a 400-pound sow we did not need and 100 pounds of sericea seed. In all our sales amounted to \$3,410. Cash expenses totaled \$2,435, including seed and fertilizer expenses for planting the 1946 acreage. Nearly \$1,200 of the total expenses were for seed and fertilizer for all crops. We paid out \$412 for tractor and machinery hire and \$130 for extra labor for chopping and picking cotton.

At the end of the year, we had a cash balance of \$975 for all of our efforts. There was nothing left to pay on the money invested in land, buildings, equipment, and dairy animals. That, however, is to be expected.

In 1947, we invested additional capital in the following:

\$ 335 for milking machine and hot water heater.

1,025 for 10 cows and 4 pigs

86 for 360 rods of new fencing

\$1,446 total

For details about production, sales, and expenses by years, turn to Appendix Table 1, page 23.

Second Year of Operation, 1948. At the start of the 1948 year, we added 35 acres to the place, 16 of which were in fall-planted oats. Row crop acreages for this year were 11 in cotton, 6 in corn, and 5 in grain sorghum.

With more animals on the farm and with more calves due, we expanded our hay and grazing crops to 71 acres. Eight acres of sericea, 2 of Ladino clover-fescue grass pasture, and another acre of kudzu were added to the acreages in these crops. Alfalfa was planted for the first time on 8 acres. By late fall we had 24 acres of sericea, 13 of kudzu, 10 of clover-grass pasture, 8 of alfalfa, 11 of crimson clover and ryegrass, and 5 of oats. On 21 of the 24 acres of sericea, we over-seeded with crimson clover in order to extend use of the area into the winter months.

We harvested that fall 9 bales of cotton (413 pounds per acre), 275 bushels of corn ($45\frac{4}{5}$ bushels per acre), and used 54 acres of hay and grazing crops for the dairy animals. Yields were improved; we picked about 100 more pounds of lint and gathered 8 more bushels of corn per acre than the previous year.

Milk production, however, was decidedly off — nearly 12,000 pounds under that of 1947. Pounds of milk produced per acre of hay and forage crops was down to 705 pounds. Average production per cow was 2,927 pounds for the 13 cows milked in 1948.

For one thing, a long drought cut our grazing in May and June. This came shortly after about half of the herd had freshened. Then we had difficulty in getting the cows to settle by artificial insemination. Of the 11 bred artificially, 5 were settled at the first or second service, while two required additional services. The other four failed to breed by artificial insemination, and finally were bred to an available bull. The delays in settling the cows extended their dry periods, resulting in less milk produced during the year.

A veterinarian found no reactors in his examinations for Bang's disease and for possible reproductive disorders. It was his conclusion that the trouble was the result of inexperienced techni-

cians doing the artificial insemination work for the local association. Since then we have had less difficulty with artificial breeding.

Change-over from hand to machine milking affected a few cows, tending to shorten their lactation periods.

Our total sale for this year was about \$1,200 above 1947 receipts, even though we had less milk to sell. Sales of lint and seed amounted to \$1,687, while milk brought \$1,430, or nearly \$400 under that of the year before. Miscellaneous sales included six cows and one heifer culled because they were shy breeders or low milk producers, one steer, and 568 bushels of oats, bringing \$1,511.

Over half of our year's expenses (\$1,700) was for seed and fertilizer. We paid out \$538 for tractor and machinery hire, and \$202 for extra labor for cotton chopping and picking.

After taking out all cash expenses, we had a cash balance of \$1,566 for the year's work. This is the first time since our start that some payment could be applied on debt retirement.

By the end of the year, we had 15 cows, 14 heifers and calves, and one bull calf. Nine of the heifer calves and the bull calf were dropped during 1948.

During the year we made additional investments in the following:

\$ 700	for 35 additional acres of land
245	for necessary improvements in labor houses
445	for 3 dairy cows and 2 heifer calves
101	for 347 rods of new fencing
<hr/>	
\$1,491	total

Third Year of Operation, 1949. In 1949 we increased cotton acreage $1\frac{1}{2}$ acres, and planted 5 acres in corn and 4 in grain sorghum. This difference in acreage from the year before was mainly because of our rotation of fields in row crops.

We made very little change in the acreage of forage and hay crops. Actually we added only one acre and that was to the sericea area. As you will remember, the year before we over-seeded 21 acres of the sericea with crimson clover. In 1949, we over-seeded the remaining 4 acres of sericea with manganese bur clover. Of the 72 acres in forage and hay, 71 were used this year for the milking herd, dry cows, and young animals.

While our corn yield per acre (45 bushels) was about the same as the year before, we picked 842 fewer pounds of lint from $1\frac{1}{2}$

more acres in cotton than in 1948. Boll weevil and other cotton insects cut our yield to 296 pounds per acre. While we actually applied about as much poison per acre as in 1948, the infestation was far worse. We simply did not do a good job of poisoning. It was a good but costly lesson — what happens when we don't apply cotton insecticides often enough from the time the cotton is fruiting freely until the top bolls are about two-thirds grown.

Although we milked one more cow (14) than the year before, milk production in 1949 was more than double that of 1948, when we had so much breeding trouble. Average milk production per cow was 5,520 pounds, while average production per acre of forage and hay used was 1,088 pounds.

Our cotton and seed brought \$1,218, which was over \$400 less than our receipts from cotton the previous year. We sold 61,301 pounds of milk to the plant, with receipts totaling \$2,075. Miscellaneous receipts amounted to \$593 from the sales of four cull cows, one calf, one steer, four market hogs, and five pigs.

Our total cash receipts at the close of the year amounted to \$3,886. This was over \$700 less than our receipts of the year before. A drop in milk prices of \$1.01 per hundred, reduced cotton yield, and less miscellaneous sales account for the smaller total sales in this third operation year.

During the year we paid out \$1,009 for seed and fertilizer, \$381 for tractor and equipment hire, and \$184 for chopping and picking cotton. Our total cash expenses amounted to \$2,417, which was more than \$600 less than the year before. We had a cash balance of \$1,469 after paying all of our current operating expenses. Some of this balance could be applied on our capital debt for land, buildings, livestock, equipment, and the like.

We invested very little capital in equipment this year, which was as follows:

\$33 for construction of a cooling vat
<u>46 for six additional milk cans</u>
\$79 total

By the end of this year, our dairy animals included 17 cows in the herd, 9 heifers, and 10 heifer calves — 36 in all. Ten calves were dropped during this year.

Fourth Year of Operation, 1950. The year 1950 was one of greatest progress on the unit. Production was better than in any previous year. We had more to sell, and cotton and milk prices were considerably better than those of 1949. The long pull of

FORAGE and HAY fo



**Forage and hay crops on the T
Piedmont Substation; fall-seed
and/or grain; crimson clover
and spring grazing; improved cl
for spring and summer forage;
kudzu (lower right) for grazin**



2 MILK PRODUCTION



95-acre cotton-dairy unit at the
and oats (upper left) for grazing
grass (center) for fall, winter,
over-grass pastures (upper right)
alfalfa (lower left) for hay; and
ing during dry summer periods.



expanding and improving hay and forage crops was beginning to show greater returns.

In this year, our acreages in row crops were 11 in cotton, 5 in corn, and 2 in grain sorghum. We also planted 7 acres in oats for grain. As you will note, we cut the acreage of grain sorghum about half. This crop has not produced good yields on our kind of land. May and June dry weather bakes the soil, making it very difficult to plow. In fact, it is almost impossible to prepare a good seedbed, and as a result we have not been able to get good stands.

We increased our acreage of hay and forage crops to 83, putting in 4 more acres of alfalfa and 5 additional acres of Ladino clover-fescue pasture along a creek bottom.

Our new 4-acre seeding of alfalfa was killed by the late November, 1950, severe freezes. It was the first time that we had lost a stand from cold damage. Like a lot of farmers, we were misled by the name, later learning that the Arizona seed were not a "common" strain, such as the Kansas and Oklahoma Common that grow well in Alabama.

Victoria Blight (*Helminthosporium victoriae*), a fairly new small grain disease in these parts, cut our grazing and grain yields last year. So in the fall of 1950, we decided not to plant oats for grazing and instead increased our crimson clover-ryegrass from 11 to 18 acres. The acreages in kudzu and sericea remained unchanged. Of the 83 acres in forage and hay, we used 74 for our dairy animals.

Although handicapped by dry periods, cotton insects, and late fall low temperatures, we produced more cotton, corn, and milk than in any previous year. We gathered 250 bushels of corn (50 bushels per acre), picked a little over 9 bales of cotton (426 pounds of lint per acre), and cut 4 tons of grain sorghum stover.

This year will be remembered as the worst cotton insect season in the last 25 years. Despite heavy infestation, we made 130 more pounds of lint per acre than the previous year, when we learned our lesson about cotton insect control. During the 1950 season, we used a little over 80 pounds of cotton insecticide per acre as compared to 50 pounds the season before.

Production from 20 cows milked in this fourth year totaled 100,586 pounds, which is the largest since our start and which is 30 per cent above our best previous year. Average milk production per cow was 5,029 pounds and per acre of forage and hay crops used (74 acres) was 1,359 pounds.

For the first time our total annual receipts went above \$7,000. Cotton and seed brought \$2,393, while receipts from 83,184 pounds of milk sold to the milk plant amounted to \$3,038. Our miscellaneous receipts totaled \$1,836 from sales of the following: 1 cow, 16 yearlings and calves (\$880); 3 market hogs, 5 shoats, and 2 pigs (\$223); 14,510 feet of stumpage from thinnings on the place (\$218); and 364 bushels of seed oats (\$516).

This year we paid out \$1,034 for seed and fertilizers, \$500 for tractor and machinery hire, \$364 for extra labor for chopping and picking cotton, and \$1,167 for miscellaneous expenses.

After taking all operating expenses (\$3,066) from our total sales (\$7,267), we had a cash balance of \$4,201 for the year's operations. This balance would permit a sizeable payment on capital debt retirement.

During the year we invested additional capital in the following:

\$ 47 for six additional milk cans
<u>161 for new fencing</u>
\$208 total

At the end of the fourth year's operations, we had 21 cows in the milking herd, 9 heifers, and 5 calves.

Fifth Year of Operation, 1951. A long drought — from May 1 to mid-September — reduced yields with the result that total cash receipts were less than the previous year.

Compared with 1950, milk production was off about 10,000 pounds (10 per cent), cotton yield was 40 pounds of lint less per acre, and corn yield was down 21 bushels.

Our row crop acreage was 10 in cotton and 7½ in corn. The year before we cut grain sorghum acreage to 2 acres, and this year we gave up trying to produce the crop — just about impossible to get a good stand on the kind of land we have. Instead, we increased our acreage of corn by 2½ acres over what we planted in 1950.

By this year, the sericea had practically disappeared from the old 25-acre area where it had been over-seeded 3 years before to crimson clover and manganese bur. Evidently, it could not stand the competition from the two clovers. The area now (1951) is a mixture of Bermuda and Dallis grasses, and crimson, bur, and white Dutch clovers.

In 1950 we planted 7 acres in oats expecting to use the crop for grain. However, severe cold weather in November badly damaged the stand. We finally salvaged 5½ tons of oat hay from

this area in the following spring. This area we fallowed and planted to alfalfa in the fall of 1951.

In the fall of 1951, our forage and hay crop acreages totaled 100 — 17 in kudzu; 25 in Bermuda, Dallis grass, crimson, man-ganese, and white clover (old sericea area); 20 in crimson clover and ryegrass, 26 in clover-grass pasture; and 12 in alfalfa. All but 8 acres of the 100 were used for grazing our stock.

While drought cut our cotton yields, we did have considerably less infestation of cotton insects than in 1950. It was necessary to use only 20 pounds of poison per acre as compared to over 80 the year before.

Total production from 20 cows milked this year was 90,163 pounds, or an average of 521 pounds less per cow than in 1950. Just how dry weather in 1951 affected pastures, our average milk production per acre of forage and hay (92 acres used) was 980 pounds, whereas the year previous the average per acre was 1,359 pounds (74 acres used). In other words, we used 18 more acres of forage and hay and produced 10,423 fewer pounds of milk than in 1950.

Our total sales for 1951 — \$6,781 — was a little less than \$500 under our receipts of the year before. Cotton and seed brought \$1,734, while sale of 78,644 pounds of milk amounted to \$3,471. Miscellaneous receipts totaled \$1,576 from the sale of 15 bull calves, 5 cull cows, 1 heifer calf, and 1 sow (\$1,400); of 18 cords of pulpwood (\$44); and of 600 pounds of crimson clover seed (\$132).

Two of the five cows were sold because of chronic mastitis; one was a shy breeder, while two milked only short periods and became dry.

During the year we paid out in cash expenses \$1,350 for fertilizer and seed, \$393 for machinery expenses; \$291 for extra labor for chopping and picking cotton; and \$940 for taxes, insurance, dairy supplies, veterinary services, and other miscellaneous expense items.

Deducting operating expenses (\$2,974) from total sales (\$6,781), we had a net cash income of \$3,807 for our operations in 1951. With this much balance, a sizeable payment could be paid again this year on capital debt retirement.

Until early in the year, we had paid out a total of \$1,831 for machinery hire in the first 4 years of operation. With our acreage in row, forage, and hay crops over 100, we decided to invest \$1,575 in a medium-powered tractor and needed equipment.

Our additional capital investment during the year was:

\$ 850 for medium-powered tractor
225 for disc harrow
100 for bush and bog harrow
250 for 3-disc direct hitch tractor plow
150 for hammer mill
97 for milk cans, tools, lumber for hay racks
44 for new fencing
<hr/>
\$1,716 total

HIGHLIGHTS *of* FIVE YEARS' PROGRESS

The purpose of our farm-scale experiment has been to find out how Piedmont farm income might be bettered — practical ways of using more land per farm and getting more dollars from the land.

In addition to growing cotton, we added production of milk for manufacture.

Summed up here are highlights of 5 years' production and sales:

(1) Our sales from the 1951 crop year were about double those of our first season — 1947. Aside from cotton, we had more to sell — milk, cull animals, surplus seed and hogs, and other miscellaneous items. Our total cash sales, operating expenses, and net cash balances by years were:

	1947	1948	1949	1950	1951
Total sales	\$3,410	\$4,627	\$3,886	\$7,267	\$6,781
Operating expenses	2,435	3,061	2,417	3,066	2,974
NET CASH BALANCE .. \$	975	\$1,566	\$1,469	\$4,201	\$3,807

For each dollar we put out for current operating expenses, we got back in —

1947	1948	1949	1950	1951
\$1.40	\$1.51	\$1.61	\$2.37	\$2.28

(2) While some payment on borrowed money could have been started by the end of the second year, it was not until the fourth and fifth years that sizeable reductions in the debt could have been made. By the end of the fifth season, all money owed for dairy herd, machinery, fencing, pasture development, and equipment could have been paid off. The remainder would have been long-term debt for land and buildings.

(3) Had you owned this farm, and had followed identically our operations year by year, you could have maintained a fair living and in addition could have cleared yourself of all indebtedness for dairy animals, machinery, fencing, equipment, and annual operating expenses including interest by the end of the fifth year.

(4) If the farm unit had been closed out lock-stock-and-barrel at the close of the fifth year, there would have been a cash balance of more than \$8,500 after paying all debts.

(5) In no year did the dairy of our farm unit produce less than half of the total sales each year. Here are the proportions of total sales by years from cotton, dairying, and miscellaneous items:

	<i>Proportion of total sales by years</i>				
	1947	1948	1949	1950	1951
Cotton (lint and seed)	44%	36%	31%	33%	26%
Dairy (milk and cull animals)	53%	50%	64%	54%	71%
Miscellaneous (surplus seed, hogs, & timber)	3%	14%	5%	13%	3%

(6) Take away the dairy business on this farm unit and see what happens. In such a case our total cash receipts each year would be limited to **cotton, cottonseed, a few surplus hogs, and some timber and pulpwood**. There would be **no milk, no cull cows or calves, and no surplus forage crop seed** to sell. The following is a comparison of total sales of the farm unit had it been operated as a row-crop, cotton farm with actual receipts of the cotton-dairy unit during the 5-year period.

	1947	1948	1949	1950	1951
Total sales from cotton, cottonseed, surplus hogs, timber, and pulpwood	\$1,576	\$1,686	\$1,400	\$2,833	\$1,847
Actual total sales of cot- ton-dairy unit	\$3,410	\$4,627	\$3,886	\$7,267	\$6,781

With the single cash crop — cotton, we would have been row-cropping the place just as earlier tenants had done, leaving nearly a 100 acres of available land idle — producing no income.

(7) By the end of the fifth year, over half of the farm unit was in pasture, hay, and forage crops (100 acres). Less than a 10th was in row crops — 10 acres in cotton and 7½ in corn. Keep in mind that the unit when started in 1946 was an abandoned cotton farm, having on it only 6 acres of kudzu, and some old fencing.

(8) Our cotton yields in the 5 years ranged from 22 to 78 per cent higher than our local county (Tallapoosa) averages for the corresponding years.

	1947	1948	1949	1950	1951
Cotton-dairy unit, pounds per acre	315	413	296	426	386
Tallapoosa County average, pounds per acre	259	250	188	240	273
Difference per acre (lb.)	56	163	108	186	113
(pct.)	22	65	57	78	41

(9) In the 5-year period, our corn yield was more than double that of Tallapoosa County. Except for the 18 weeks of drought in 1951 that cut the crop about 40 per cent, our corn yields improved a third.

	1947	1948	1949	1950	1951
Cotton-dairy unit, bushels per acre	37.5	45.8	45.0	50.0	29.3
Tallapoosa County average, bushels per acre	15.4	22.7	20.9	19.4	13.6
Increase over county average (bu.)	22.1	23.1	24.1	30.6	15.7
(pct.)	144	102	115	158	115

(10) Based on results and 5 years' experiences with crops fertilized according to Agricultural Experiment Station recommendations, the forage crop acreage for each producing cow is about as follows:

1 acre	August-planted crimson clover-ryegrass mixture, seeded on fallowed land
2 acres	clover-grass improved pasture
$\frac{3}{4}$ acre	temporary grazing, kudzu and/or Sudan grass, for dry-weather periods
$\frac{1}{2}$ acre	alfalfa for hay
4 $\frac{1}{4}$ acres	

The 4 $\frac{1}{4}$ acres allow for grazing and hay for replacement heifers and calves.

The system of forage and hay production on this cotton-dairy management unit would be equally well suited to production of Grade A milk.

HERD MANAGEMENT

With the exception of two animals, all cows of the original herd were grade animals. They were typical of most of the animals owned or available to farmers in the area.

Since artificial insemination would not be available until mid-summer, several of the cows were bred to a locally-owned, registered Guernsey bull on a fee basis. With the start of artificial insemination service by the Tallapoosa County Breeding Association in July 1947, we began breeding cows in the herd by the artificial method. In the case of several cows that appeared impossible to settle by the artificial methods, we bred them by natural service, using a Substation beef bull.

With the exception of 1948 when breeding difficulties were experienced, artificial insemination has been satisfactory as long as the county association has been able to retain the same technician 6 months or longer. We considered results as satisfactory when cows settled on the first or second service. On the advice of a veterinarian, we have waited 70 to 90 days after calving before attempting to rebreed cows in our herd.

All cows have been tested regularly for Bang's disease, and heifer calves raised on the unit have been vaccinated at about 6 months of age. The herd throughout the 5 years has been free of Bang's reactors. Whenever we have suspected reproductive disorders, the animal has been examined by a veterinarian. His advice has been followed with respect to treatment or sale of the individual. During the 5 years, we have sold 5 of the 25 cows bought because they were shy breeders. Seven others were sold because of either low milk production or mastitis.

We have avoided early breeding of heifers, allowing them to reach good body size. Usually they have been bred at 20 to 24 months of age, depending upon when we wanted them to freshen.

We have separated the calves from the cows at birth, raising them in individual movable calf pens. During the 4-month period in the pens, the calves have been given a total of 700 to 800 pounds of milk in twice-a-day feedings, plus crushed grain, calf feed, and all of the alfalfa hay they would eat.

HOW CROPS WERE GROWN

Row Crops. Cotton and corn were planted on well-prepared seedbeds. Time of planting cotton was the third week in April, while that of corn was the second week in May. We fertilized our cotton with about 600 to 700 pounds of 6-8-4 per acre. In most

years our corn followed a turned winter legume crop — usually vetch. We fertilized the corn with 300 pounds of 4-10-7 per acre applied at planting time.

In the case of grain sorghum, we planted it the last of June, seeding at the rate of 10 pounds per acre. In some cases, the grain sorghum followed crops of crimson clover or vetch that were harvested for seed. We used the same fertilizer grade and rate per acre as for corn.

Vetch has been our chief soil-improving legume for row crops. We planted it at the rate of 20 pounds per acre in the cotton middles as soon as there was enough moisture in September, and fertilized with about 32 pounds of P_2O_5 per acre. (The rates of P_2O_5 reported herein were supplied as 18% superphosphate or as basic slag. The required rate of application per acre of basic slag was about double that of superphosphate. Potassium, K_2O , was supplied as 60% muriate.)

Grazing and Hay Crops. We have tried always to plant sericea, alfalfa, and crimson clover (either alone or in combination with ryegrass) on a well-prepared, firm seedbed. In preparing the land, we have plowed and then followed with two discings. The second discing was for cutting in the applied fertilizer and for further firming of the seedbed. In all cases we have used a cultipacker after seedings.

At the time of establishing our sericea, we fertilized with 108 pounds of P_2O_5 and 60 pounds of K_2O per acre. We planted the last of March, seeding at the rate of 30 pounds per acre. To maintain the sericea stand, we applied annually two-thirds of the rates of superphosphate and muriate of potash as used in establishing the crop. Later we over-seeded the sericea area with crimson clover and manganese bur clover. From then on our annual fertilizer treatment included 60 pounds of P_2O_5 and 30 pounds of K_2O per acre to maintain stands.

During the last 3 years, we have planted crimson clover in early August — after July rains. This has given us earlier fall grazing than in the first 2 years when we planted in September. In preparing for August seedings, we have plowed in June and have summer fallowed to destroy weeds and conserve moisture. Our fertilizer treatment has been 70 pounds of P_2O_5 and 30 pounds of K_2O per acre. In seeding crimson alone, we have planted at the rate of 30 pounds per acre.

In the case of crimson clover-ryegrass mixture, our seeding rate has been 25 pounds each. We have used the same fertilizer treat-

ment for this mixture as that used for crimson clover alone. In order to get good growth of ryegrass, however, we have applied a top-dressing of 100 to 150 pounds of ammonium nitrate when the planting was up to a good stand.

We have seeded our alfalfa at the rate of 25 pounds per acre, planting in early September. During the time of fallowing the seedbed, we applied 2 tons of lime per acre. Our fertilizer treatment just before seeding was 1,000 pounds of 0-12-20 per acre, which also contained borax. We have used this same fertilizer grade and rate per acre each year to maintain stands.

In establishing clover-grass pastures, we have first disced with a bush-and-bog harrow, then smoothed and cut in the applied fertilizer with a disc, and fallowed with seeding in September or October. As a fertilizer treatment, we have used 70 to 100 pounds of P_2O_5 and 30 pounds of K_2O per acre. The same treatment and rate have been used for annual applications to maintain stand. Our seeding rates per acre have been as follows: white clover, 3 pounds; grasses (fescues or orchard), 10 pounds; and crimson clover, 12 pounds.

We have established kudzu on well-prepared land, laying off 6-foot furrows and setting the crowns 6 feet apart in the furrows in February or March. Our fertilizer treatment was 40 to 50 pounds of P_2O_5 per acre, using the same treatment annually for maintaining the stand.

In the case of oats for grazing or for grain, we have drilled them on a well-prepared seedbed, planting the middle of September. We applied at planting time 400 pounds of 4-10-7 fertilizer per acre. Oats that we expected to harvest for grain were top-dressed with 150 pounds of ammonium nitrate per acre about March 1. Our seeding rate was 3 bushels per acre.

FAMILY LIVING

The cotton-dairy management unit has produced and provided each of the two families the following food supplies: 1 gallon of milk per day, 2 dozen eggs per week, 2 hogs and 15 chickens per year, and truck and vegetable crops in season and for canning.

A reasonable evaluation indicates that these food supplies amounted to about \$350 per family per year.

APPENDIX TABLE 1. PRODUCTS SOLD, SALES, EXPENSES, AND NET BALANCES OF 195-ACRE COTTON-DAIRY MANAGEMENT UNIT, PIEDMONT SUBSTATION, 1947-51

Items	1947	1948	1949	1950	1951
PRODUCED AND SOLD:					
Cotton, lint, lb.	3,464	4,544	3,702	4,684	3,860
seed, lb.	5,671	7,000	6,200	6,280	5,860
Milk, lb.	42,810	33,027	61,301	83,184	78,644
Cull cows and calves, no.	--	8	4	17	21
Surplus hogs, pigs, lb.	400	0	900	1,012	405
Surplus Seed					
Oats, bu.	--	568	--	364	--
Crimson clover, lb.	--	--	--	--	600
Sericea, lb.	100	--	--	--	--
Timber, bd. ft.	--	--	--	14,510	--
cords	--	--	--	--	18
SALES:					
Cotton, lint	\$1,213	1,424	1,092	2,047	1,544
seed	284	263	126	345	190
Milk	1,808	1,430	2,075	3,038	3,471
Cull cows, calves	--	886	412	880	1,331
Hogs	80	--	182	223	69
Surplus seed	25	625	--	516	132
Timber	--	--	--	218	44
TOTAL	\$3,410	\$4,627	\$3,886	\$7,267	\$6,781
CASH EXPENSES:					
Fertilizers for cotton	184	138	140	102	120
Fertilizers for all other crops	695	998	540	771	899
Seed, all crops	309	557	329	162	332
Machinery and tractor hire	412	538	381	500	393
Extra labor	130	202	184	364	291
Feed bought	290	70	82	75	73
Taxes and insurance	22	84	84	84	84
Miscellaneous*	393	475	678	1,008	784
TOTAL	\$2,435	\$3,061	\$2,417	\$3,066	\$2,974
Total sales	3,410	4,627	3,886	7,267	6,781
Total cash expenses	2,435	3,061	2,417	3,066	2,974
Cash balance	975	1,566	1,469	4,201	3,807

* Dairy supplies, breeding fees, veterinary services, milk hauling and warehouse charges, repairs, ginning, trucking and sales commission, bagging and ties, sampling, electricity.

APPENDIX TABLE 2. PRODUCTION SUMMARY

Item	1947	1948	1949	1950	1951
Cotton, <i>acres</i>	11.0	11.0	12.5	11.0	10.0
Yield, <i>lb.</i> lint per acre	315.0	413.0	296.0	426.0	386.0
Corn, <i>acres</i>	8.0	6.0	5.0	5.0	7.5
Yield, <i>bu.</i> per acre	37.5	45.8	45.0	50.0	29.3
Milk produced, <i>lb.</i> ¹	49,609.0	38,047.0	77,275.0	100,586.0	90,163.0
Cows milked, <i>number</i>	11.0	13.0	14.0	20.0	20.0
Milk produced per cow, <i>lb.</i>	4,510.0	2,927.0	5,520.0	5,029.0	4,508.0
Forage and hay, <i>acres</i>	45.0	71.0	72.0	83.0	100.0
<i>acres</i> used	47.0 ²	54.0	71.0	74.0	92.0
Milk produced per acre of forage and hay used, <i>lb.</i>	1,055.0	705.0	1,088.0	1,359.0	980.0

¹ Includes milk used at home and that fed to calves.

² Includes 16 acres of fall oats rented.

