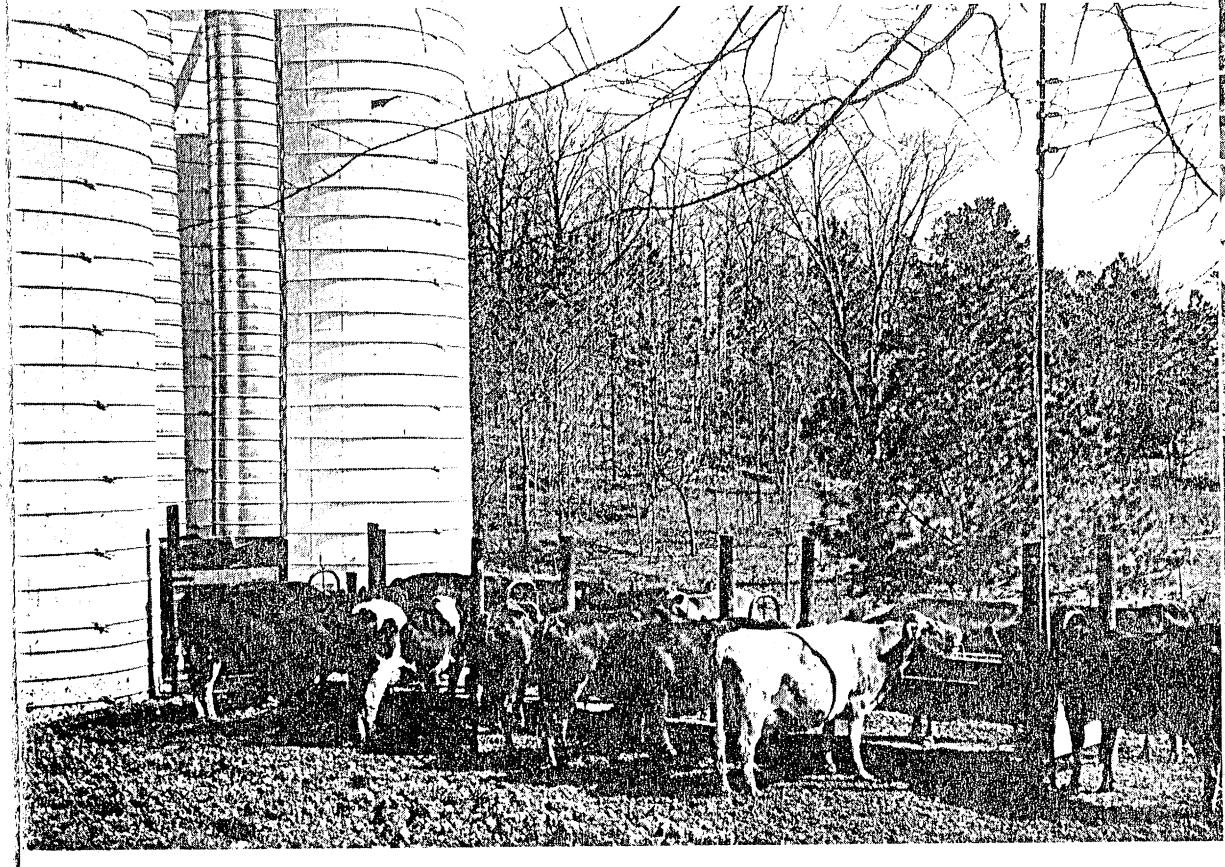
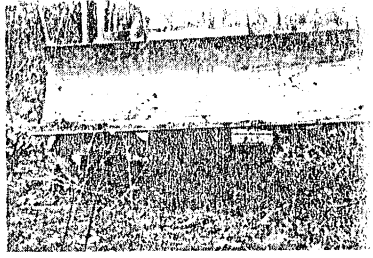
SUMMER 1959

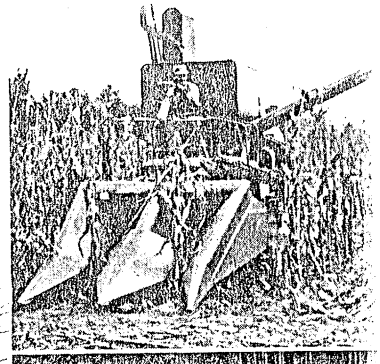
HIGHLIGHTS

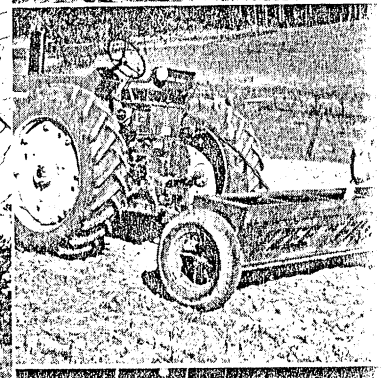
of

AGRICULTURAL RESEARCH









AGRICULTURAL EXPERIMENT STATION SYSTEM

of the

ALABAMA POLYTECHNIC INSTITUTE

A Quarterly Report of Research
Serving All of Alabama

HIGHLIGHTS of Agricultural Research

VOLUME 6, No. 2 SUMMER, 1959

In this issue . . .

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AGRICULTURAL EXPERIMENT STATION of the ALABAMA POLYTECHNIC INSTITUTE

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New and Timely PUBLICATIONS

Listed here are timely and new publications reporting research by the Agricultural Experiment Station.

Bulletin 314. Marketing Truck Crops in Alabama presents opportunities for developing truck crop markets and discusses problems in development.

Circular 128. Livestock Market News Situation in Alabama covers sources, methods of presentation, and use of livestock market news.

Leaflet 61. Sources and Rates of Nitrogen for Strawberries gives results on effects of different nitrogen materials on strawberry yields.

Grain Sorghum Variety Report covers 1958 variety testing and gives those recommended for 1959 planting.

Free copies may be obtained from your County Agent or by writing the API Agricultural Experiment Station, Auburn, Ala.

OPPORTUNITIES

for farm profits

JOHN E. LEE, JR. *and* E. D. CHASTAIN
Department of Agricultural Economics

OPPORTUNITIES for greater profits are present on many Alabama farms!

Though prices and production rates have both received deserved emphasis, attention to other factors affecting profits can also mean greater income.

A recent state-wide farm management study disclosed that under employment (poor labor efficiency) and too little to sell (low business volume) are two factors needing attention on many farms.

This management study by the API Agricultural Experiment Station is based on interviews with 252 Alabama farm families cooperating in Farm and Home Development activities in 1957 and on their farm business records.

About 50% of the operators produced so little farm income that they were unable to pay themselves for their own labor and management. In fact, they were in the "*red*" after taking out all costs. Commonly called "operator's labor income," this measure reflects the return to the operator for his labor and management after subtracting from gross cash and inventory receipts all cash expenses, value of unpaid family labor, and interest on the money he has invested. Some farmers do not consider capital investment as an expense item. Yet there are other uses for such capital; therefore, to include this as an expense item is logical and important.

Volume of Business

The volume of business on the farms studied was measured by calculating the man days of work required for all crop and livestock enterprises on the individual farms under conditions considered typical. These man days of work are referred to as *productive man work units*. They represent the work done in one day by an individual under typical or specified conditions. Total work units for various productive enterprises are an indicator of the volume of business or number of productive work days on the farm in a year.

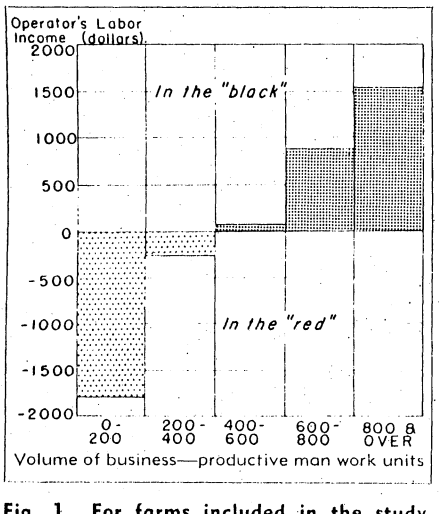


Fig. 1. For farms included in the study, operators' labor incomes were higher on those farms with greater volumes of business, as shown in above chart.

The number of productive man work units on these farms ranged from 82 to 3,711. Productive work units on about 30% of the farms fell below the number considered necessary for one man to be fully and efficiently employed for a year. It is pointed out that a similar spread in mechanization occurred.

On many of the farms, the enterprises were not big enough to keep a man busy the year 'round. Nor were land and other resources fully utilized. Of farms producing cotton, 30% had less than 10 acres in the crop, and 80% had 25 acres or less. About 30% of the dairy farms had fewer than 10 dairy cows, and there were less than 30 beef cows per farm on 70% of the farms producing slaughter calves.

Of the farms studied, it was found that as volume of business increased, the returns to the operator for his labor and management increased, Fig. 1.

Labor Efficiency

Full employment, or labor efficiency, was measured by dividing the *total productive man work units* by the number of full-time men employed (man equivalents) on each farm studied. One man working full time or two men working a half year each were considered to be one man equivalent. The greater the number of productive work units per man equivalent, the greater was the labor efficiency.

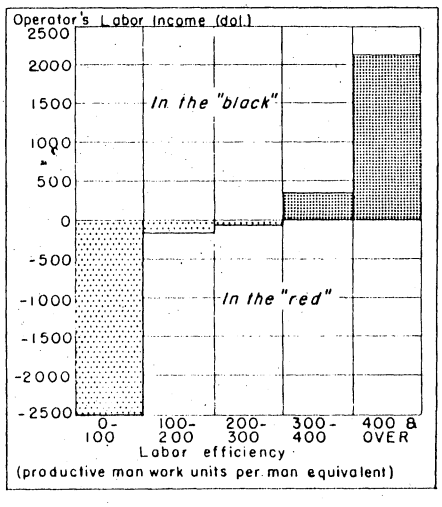


Fig. 2. The chart shows that for the farms included in the study, operators' labor incomes were higher on those farms with greater labor efficiency.

There were wide variations in productive work units per man equivalent on the farms studied. On 10% of the farms making poorest use of labor, the number of productive work units per man equivalent averaged 83. In contrast, the average was 535 units per man on the 10% of farms using labor most efficiently. It was found that as labor efficiency increased, operator's labor income increased, Fig. 2.

From results of this study, it is concluded that business volume and full and productive use of labor (labor efficiency) are major factors to be considered for profitable farm operations.

A laboratory technician is shown applying an insecticide to a DDT-resistant housefly. The insect is examined at intervals of time to determine why the insecticide is ineffective in killing the fly.

RADIOACTIVE INSECTS?

WAYNE ARTHUR, *Assistant Entomologist*

RADIOACTIVE fire ants and boll weevils may not be headline makers like atomic explosions and "fall out." But, more important, they may lead to important discoveries for better and safer insect controls.

The API Agricultural Experiment Station is using radioisotopes as a tool in its search for improved materials to combat insect pests, for answers to problems of insect resistance to insecticides, and for determining insecticidal residues on food crops to safeguard public health.

Imported Fire Ant

The fire ant is receiving its share of attention at the API Station with respect to radiological research techniques. The food habits, ecology, and control of the fire ant are easier to study by incorporating radioisotopes into the food or poison baits of the ants. Even the amount of food eaten by each form of the fire ant, such as soldier, queen, or various workers, can be determined by using radioisotopes. The best poison bait to use in fire ant control programs may hinge upon how well the ants like the bait. This is currently being studied by using radioisotopes in baits and determining the quantity of bait consumed by the ants. Whether migration of ants occurs from one mound to another is an additional aspect of the research project.

Resistance to Insecticides

The boll weevil is not resistant to the insecticides recommended in Alabama for the control of this cotton pest. However, in other southern states boll weevil resistance is a reality. The nature of resistance is currently being investigated at Auburn, and this study is greatly aided by using radioisotopes. For example, DDT, labeled with carbon-14, was found to be absorbed poorly by both non-resistant and resistant boll weevils. However, the resistant weevils throw off the poisonous effects of the absorbed DDT (detoxify) more quickly than did the non-resistant weevils. Addition of toxaphene to the DDT caused greater penetration.

Radioactive DDT has been used on resistant and susceptible houseflies to study its absorption, distribution, and detoxification rates. The nature of resistance in the boll weevil appears to be different from that in the housefly. The causes of resistance and how to develop susceptibility in resistant insects are still unknown. Radioisotopes will aid greatly in solving these problems.

Insecticidal Residues

Insecticidal residues on edible crops and in animal products are a public health hazard. Recently, Federal laws have been enacted that establish the maximum amount of each insecticide allowed in or on foods. By making an insecticide radioactive, the quantities of insecticidal residues on edible produce are easily and accurately determined. Such studies have been done with 5 radioactive insecticides during the past year. Residues can be detected by radiotracer techniques whereas they cannot be detected by the best chemical analyses. Residues are as easily determined in meat, milk, and eggs as on plants. Often radioanalyses are made when chemical analyses for insecticides have not been developed.

Safer Insecticides

Radioisotopes may make it possible to develop highly effective insecticides that are non-toxic to man and livestock. Research at Auburn with radioactive insecticides has shown that mammals are not poisoned with some insecticides at dosages required to kill certain insects, since mammals can throw off effects of the materials more rapidly than insects. As many as 16 different radioactive materials have been isolated from mammals that were treated with a single radioactive insecticide, whereas the insecticide remained virtually unchanged in the insects. To protect the public from the indiscriminate use of insecticides, the Federal Food and Drug Administration requires a complete evaluation of each material in mammals, plants, and insects. All of these factors could not be studied without radioisotopes.

Insect Habits Studied

Many insects have been "tagged" with a non-toxic radioactive chemical to study their migratory habits, flight patterns, food sources, and movement under natural conditions. The more the entomologist learns about the biology and ecology of insects, the easier it is to plan efficient pest control programs.

Screwworm Irradiation

Screwworm research by several southern states and USDA makes use of irradiation. The male screwworm flies are reared in large numbers, made sterile and then released. Female flies mate only once and chances of mating with a sterile male are increased many times when irradiated males are released. Eggs laid by the females are infertile. Thus, the native population of screwworms is reduced. Such techniques are also being used experimentally to eradicate mosquitoes and other insects.

The use of radioisotopes and irradiation techniques in entomological research is in its infancy, and undoubtedly many new and improved methods will be developed to aid the entomologist in his never-ending fight against destructive insects.

Plots in foreground above show, left to right, one fertilizer application to potatoes on Chesterfield sandy loam, one to Cecil sandy clay, three applications to Chesterfield sandy loam and three to Cecil sandy clay.

DIVIDED APPLICATIONS *of fertilizer increase* VEGETABLE YIELDS

L. M. WARE *and* W. A. JOHNSON
Department of Horticulture

DIVIDED applications of fertilizer can increase yields of vegetable crops by 5 to 6 times.

Yields of many commonly grown vegetables are much lower in the South than in other sections of the country. Research at the API Agricultural Experiment Station has shown that a combination of good agricultural practices including the application of ample plant food will increase crop yields 3, 5, or even 10 times.

Divided Fertilizer Applications

On certain soils in some years, dividing the same amount of fertilizer has increased yields 2 to 6 times. The greatest increases from divided applications have been obtained on light soils during the spring in years of heavy rains.

Results of a 5-year study with spring and fall crops grown on a light sandy loam soil are given in Table 1. In the spring, yields of beets were increased 174%, carrots 78%, and mustard 147% by adding the same amount of fertilizer in four applications rather than one. In the fall, there was little difference in the yield of mustard from single and divided applications. The fertilizer applications in both comparisons supplied 90 lb. of N, 120 lb. of P_2O_5, and 60 lb. of K_2O per acre. A single application of 12 tons of stable manure per acre was used with each treatment.

TABLE 1. EFFECT OF DIVIDED APPLICATIONS IN SPRING AND FALL ON VEGETABLE CROPS, 5-YEAR AV.

	Crops			
	Spring			Fall
	Beets	Carrots	Mustard	Mustard
	Lb.	*Lb.*	*Lb.*	*Lb.*
1 app.	3,944	9,899	5,211	22,710
4 app.	10,790	17,641	12,879	23,209

Soil and Rainfall Important

Rainfall affected increases resulting from dividing fertilizer applications, Table 2. In 1952, a year of average rainfall, by dividing a 2,500 lb. rate to potatoes on a loamy sand soil yields were increased 91%; in 1954, a year of unusually high rainfall, 535%, and in 1954, the driest year on record at Auburn, only 39%. The same amount of fertilizer was applied in one and three equal applications. In both comparisons, at the 2,500-lb. rate, 100 lb. of N, 250 lb. of P_2O_5, and 175 lb. of K_2O per acre were added.

TABLE 2. EFFECT OF DIVIDED APPLICATIONS ON YIELD OF POTATOES ON LIGHT SOIL IN YEARS OF DIFFERENT RAINFALL

Fert. rate	No. app.	Yield of No. 1/A.			Av.
		1952	1953	1954	
		Bu.	*Bu.*	*Bu.*	*Bu.*
1,500	1	92	17	160	90
1,500	3	188	80	148	139
2,000	1	97	17	165	93
2,000	3	230	110	205	182
2,500	1	122	20	188	110
2,500	3	233	127	262	207

Extent to which soil type influenced the effects of dividing fertilizer application in seasons of different rainfall is given in Table 3. The soils were light sandy loam and relatively heavy sandy clay. In 1953, a year of heavy rainfall, yield of potatoes on the light soil was increased 297% by dividing the application, whereas it was increased only 14% on heavy soil. In 1954, a year of light rainfall, increases from divided applications were 27% on light soil and 28% on heavy soil. Fertilizer applications included 120 lb. N, 160 lb. P_2O_5, and 80 lb. K_2O.

TABLE 3. EFFECT OF DIVIDED APPLICATIONS ON YIELD OF POTATOES ON DIFFERENT SOILS IN YEARS OF HIGH AND LOW RAINFALL

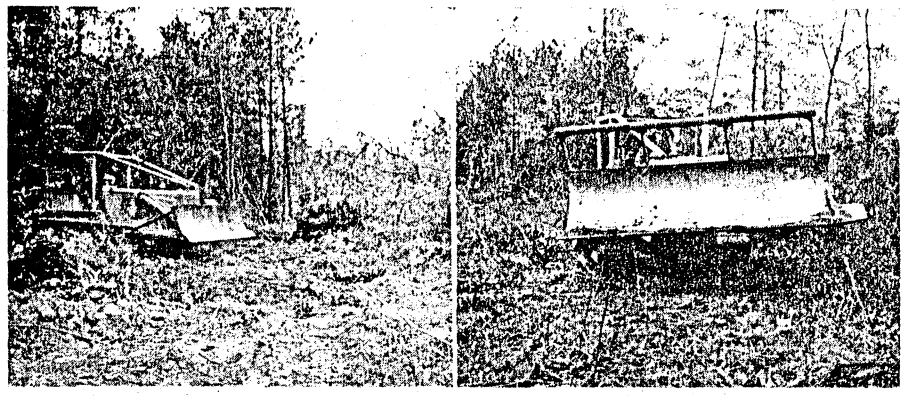
Year	Light soil		Heavy soil	
	1 app.	3 app.	1 app.	3 app.
	Bu.	*Bu.*	*Bu.*	*Bu.*
1953	57	226	227	259
1954	237	300	232	296

Response was obtained by adding N, P, and K, Table 4. Yields of No. 1 potatoes over a 3-year period were increased 58 bu. by dividing the application of N, 31 bu. from dividing the K, and 28 bu. by dividing the P. The check plot received 60 lb. N, 150 lb. P_2O_5, and 105 lb. K_2O. The additional applications included 40 lb. N, 100 lb. P_2O_5, and 70 lb. K_2O.

These results show that greater increases in yield are obtained from adding an application on light soils in years of high rainfall. Increases are greatest from (1) N, (2) K, and (3) P.

TABLE 4. EFFECT ON YIELD OF POTATOES FROM SIDE APPLICATIONS OF NITROGEN, POTASH, AND PHOSPHORUS, 3-YEAR AV.

Check	+ N	+ NK	+ NPK
Bu.	*Bu.*	*Bu.*	*Bu.*
90	148	179	207



Bulldozer (left) and KG blade (right) were used in land clearing tests. Note point on KG blade for splitting large trees.

TIME *and* COST *of clearing land*

C. H. STOKES, *Associate Agricultural Engineer*
J. H. YEAGER, *Agricultural Economist*

Land clearing by hand methods is hard work and takes a lot of time. But, it doesn't have to be done that way. With machines now available, the job can be done with a minimum of labor and at reasonable cost.

There are many acres of land in Alabama covered with poor quality or undesirable species of trees that yield almost no income. Much of this land would be productive if cleared. Owners of such land need to know how much it will cost to clear. Such information is necessary to determine if future income from the land will justify the cost of clearing.

Cost Study Conducted

To study the cost of clearing, a test was carried out during October and November, 1958, in southwestern Cherokee County. A bulldozer and a KG blade[1] (see photos) were each used on D-6, D-7, and D-8 crawler tractors. Twelve 2-acre plots were cleared – 2 with each size tractor and type of blade.

Time records were kept on clearing each plot. Clearing cost was calculated based on ownership and operating costs of machines, labor, and other inputs. Machine operators were rotated every 30 min. to ensure equal skill for the operator of each machine. The uniformly level plots were of Conasauga silt loam soil. Less than ¼ in. of rain fell during the experiment.

Three separate steps – felling and piling, disposal, and harrowing – were included in the clearing operations. With the KG blade, trees were sheared off at ground level. On plots cleared with the bulldozer blade, most of the large trees were dug up.

After pushing trees and brush into windrows, diesel fuel was poured on and the piles burned. The D-8 tractor with KG blade was used to "punch" fires.

Harrowing or plowing with a heavy disk harrow was primarily to cut roots and small stumps and to till the soil. Whether roots and stumps left in the ground are a problem depends on how the land is used.

Cost Comparisons

A comparison of time and costs for each step in clearing is shown in the table. Felling and piling and disposal time and cost, as well as total machine time and cost, were significantly lower on plots cleared with the KG blade. One reason for greater disposal time on bulldozer cleared plots was the dirt on roots of trees, which caused trouble in burning.

Total machine time ranged from 2.2 to 5 hours per acre, with total cost ranging from $34.57 to $61.70 per acre. Time and cost would have been about half that had diesel fuel not been used in disposal and the harrowing omitted.

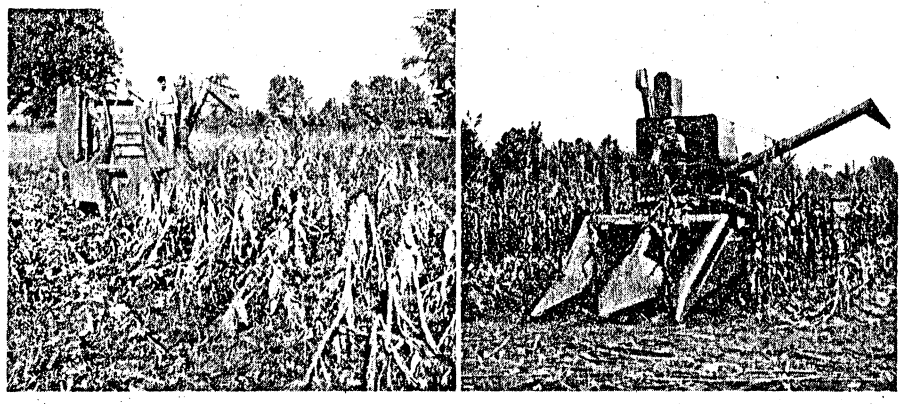
There was a time advantage in using a large tractor for both types of blades in felling and piling. However, total cost per acre did not vary greatly among sizes of tractors when the same type blade was used.

Counts of trees were made in two randomly selected sample areas of each plot before clearing. Trees 2 in. or more in diameter at breast height averaged 510 per acre on plots cleared with the dozer blade and 700 on KG plots. Hardwoods accounted for 60% and pines 36%. Most of the trees were less than 6 in. diameter at breast height – 94% of pines and 84% of the hardwoods. The large hardwoods had more effect on clearing time than did a large number of small trees.

Machine Hours and Cost of Clearing Land per Acre, Cherokee County, 1958

Tractor size and type of blade	Machine time and cost of each operation							
	Felling and piling		Disposal		Harrowing		Total	
	Time	Cost	Time	Cost	Time	Cost	Time	Cost
	Hours	*Dollars*	*Hours*	*Dollars*	*Hours*	*Dollars*	*Hours*	*Dollars*
D-6								
Dozer	2.7	23.62	1.8	31.23	0.5	4.82	5.0	59.67
KG	2.1	18.98	.8	14.14	.6	5.80	3.5	38.92
D-7								
Dozer	2.3	23.85	1.8	32.43	.4	3.81	4.5	60.09
KG	1.7	18.88	.8	14.29	.3	3.54	2.8	36.71
D-8								
Dozer	1.4	20.84	1.9	36.16	.3	4.70	3.6	61.70
KG	1.2	17.63	.7	11.98	.3	4.96	2.2	34.57

[1] A KG blade is an angle blade with a cutting edge parallel to the ground and a protruding point for splitting large trees. It is available commercially.



Lodged corn (left) makes harvesting difficult and lowers harvesting efficiency. The upright corn at right was harvested rapidly with little loss.

HARVESTING *and* DRYING *high-moisture* CORN

C. A. ROLLO, *Associate Agricultural Engineer*

Harvesting corn early reduces field losses. Every day that corn is left in the field after it reaches a good harvestable stage increases chances of losses.

Early harvest is especially important during years of bad fall weather. Fall winds and rains can cause corn to break over badly, making harvesting slow and difficult with combines or picker-shellers (see photos). In addition, much corn is left on the ground when the crop is badly lodged and picker efficiency is low. Leaving corn in the field until late in the fall also gives insects a greater chance to cause damage.

Moisture content is the major problem in early harvest. Corn can be harvested with a combine or picker-sheller at moisture contents as high as 27%. But shelled corn at this moisture level cannot be safely stored in conventional metal bins or wooden cribs. It must be dried to 12.5% moisture for safe farm storage.

Leaving corn in field until late fall increases chances of insect damage.

Harvesting and Drying Studies

Research on field shelling and drying high moisture corn has been done at the Agricultural Engineering Farm, Auburn, and the Upper Coastal Plain Substation, Winfield. Corn was harvested at moisture contents ranging from 27% to 18% in these tests.

Results show that the combine harvested 27%-moisture corn as efficiently as it did that at 18% moisture. The amount of cracked grain was not materially affected by moisture content at harvest time.

Information was obtained to determine cost and time required to dry high moisture corn artificially with heated air. Experience has shown that the moist climate in Alabama during harvest season makes it essential that the drying system be equipped to heat the drying air.

Full Capacity Economical

As shown by data in the table, it was more economical to use drying facilities at full capacity. Fuel, electrical, and labor costs amounted to only 4.6¢ per bu. when the drier was used at its full capacity of 600 bu.

Drying costs and time varied with initial and final moisture content, outside air temperature and humidity, and drying air temperature. When 23.5% moisture corn was dried at night during rainy weather, drying time was 10¾ hours (see table). The same amount of 25% moisture corn dried during fair weather required only 6½ hours.

Cooling grain to the outside air temperature after drying was considered part of total drying time. Cooling dried grain before storage is necessary to prevent moisture condensation that would spoil the grain during storage.

Corn can be harvested 3 to 5 weeks early if drying facilities are adequate. Getting the crop off the field early decreases insect damage, lodging, and windstorm losses, which are extremely high some seasons. In addition, early harvest allows more time for fall plowing and seeding of fall crops.

Fuel, Electrical, and Labor Costs and Drying Time for High Moisture Corn

Bushels		Moisture content		Drying cost per bushel				Drying time		
Wet	Dry	Initial	Final	Fuel	Electrical	Labor	Total	Drying	Cooling	Total
No.	*No.*	*Pct.*	*Pct.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Hours*	*Hours*	*Hours*
300	264.5	25.5	11.0	0.027	0.002	0.030	0.059	5.67	1.08	6.75
300	266.4	25.0	11.7	.018	.002	.026	.046	5.50	1.03	6.53
300	271.5	23.5	11.3	.050	.003	.044	.098	9.80	.95	10.75
Average 300-bu. batch				.032	.002	.033	.067	6.99	1.02	8.01
600	520.2	26.6	10.8	.029	.001	.022	.053	8.54	1.38	9.92
600	544.8	23.3	11.5	.029	.001	.019	.049	7.07	1.63	8.70
600	568.2	20.0	11.1	.019	.001	.016	.035	5.92	1.25	7.17
Average 600-bu. batch				.026	.001	.019	.046	7.18	1.42	8.60

DAIRYING--*a way of building* FARM BUSINESS

E. L. MAYTON, *Supt., Piedmont Substation*
J. H. BLACKSTONE, *Agricultural Economist*

FARMS of almost any size can grow into the dairy business. Dairying has advantages over most other livestock enterprises on smaller farms. There is a market for manufacturing milk produced from a few or many cows. Limited capital for adjustments is no serious handicap. As a farm enterprise, dairying can be expanded by increasing herd size and production per cow. Most successful dairy farms of today had small beginnings.

Farm-Size Experiment

A farm-size experiment at the Piedmont Substation at Camp Hill, Ala., in an 11-year period proved the profitableness of a farming system that combined production of cotton and milk for manufacture. Operation of the 195-acre experiment was begun in 1947 with the usual mule and workstock equipment. At the outset, cotton was the main source of cash income.

About $1,400 was spent to establish the dairy enterprise as a second major source of income. This investment, or capital outlay, was used to construct a milk shed, to purchase 9 milk cows and a heifer, to buy 6 milk cans, and to build a milk cooling vat. A year later, an additional $1,446 was spent to buy a milking machine, a water heater, 10 cows, 4 pigs, and some new fencing. Three additional dairy cows and 2 heifers were purchased the third year, and 2 more cows were bought in the seventh year.

Herd Improvement

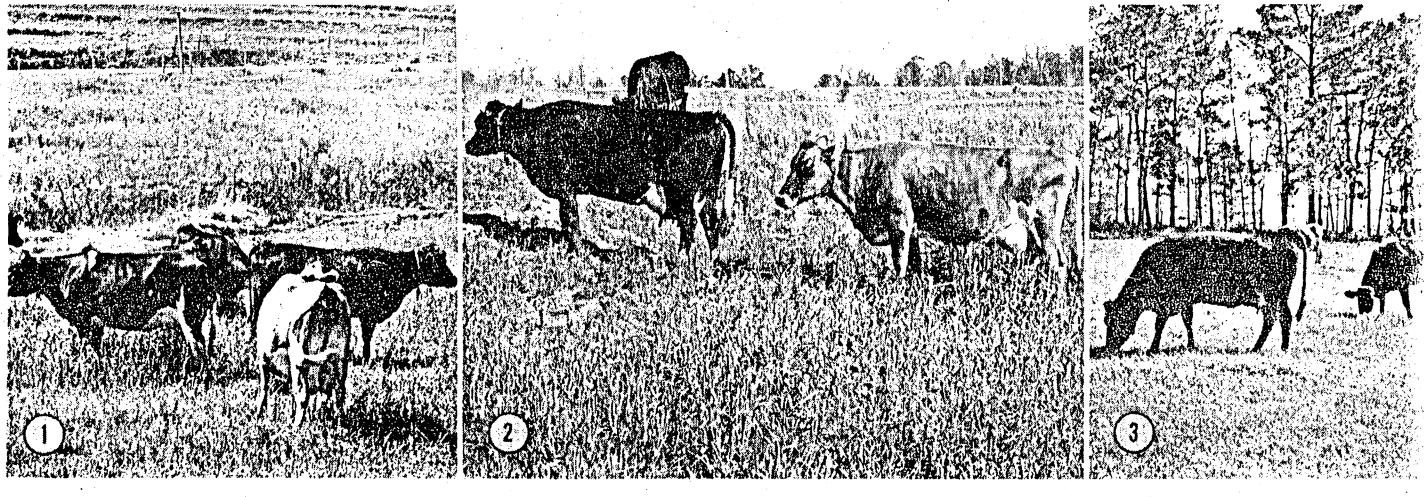
Throughout the 11 years, a total of 25 cows had been purchased. At the end of the operation, there were 22 cows and 25 heifers of all ages on hand. Most of the original cows had been replaced with heifers raised on the farm. Cattle sales greatly exceeded purchase of cattle. The bought cows were mostly small, of Jersey blood, and low in production. In first 2 years, milk production averaged about 3,600 lb. per cow. For the last 2 years, production per cow was around 6,600 lb. This increased production was the result of improved breeding, feeding, and management.

Production and Sales

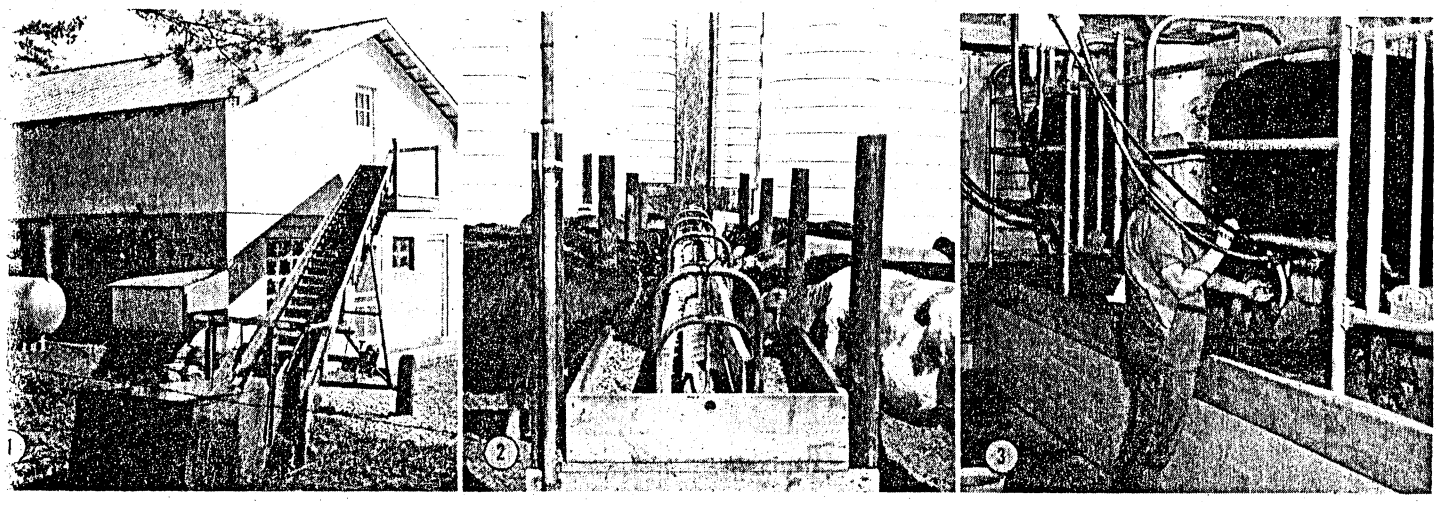
Most of the feed used by the dairy herd was grown on the farm. Only cottonseed meal as a source of protein was purchased. About 1 lb. of grain was fed for each 5 lb. of milk produced. Fertilized according to Agricultural Experiment Station recommendations, the feed crop acreage for each cow and replacement in recent years was 4.8 acres. This land was used as follows: 0.9 acre for grain and hay, 1.6 acres for temporary summer and winter grazing, and 2.3 acres for permanent pasture.

During the first 3 years of operation, sales from cotton and dairying were about equal. As the dairy herd was improved, milk sales increased. At the same time, cotton acreage was reduced by government allotments. For the last full year of operation, sales from the dairy enterprise accounted for 88% of all cash farm sales.

The first 3 years of operation were required to establish the farm on a full



Farm-size experiment, 1947-58, proved profitableness of system that combined production of cotton and milk for manufacture. Production per cow was increased by selective breeding; (2) typical crossbred at left averaged 4,000 lb. more milk (3-yr. av.) than Jersey-type at right (5-yr. av.). Cool weather forages—rye (1) and crimson cl ryegrass mixture (3)—were used for winter grazing.



research is aimed at dairymen's problems of tomorrow—ways of easing production per cow, improving labor efficiency and cutting r requirements, lowering feed costs per cwt. of milk, and the like.

New facilities have been provided for this current research: (1) a power-driven elevator to overhead feed bins; (2) auger-type feed bunks; and (3) four-stall milking parlor.

production basis. Since that time, per acre and per cow outputs have continued to increase. Due to the fall in farm prices, total dollar sales on the farm have been declining since 1950. At the same time, purchased items for farm production increased in price, creating a "cost-price squeeze." However, the farm was able to offset some of these conditions by increasing production and by lowering costs of production.

During the first 3 years, sales averaged $3,975, expenses $2,638, leaving a net cash income of $1,337. In the last 3 years, sales averaged $6,148, expenses $2,892, and net cash income of $3,256.

Returns

For the 11 years of operation, total cash sales amounted to $62,401; cash operating expenses totaled $31,230. This left a total cash balance of $31,171. Capital expenditures for cows, tractors, dairy barn, fencing, machinery, and other related items amounted to $10,180. This left a net cash return of $20,991 or an average of $1,908 per year. Had the original farm been owned debt free, this amount could have been spent for family living. In addition, many items produced on the farm were used in the home by the farm family. Had this farm remained a typical cotton farm during this 11-year period, returns to the family would have been less than half what they were for the cotton-dairy farm.

At the close of operation of the place as a cotton farm in 1946, the value of all inventory items amounted to $10,416. Eleven years later the inventory totaled $17,555. If an increase in land value is included, the $10,416 farm was worth close to $30,000 after 11 years' operation as a cotton-dairy farm.

The cotton-dairy farm has provided the farm family with a much higher year-to-year living. In addition, it enabled the family to accumulate a farm estate that was worth at least twice what it would have been if operated as a typical cotton farm. This has been possible by adding dairying as a year-round enterprise. Not only have cows been milked each day of the year, but a sufficient number has been milked to make it a true dairy operation.

Results from this 11-year operation have been used to answer the question — Can dairying, with the production of manufacturing milk, be used to make a good farm family living? The answer is yes — provided dairying is handled on a year-round basis with a sufficient number of cows of a reasonably high production level. During its operation, this farm has answered many practical farm questions on feed production, management of cows, growing replacement stock, herd size, breeding and culling cows, and other related questions.

New Research

Many new and different questions now need to be answered. Some of these deal with ways of (1) increasing herd production to 10,000 lb. or more of milk per cow, (2) increasing labor efficiency to handle 300,000 lb. of milk or more per man per year, (3) reducing farm and dairy labor requirements, (4) lowering acreage requirements for feed per cow, (5) feeding and management practices needed for high-producing cows, (6) lowering feed costs per cwt. of milk, (7) reducing summer slumps in milk production, (8) increasing years of milking life of high-producing cows, and other related questions.

No longer is there the question — can dairying be used in Alabama as a way of making a living? Rather, it is now a question of how to improve this way of making a living. Present day agriculture has to compete with many opportunities for farm families both on and off the farm. Also, many changes are occurring in other phases of agriculture as well as in dairying. Prices of the things that farmers buy will continue to rise in the future. Farm labor will continue to be scarce. Other states will strive to make dairying a profitable way of farming. In view of these types of factors, it is necessary that the State's dairy research program be expanded and intensified.

In keeping with current dairy research needs, the Piedmont Substation recently reorganized the cotton-dairy farm to make it a modern, up-to-date dairy unit. More cows will be milked, and a higher production per cow and per man is expected. Changes have been made in the feeding system that may well reduce the acreage requirement per cow. This modern dairy operation should answer dairy farmers' questions of tomorrow.

NEED *for* WATER-SOLUBLE *phosphorus in fertilizer*[1]

L. E. ENSMINGER, *Soil Chemist*

GETTING THE RIGHT fertilizer isn't as simple as it once was. A few years back, the major worry was using the right amount. Then came an awareness of importance of the right combination of plant food elements and reaction of soil to different materials. Now it is known that manufacturing processes and raw materials used in fertilizer manufacture can play a big part in results obtained.

Phosphate fertilizers are a good example of how manufacturing processes affect the final product. The phosphates sold today vary greatly in water solubility. Improved procedures of ammoniation (adding ammonia) and new manufacturing processes are causing a trend toward lower water-soluble phosphorus in mixed fertilizers. On the other hand, high-analysis fertilizers containing ammonium phosphates, which are 100% water soluble, are increasing in importance. Because of these facts, more information about the need for water-soluble phosphorus in fertilizers would be valuable.

Several Factors Important

The importance of water-soluble phosphorus depends on several factors. In general, more water-soluble phosphorus is needed for short-season than for long-season crops. Plants often show a response in favor of water-soluble phosphorus during early stages of growth, but differences may not be evident in final yields.

Importance of water solubility decreases with increasing rate of application. Observations indicate that high solubility is more beneficial to plant growth under poor weather conditions. Differences due to water solubility are more likely to appear when fertilizer is band placed than when broadcast.

Response of Cotton

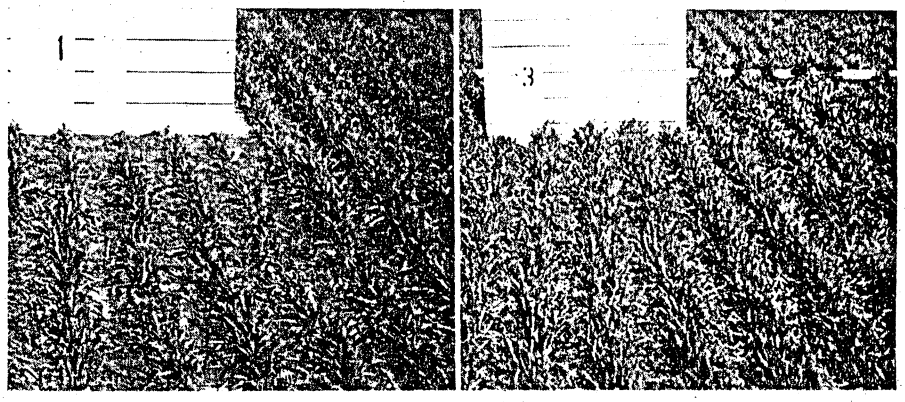
Field tests by the API Agricultural Experiment Station have been conducted since 1931 to evaluate importance of water-soluble phosphorus for cotton. A study was made from 1931 until 1934 at 185 locations to learn effect of degree of ammoniation of superphosphate on cotton yields. The data show that superphosphate ammoniated to 4% nitrogen increased yields only 85% as much as did regular superphosphate. The decrease was attributed to a decrease in water-soluble phosphorus.

More recently a test was carried out at 6 locations to determine response of cotton to ammoniated superphosphates of known solubility. Results are presented in Table 1. A commercial fertilizer with 63% of its phosphorus water-soluble produced an average of 122 lb. more seed cotton per acre than a similar fertilizer with only 25% of phosphorus water-soluble.

Wheat Response

Response of wheat to phosphate fertilizer of varying water solubility was studied at Thorsby. Results show that first clipping forage yields increased with increasing water solubility, Table 2. The effect was less pronounced for the second clipping. Grain yields were not affected.

Since the need for water-soluble phosphorus in fertilizer depends on many factors, it may be impossible to make specific recommendations. However, enough results are available to show that some phosphorus should be water-soluble for most crops. On the other hand, it is doubtful if there is any advantage in having more than 50 to 60% in water-soluble form, even for responsive crops grown on highly deficient soils.



Effect of water solubility on wheat during early growth stage is shown by comparison of plot receiving 14% soluble phosphorus (left) and 85% soluble (right).

TABLE 1. EFFECT OF WATER SOLUBILITY OF PHOSPHORUS IN FERTILIZER ON COTTON YIELD, SIX LOCATIONS

Soil type[1]	Seed cotton yield/acre		
	No P_2O_5	48 lb. P_2O_5	
		25% soluble	63% soluble
	Lb.	*Lb.*	*Lb.*
Decatur c.l.(3)[2]	1,208	1,286	1,500
Boswell v.f.s.l.(2)	670	871	863
Boswell v.f.s.l.(1)	374	691	950
Kalmia l.s.(4)	962	1,164	1,326
Kalmia f.s.l.(4)	769	1,238	1,337
Kalmia f.s.l.(3)	608	906	954
Weighted av.	829	1,095	1,217

[1] Abbreviations: c.l., clay loam; v.f.s.l., very fine sandy loam; f.s.l., fine sandy loam, and l.s., loamy sand.

[2] Number in parentheses is number of years test conducted.

TABLE 2. EFFECT OF WATER SOLUBILITY OF PHOSPHORUS IN AMMONIATED SUPERPHOSPHATE ON WHEAT FORAGE YIELDS, THORSBY, 1957

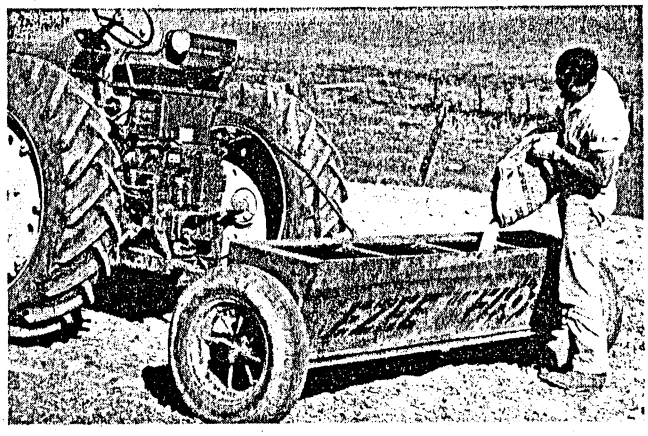
Pct. phosphorus in water-soluble form[1]	Per acre forage yield	
	First cutting	Second cutting
	Lb.	*Lb.*
No phosphorus	224	740
14	501	977
30	581	948
52	688	1,168
71	755	1,230
85	805	1,180

[1] 30 lb. P_2O_5 applied in bands.

[1] Some of the studies reported were cooperative with TVA and SWC-ARS, USDA.

FERTILIZER USE
by Alabama farmers

O. D. BELCHER *and* J. H. YEAGER
Department of Agricultural Economics



CROP YIELDS are determined by a lot of factors. Such things as variety, planting time, soil fertility, cropping practices, weather, and harvesting methods have a bearing on yields and profits.

Since commercial fertilizer has such an important effect on yields, using correct amounts is essential. This is pointed up by the fact that per unit cost of production normally decreases as yields increase. Thus, profits go up with yields in most cases.

In 1957, Alabama farmers used an average of 51 lb. of N (nitrogen), 54 lb. of P (phosphate), and 50 lb. of K (potash) per acre on cotton. On corn, the average was 40 lb. N, 27 lb. P, and 21 lb. K. These facts on 1957 fertilizer use were obtained from interviewing 463 farmers in 16 Alabama counties in a cooperative study with the Tennessee Valley Authority.

N Used on Peanuts

Although nitrogen is not recommended for peanuts, half of the farmers growing this crop in the eastern Lower Coastal Plain Area used N. Average amount used was 7 lb. per acre. The reason given for using this element was "to get peanuts off to a good start ahead of weeds and grass."

Almost all farmers used nitrogen on cotton and corn. Only 32% used N, 45% P, and 43% K on hay crops and pastures. The low percentage using fertilizer on hay crops and pastures reduced the average amount per acre.

Amounts of fertilizer used varied by types of farming areas (see table). Sand Mountain farmers used more N, P, and K per acre on cotton and more N for corn than those of any other area. Farmers in the Lower Coastal Plain Area were relatively high per acre users of fertilizer on cotton and corn. They were highest in use for hay crops and pastures.

Nitrogen Sources

All farmers interviewed were asked to name the source of nitrogen they preferred and to give their reason. Ammonium nitrate was preferred by 40% and nitrate of soda by 36%. Several other sources were mentioned. Percentage of farmers reporting each reason for preference is as follows:

Reason	*Per cent*
Preferred ammonium nitrate	
Higher percentage N	30
Better results	24
Cheaper per lb. of N	24
Other	21
No reason given	1
Preferred nitrate of soda	
Always used this source	39
Better results	18
Easier to apply	16
Non-acid forming	6
Other	19
No reason given	2

High Analysis Fertilizers

A mixed fertilizer that contained 30 lb. or more of plant food per 100 lb. was considered a high analysis fertilizer. Only 17% of all farmers reported they had used a high analysis fertilizer. A majority of these lived in the Tennessee Valley and Lower Coastal Plain (eastern) areas. Most common ones used were 0-10-20, 0-12-20, and 0-20-20.

High Analysis Preference

Of those who had used high analysis fertilizers, 62% said they preferred such grades. Major reasons given were more plant food per bag, and cheaper per lb. of plant food. Some farmers said their preference depended on the crop. There appeared to be a preference for high analysis fertilizers to use on hay and pasture crops. Some farmers had experienced difficulties in getting stands of field crops and associated this with use of high analysis fertilizers.

As reported by those interviewed, 57% borrowed funds to purchase fertilizer in 1957. Almost all credit was used for purchases in the spring. The largest percentage of farmers borrowed in the Black Belt where the proportion of tenants was greatest. Commercial banks, fertilizer dealers, and landlords were credit sources most frequently reported.

AVERAGE AMOUNT OF N, P, AND K USED PER ACRE ON SELECTED CROPS, ALABAMA, 1957

Area	Average amount used per acre								
	Cotton			Corn			Hay and pasture		
	N	P	K	N	P	K	N	P	K
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Tennessee Valley	43	44	40	24	26	20	2	8	8
Sand Mountain	66	70	66	57	27	22	2	10	12
Limestone Valleys	60	60	56	49	32	25	2	6	7
Upper Coastal Plain	41	48	38	33	22	18	3	6	5
Piedmont	52	47	39	38	26	19	4	6	6
Black Belt	43	49	41	29	19	15	1	2	2
Lower Coastal Plain (west)	56	59	55	45	33	27	17	19	17
Lower Coastal Plain (east)	47	49	61	44	29	23	10	21	22
STATE AVERAGE	51	54	50	40	27	21	5	10	10

INCOME *opportunities from* CONTRACT EGG *production*

BILL R. MILLER *and* MORRIS WHITE
Department of Agricultural Economics

CONTRACT PRODUCTION and marketing of table eggs offers a new income opportunity for many Alabama farmers.

Although familiar for broiler production, contracts for table eggs are a fairly recent development. Under provisions of egg contracts, the contractee (farmer) furnishes house, equipment, and labor and is paid a set rate per doz. for eggs produced throughout the life of the flock. The contractor (merchant, feed dealer, or other) furnishes the flock, feed, medications, and reserves the right to make managerial decisions.

Most in Eight Counties

Egg production contracts are not available to all Alabama farmers. They are most prevalent in 8 Sand Mountain counties (see map). The number of hens kept under contract in this area has steadily increased since contracts were first offered in 1954. An estimated 5% of table egg production in Alabama is under contract.

Since egg contracts are in beginning stages, payments and other provisions may change in the future. Thus far the trend in payment has been downward. One contractor paid 12¢ per doz. for eggs of all sizes on his first contract. On the next production cycle the rate was 10¢ for large and 5¢ for medium and small eggs. It then dropped to 9¢ for large and 5¢ for medium and small eggs. Future rates by this contractor will be 6¢ for large and 3¢ for medium and small eggs. Prices paid by 8 Alabama and 1 out-of-state contractors are given in the table.

Incentive payments for high production, low mortality, and good feed conversion are expected to become more popular. This is one way for the contractor to get better management. However, contractees seem satisfied with a straight payment plan.

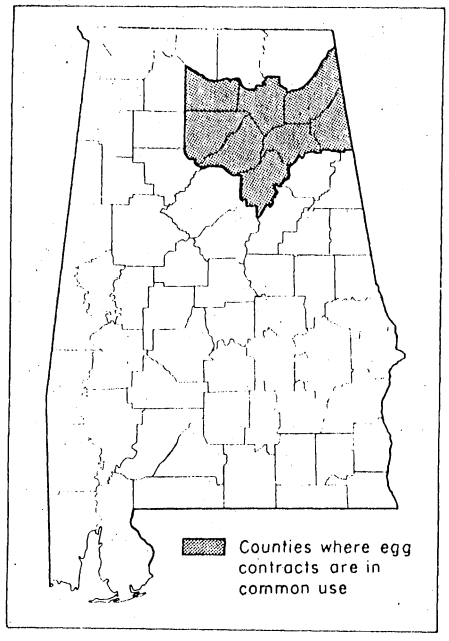
Payment Plans Preferred

In a recent Alabama study, contract and independent producers were asked what method of payment they desired. A majority of answers were either (1) straight payment plan with contract price per doz. the only return to growers, (2) contract price per doz. plus a bonus paid by an incentive plan, or (3) a monthly salary based on number of birds housed.

There was a significant difference between choices of contractees and independent producers. About 7 out of 10 contractees favored the straight payment plan, whereas 6 out of 10 independents favored an incentive plan.

Contracts have been most popular with farmers having no previous experience with table egg production. Over half (52%) had not produced table eggs before accepting a contract.

Experienced poultrymen have not been enthusiastic about contracts. Only a small percentage indicated any interest in changing from independent to contract production. One reason given was that potential returns from contract production were not equal to those from independent operation.



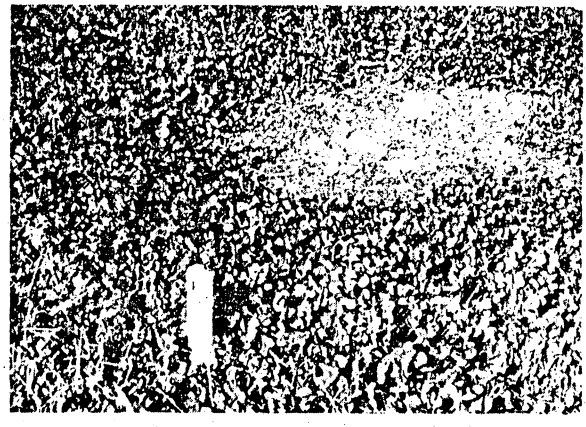
Average lifetime egg production of hens on contract has been about 60%. Thus, contractees have received returns ranging from $1 to $1.25 per hen. Independent producers in the same communities estimated that they received about $2 per hen from the same production rate. The difference in returns goes to the contractor as payment for capital, supervision, and risk.

Despite the differences in returns, an increase is anticipated in the number of eggs produced and marketed under contract. A majority of the contractees are satisfied with contract price and provisions. Contract operations are providing an outlet for labor that has either been idle or underemployed for the most part. Even with the low contract rate, additional income can be earned.

PRICES PAID PER DOZEN FOR EGGS BY NINE CONTRACTORS, BY SIZE OF EGGS, 1958

Contractor	Rate per dozen, by egg size			
	Large	Medium	Small	Dirty, pee wee, or cracked
	Cents	*Cents*	*Cents*	*Cents*
A	8	6	4	[3]
B[1]	9	5	5	[3]
C[2]	6	6	6	3
D	7	7	5	[3]
	8	8	5	
E	6	6	3	3
F	6	5	5	2
G	8	8	8	[3]
H	6	6	6	[3]
I	6	6	6	4
Average	7	6.3	5.3	3

[1] Bonus paid if contractor makes profit.
[2] Incentive payment for high production.
[3] Left on farm for home use.



Shown in the photo is damage done to a stand of white clover by Sclerotium rolfsii. This parasitic soil organism, which causes southern blight disease, is a serious enemy of all leguminous crops and many vegetables.

WHITE CLOVER *robbed by* SOIL ORGANISM

E. A. CURL *and* J. D. HANSEN
Department of Botany and Plant Pathology

THE CHANCES are good when standing on field crop land that you are on many millions of living organisms — some of them thieves.

A single gm. of fertile field soil may contain as many as 100 million bacteria and 500 thousand fungi. An acre-foot of soil weighs approximately 2 million lb. and there are 453.6 gm. in a lb. Thus, the microbial population runs into fantastic numbers.

Soil Plant Life

The tiny plant life of the soil is referred to as the soil microflora. It is made up chiefly of bacteria and fungi living in close association with one another. They compete fiercely for a place in the organic matter of the soil from which they obtain food. The number and kinds of organisms in a "community" depend upon the kind of organic matter present and the kind of crop growing in the area. Most of the tiny organisms within a "community" are harmless, but, like communities of people, there are usually a few "thieves." These are the plant parasites that annually rob farmers of many valuable plants by causing root-rot diseases.

One of the worst public enemies of agriculture is the fungus, *Sclerotium rolfsii*, that attacks all leguminous crops as well as many vegetables, causing the disease known as southern blight.

Soil Parasite Research

The primary concern of one research project at the API Agricultural Experiment Station is to learn how to control the parasitic activities of *S. rolfsii*. The usual procedure necessary to catch a thief is (1) to become acquainted with the weaknesses in his operation, (2) to learn which associated individuals are "aiding and abetting" the criminal or are detrimental to his activities, and finally (3) to use this information to trap the suspect.

Southern Blight Studies

Basic studies at Auburn are being conducted to determine the relationships between the southern blight fungus and other organisms associated with it in diseased white clover. Stolons of white clover naturally infected by *S. rolfsii* were collected from fields at the Thorsby Foundation Seed Stocks Farm, the Tallassee Plant Breeding Unit, and at Auburn. The tiny organisms were removed in the laboratory from the diseased tissue of each stolon for study. From about 1,000 stolons processed, over 3,000 fungi and a similar number of bacteria were obtained. It was noted that certain ones of these were more abundant than others in infected stolons. By growing these organisms together in various combinations in the laboratory, some of their effects upon *S. rolfsii* and upon one another were determined.

Organisms Compared

Results of tests among the 11 predominant fungi isolated from stolons showed all of the fungi tested except one either affected or were affected by one or more other fungi in the group. Four of the fungi stopped growth of *S. rolfsii*. Two of them stopped growth of most of the other fungi in the population. This indicates that these two fungi are highly competitive in a mixed population and are worthy of further study in connection with their possible use in biological control of *S. rolfsii*.

Other Tests Studied

Further tests showed that these fungi associated with diseased clover affected to various degrees the production of sclerotia by *S. rolfsii*. The sclerotia are the tiny hard structures produced in large numbers by the southern blight fungus on diseased plants and in the soil. They are very important in the life cycle of the parasite, since they may live in the soil for several years, then germinate and continue the disease. All but two of the fungi caused a reduction in amount of sclerotium produced when grown in the presence of *S. rolfsii*. The check, in which *S. rolfsii* was grown alone in culture, averaged 2,000 sclerotia per test plate. *Trichoderma* (try-co-*der*-ma) allowed no sclerotium production, whereas two others actually stimulated sclerotia to form.

Studies are being continued to determine the effects of bacteria upon the activities of *S. rolfsii* and associated fungi. Thus far several bacteria isolated from white clover have shown strong antibiotic effects upon *S. rolfsii*.

New VEGETABLE VARIETIES *developed*

C. L. ISBELL, *Horticulturist*

FROM FARMER-GROWN vegetables to new varieties and old ones with a "new look" has been the story of vegetable improvement carried on by the API Agricultural Experiment Station.

Results of this work have been helpful to 203,000 home gardeners and commercial growers. Vegetables tested at this Station for many years include bush, semi-vining, pole and lima beans; southern peas, pumpkin, tomatoes, lettuce, cabbage, onions, peppers, sweetpotatoes, corn, watermelons, and others.

New Varieties

In this research, possibilities of using native species in developing new varieties have been emphasized. In testing beans more than 50 farmer strains were grown for comparison and breeding. From these came two new varieties, the Mild White Giant and the Alabama No. 1. The latter was probably the first nematode-resistant breeding stock in America.

Also developed were eight varieties of southern field peas. The last two, Early Purple Hull and Knuckle Purple Hull, were introduced in 1958.

Winter hardy, reseeding colored strains of leaf lettuce were improved. Cabbage strains were tested to determine the best for Alabama conditions. New methods of propagation, using roots, leaves, and buds were helpful in breeding work.

Storage and Quality

Three strains of onions that withstand low temperature and store well were tested. Two of these are now considered of value as dry onions for general use. They store better than the Yellow Bermuda. One, a multiplier type, also supplies green onions for about 8 months of the year.

Work with peppers included a hot variety for use with pickles, comparison of sweet varieties for yield and storage, and a new yellow pimiento.

A new pumpkin variety, Alagold, is a high yielder, stores well, and is an excellent substitute for sweetpotatoes when baked or used for pies.

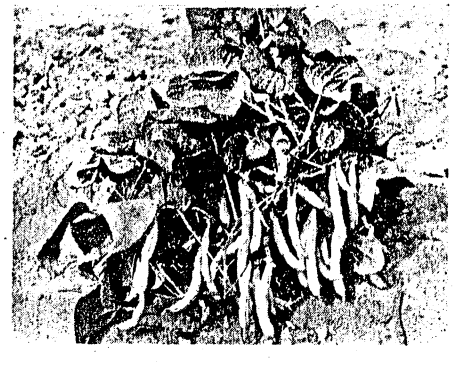
Several hundred kinds of watermelons were tested for earliness, size, yield, color, and table quality of flesh. Methods of freezing and a high quality ice box variety were developed.

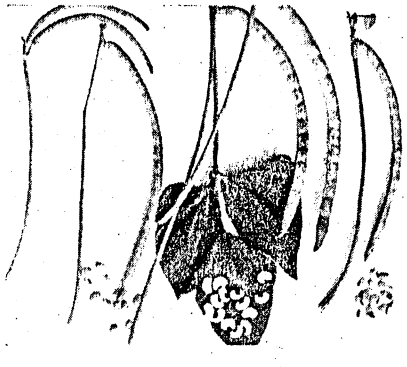
Tomato work included the improvement of size and quality of the cherry type. New methods of propagation with leaves and grafting on related plants were used. A method of storage was developed to extend the season of ripe fruit.

From this research new and improved varieties have been returned to the farmer for greater returns from vegetable production.

New pumpkin variety, Alagold, developed through research is shown at top and Alabama No. 1 bean, probably the first nematode resistant variety ever developed, is shown at bottom.

Below are some of the varieties improved and developed in the vegetable breeding research. Left is an improved variety of sweet pepper, center, a semi-vining bean and at right, the Giant Blackeye pea. It is one of eight varieties introduced.





BLOOD GROUPING *valuable in* ANIMAL BREEDING

L. W. JOHNSON, *Assistant Poultry Husbandman*

The bird above is receiving a transfusion of whole blood from another bird. He will produce antibodies in his blood serum that are capable of causing red blood cells of the donor bird to clump. Through this process it is possible to recognize various blood groups for study.

BLOOD GROUPING, a way of finding differences in farm animals, may prove invaluable to livestock breeders in Alabama.

More is known at present about blood grouping in chickens and cattle than other farm animals.

Poultry Diseases Studied

Blood grouping is a part of the poultry research program at the API Agricultural Experiment Station. Several workers are engaged in a pioneering study of the blood groups in connection with diseases of the chicken.

The groups are based on chemical structures in the surface of the red blood cell called antigens. Antigens are inherited characters, each a product of a specific unit of heredity or blood group gene. Every chicken has five known pairs of blood group genes. One member of each pair is passed on to the individual from each of its parents. Inheritance of the gene pairs is governed by five corresponding genetic systems named A, B, C, D, and E.

Blood Grouping Method

The blood of an animal is grouped in the research work by testing the red cells in a series of fluids. The fluids are blood serums taken from individuals immunized by transfusions of blood from selected donors. Each fluid contains antibodies capable of combining only with one kind of antigen. This combination causes red cells to stick together in clumps. Chicken blood is tested routinely by adding a drop of cells to a test tube containing two drops of a fluid, allowing the test to incubate, and observing it for the presence or absence of clumping. Multiple tests employing many fluids show the complete blood type of a bird.

Leghorns Tested

There are several aspects to the research work at the API Station. Foremost, blood groups of several inbred lines of Leghorns are being studied for differences in natural resistance to certain diseases. The differences in blood groups are being investigated as possible sources of variation in disease resistance among these lines. Results from one generation of chicks give some indication that the A blood groups influence resistance to cecal coccidiosis.

Disease Resistance

Another phase deals with whether breeding chickens for resistance to one disease affects their resistance to other diseases. Preliminary findings indicate that genetic resistance to leukosis carries with it considerable resistance to cecal coccidiosis.

Also, resistance to cecal coccidiosis seems to confer resistance to both the cecal worm and blackhead. Other results show clearly a reversal to this trend. Birds that are more resistant than others to either cecal coccidiosis or leukosis are more highly infected than the others by the common roundworm.

Other Studies

The possible effects of blood groups on the constitution of man and economic traits of animals have been discussed for many years. Poultry breeders at the main Texas Station have greatly improved the outlook in this field. Although intense inbreeding tends to eliminate genetic differences, the Texas workers found that chickens within many highly inbred lines differed in respect to genes of the B system. Apparently this difference cannot be eliminated from a group of chickens without threatening the group's survival.

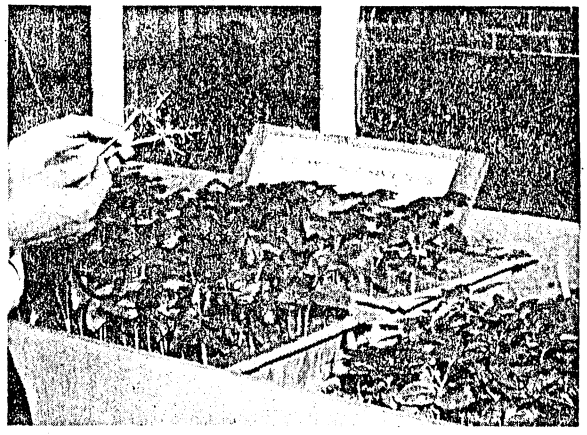
Also, it was shown in certain lines that birds heterozygous (unlike genes) for genes of the B system excelled homozygous (like genes) birds in hatchability, egg production, growth, and livability by margins ranging from 3% to 20%. Such margins of superiority are important in commercial competition, and several large poultry breeding companies have made blood studies a part of their research programs.

The founder of this approach to poultry breeding has stated that the field now surpasses all expected of it 10 years ago. Yet only a beginning has been made, and it seems that more surprises can be expected from blood grouping studies in the future.

Resistant crops, rotations economical approach to

ROOT-KNOT NEMATODE SITUATION

E. J. CAIRNS *and* N. A. MINTON
Department of Botany and Plant Pathology



Roots of plants in greenhouse are examined for rootknot nematode damage.

DIFFERENCES in the 5 species of root-knot nematodes in Alabama are proving valuable in developing a low-cost control program.

This is one solution to the root-knot nematode situation as outlined in the spring issue of HIGHLIGHTS.

Tests at the API Agricultural Experiment Station include many crops exposed to the 5 species of root-knot nematode. The chart shows examples ranging from high susceptibility in tomatoes to high resistance in crotalaria to all 5 root-knot nematodes.

The strawberry is highly resistant to all but one of the root-knot nematodes. Good production of strawberries is possible on land infested with any of the species except the northern. Land with this species will require control.

Differences in Resistance

Small differences in nematode resistance in varieties of some crops can make great differences in yields. For example, Auburn 56 and Empire varieties of cotton are similar in their susceptibilities to all but the cotton root-knot nematode. Fortunately, plant breeders have been able to develop in Auburn 56 increased resistance to that particular nematode, one of the most common in the State. Although not completely resistant, it greatly reduces losses from Fusarium wilt because infection by the fungus is associated with infestation of the roots by nematodes.

Plant breeders at Auburn were able to develop in the Alabama No. 1 pole bean resistance to the two most common root-knot nematodes in the State, the cotton and southern. However, Kentucky Wonder would be less susceptible for locations where northern or javanese nematodes are present.

Information in the chart shows that for each kind of nematode there are plants ranging from highly resistant to highly susceptible. Suitable rotations using highly resistant plants provide a way for reducing the root-knot nematode population prior to planting a susceptible crop. This saves the cost of using chemicals for control.

The differences of plant susceptibility to the different nematodes account for contradictory results obtained from different locations with the same varieties. The root-knot nematode is not just one kind of plant parasitic nematode. The chart presents obvious reasons for taking precautions against introducing an additional kind of root-knot nematode into a planting area. This is easily and frequently done by using root-knot infected transplants.

Laboratory examination of soil and plant samples to determine which kinds of nematodes are present and a recommended control is available as a free service at the API Station, Auburn.

CROP	ROOT-KNOT NEMATODE SPECIES TESTED				
	COTTON	SOUTHERN	PEANUT	NORTHERN	JAVANESE
CROTALARIA SPECTABILIS	HIGHLY RES.	HIGHLY RES.	HIGHLY RES.	HIGHLY RES.	HIGHLY RES.
STRAWBERRY (BLAKEMORE)	HIGHLY RES.	HIGHLY RES.	HIGHLY RES.	HIGHLY SUSC.	HIGHLY RES.
COTTON (AUBURN 56)	SLIGHTLY SUSC.	RESISTANT	HIGHLY RES.	HIGHLY RES.	RESISTANT
COTTON (ROWDEN)	HIGHLY SUSC.	RESISTANT	HIGHLY RES.	HIGHLY RES.	RESISTANT
POLE BEAN (ALABAMA #1)	RESISTANT	SLIGHTLY SUSC.	HIGHLY SUSC.	SLIGHTLY SUSC.	HIGHLY SUSC.
POLE BEAN (KY. WONDER)	HIGHLY SUSC.	HIGHLY SUSC.	HIGHLY SUSC.	HIGHLY RES.	MODERATELY SUSC.
TOMATO (RUTGERS)	HIGHLY SUSC.	HIGHLY SUSC.	HIGHLY SUSC.	HIGHLY SUSC.	HIGHLY SUSC.

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