HIGHLIGHTS
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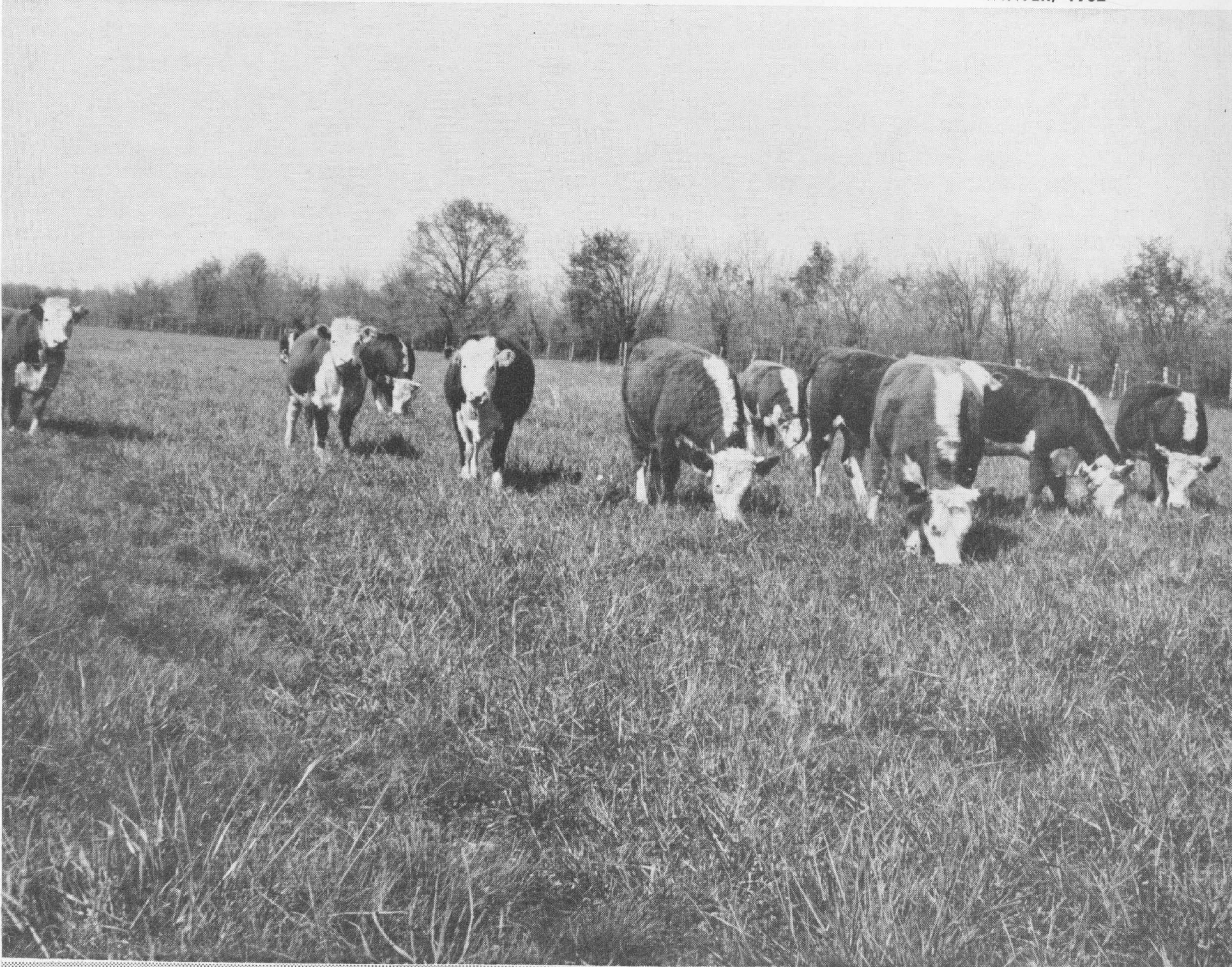

Agricultural Experiment Station
AUBURN UNIVERSITY

HIGHLIGHTS of Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 9, No. 4 WINTER, 1962

In this issue . . .

On the cover. These beef animals are grazing cool-season crops at the Tennessee Valley Substation in tests aimed at learning best management methods for beef production. Results indicate that such pastures are better for producing slaughter beef than are summer grazing crops. Increased use of cool-season grazing, coupled with confinement feeding and other intensive farming methods, shows good potential for Alabama cattle producers.

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New and Timely PUBLICATIONS

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

Bul. 330. Costs and Returns of Producing Runner Peanuts in Southeastern Alabama summarizes input and return data furnished by farmers of the area.

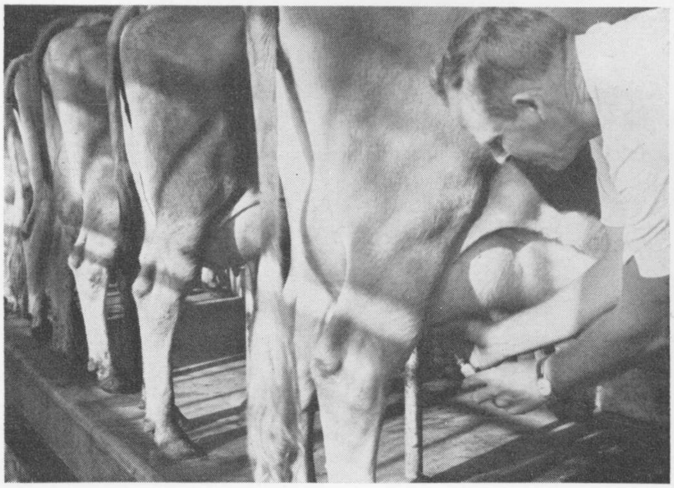
Cir. 141. Response of Field Crops to Fertilizer and Returns per Dollar Invested reveals value of fertilizer for different crops grown in Alabama.

Leaf. 55. Young Oat Forage A High Quality Dairy Feed presents information on digestibility and palatability of young green oats and value as dairy grazing.

Leaf. 67. Arrowleaf Clover. Gives results of 2 years of testing of this winter annual legume from Italy that was recently brought to the United States.

Prog. Rept. 84. Rainfall Distribution in Alabama is a longtime record of average rainfall for each 10-day period throughout the year in five areas of Alabama.

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



DRUGS in MILK— How Long Do Residues Persist?

G. E. HAWKINS, R. Y. CANNON and G. E. PAAR
Department of Dairy Science

MANY DISEASES of dairy cattle are treated routinely with antibiotics and other drugs having bactericidal properties. Use of such drugs often is essential for health of a dairy herd.

One problem with use of antibiotics and other drugs is that some of them are secreted in milk from treated cows. Because of the danger of drugs to humans, the Food and Drug Administration has set a zero tolerance for drugs in milk and banned use of certain ones for dairy cows. In addition, milk from cows treated with approved drugs cannot be marketed legally during a prescribed post-treatment period (usually 72 hours).

To correctly set limits for drugs, basic information was needed on persistency of residues in milk following treatment. A study[1] was begun at Auburn University Agricultural Experiment Station to provide such information on commonly used drugs.

Drugs studied were penicillin, dihydrostreptomycin, oxytetracycline (terramycin), and furacin. Six to 12 cows were treated with different concentrations of each drug and by different treatment methods, as listed in the tables. Among the drugs tested, procaine penicillin G in sesame oil is not approved for use with dairy cattle. Neither is the 300,000-unit dose of aqueous potassium penicillin G approved for infusion into the udder.

After treatment, milk was tested at each milking until there was no detectable drugs from two consecutive milkings. Concentrations were determined using an overnight cylinder-plate assay for antibiotics and a colormetric method for furacin.

Length of time drugs were secreted in milk following intramuscular, intrauterine, intervenous, and oral treatment is given in Table 1. Persistency was 72 hours or less for aqueous potassium penicillin G given intravenous, intramuscular, and intrauterine, and for oxytetracycline when administered intravenously. Procaine penicillin G in sesame oil with 2% aluminum monostearate lasted 86 hours after oral dosage and 96 hours after intramuscular injection. No drug residue was detected in milk after dihydrostreptomycin was given by intrauterine infusion.

When the drugs were infused into udders of dairy cows, there was a wide variation in duration of secretion in milk, Table 2. Those approved for use with dairy cows (aqueous potassium penicillin G, oxytetracycline, and furacin) persisted a maximum of 72 hours when administered at approved levels. In contrast, procaine penicillin G in sesame oil with 2% aluminum monostearate (a non-approved drug) persisted up to 182 hours.

TABLE 1. DURATION OF SECRETION OF ANTIBIOTICS IN MILK FOLLOWING ORAL AND PARENTERAL ADMINISTRATION TO DAIRY COWS

Drug and dosage	Method of administering	Duration of secretion in milk	
		Hours	*Milkings*
Penicillin G[1]			
Potassium, 3,000 units/lb.	Intramuscular	72	6
Procaine, 3,000 units/lb.	Intramuscular	96	8
Potassium, 1,000,000 units	Intrauterine	31	3
Potassium, 2,000 units/lb.	Intravenous	44	4
Procaine, 10,000,000 units	Orally	86	7
Dihydrostreptomycin, 2.5 gm.	Intrauterine	0[2]	0
Oxytetracycline, 2.0 gm.	Intravenous	34	3

[1] Potassium penicillin G in aqueous suspensions; procaine penicillin G suspended in sesame oil with 2% aluminum monostearate.
[2] None detected 10 or 24 hours after treatment.

[1] The study was supported in part by a U. S. Public Health Service grant.

It was found that non-treated quarters also produced milk containing drug residues, Table 2. However, persistency was less than for treated quarters. Longest lasting drug in non-treated quarters was the procaine penicillin G in sesame oil with 2% aluminum monostearate.

The interval between treatment with the drugs and production of milk with no residue varied considerably from cow to cow. However, amount of milk produced by the cow had little to do with the variation.

Results of the Auburn studies confirm that only approved antibiotics at approved levels should be used for treating dairy cows. Even then, milk produced during the first 72 hours (or other approved periods) after treatment should be kept off the market.

TABLE 2. DURATION OF SECRETION OF BACTERICIDAL AGENTS BY INFUSED AND NON-INFUSED QUARTERS OF DAIRY COWS FOLLOWING TREATMENT

Drug and dosage	Duration of Secretion	
	Infused	Non-infused
	Hours	*Hours*
Penicillin G[1]		
Potassium, 100,000 units/quarter	48	24
Potassium, 300,000 units/quarter	86	62
Procaine, 100,000 units/quarter	182	72
Procaine, 300,000 units/quarter	134	72
Oxytetracycline, 426 mg./quarter	58	34
Furacin, 60 mg./quarter	0[2]	0

[1] See footnote 1, Table 1.
[2] None detected 14 or 24 hours after treatment.

Skip-Row Cotton Produces Highest Yields

D. G. STURKIE, *Agronomist*
J. K. BOSECK, *Supt., Tennessee Valley Substation*

WANT MORE RETURN from your limited cotton acreage? Then try skip-row planting. This system results in 30 to 50% higher yields than from conventional solid plantings.

Yield advantage of skip-row planting was shown by results of a 5-year experiment at the Tennessee Valley Substation on a Decatur clay soil. Three systems of planting were studied: (1) 2 rows planted, 2 rows skipped; (2) 4 rows planted, 4 skipped; and (3) conventional planting.

Two rates of a complete fertilizer were used, 600 and 900 lb. per acre applied only to area planted – none to the skips. Cotton was spaced to a stand of about 40,000 stalks per acre, with spacing the same in all rows. Skipped rows were kept fallow except in two treatments used in 1956. Systems used and yields are given in the table.

Highest yields resulted from a system of planting 2 rows and skipping 2 rows. Planting 4 rows and skipping 4 produced more cotton than solid (conventional) planting but less than planting 2 and skipping 2. Most of the yield increase comes from the outside rows, as shown in the table. Since the 2 planted, 2 skipped system provides all outside rows, this method gives top benefit.

The major advantage of skip-row planting is the increase in total yield on a small acreage. Production from a 10-acre allotment with the three systems is shown below, based on fertilization rate of 600 lb. per acre:

System	*Total yield*
2 in-2 out	24.0 bales
4 in-4 out	20.4 bales
Conventional	15.4 bales

Another advantage of the system is in application of insecticides. Spray or dusting machines can operate in skips without damaging cotton.

In the fertilizer rates comparison, yield increase from 900 lb. over 600 lb. was less with 2 rows planted and 2 rows skipped than with 4 rows in and 4 out or with solid planting. This is probably because there was more soil from which each plant could obtain nutrients in the 2 in, 2 out system. This extra amount of soil supplied additional moisture and plant food elements. Fertilizer was not added to skipped rows, but the soil was highly fertile.

Results of other experiments at the Substation indicate that most of the response from 900 lb. over 600 lb. of fertilizer was from the additional nitrogen. The Decatur soil should get enough phosphorus and potassium from 600 lb. of 8-8-8. Additional nitrogen could be supplied more economically by side-dressing.

To determine if skipped rows could be used for some other crop, lespedeza was planted in the skips as a treatment in 1956. Yields dropped to the same level as that of solid planting. Thus, fallowing of skip rows is necessary for maximum yield increase from skip-row planting.

A disadvantage of the skip-row system is that only half of the land is utilized and the other half is bare. This method is not adapted to steep slopes because of erosion of the bare or fallowed areas.

Since skip-row planting requires double acreage, a grower must decide if the yield increase from the system is enough to offset income that might be obtained if the additional acres were planted to another crop.

COTTON YIELDS WITH SKIP-ROW AND CONVENTIONAL PLANTINGS, TENNESSEE VALLEY SUBSTATION

Planting system	Fertilizer[1]	Rows	Seed cotton yields per acre						
			1956	1957	1958	1959	1960	3-yr. av.	5-yr. av.
			Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
4 in-4 out	600 lb.	Inside	1,350	1,929	1,942	2,808	2,294	2,348	2,065
		Outside	2,194	3,333	2,442	3,966	3,562	3,323	3,100
		Average	1,772	2,630	2,192	3,387	2,928	2,836	2,582
4 in-4 out	900 lb.	Inside	1,215	2,131	2,038	2,917	2,382	2,446	2,137
		Outside	2,019	3,545	2,694	4,458	3,894	3,682	3,322
		Average	1,617	2,838	2,366	3,688	3,138	3,064	2,730
2 in-2 out	600 lb.		2,008	2,966	2,524	3,902	3,742	3,389	3,028
2 in-2 out	900 lb.		2,464	3,278	2,710	4,185	3,529	3,475	3,233
Solid	600 lb.		1,293	1,932	1,603	2,439	2,446	2,163	1,943
Solid	900 lb.		-----	-----	1,714	3,010	2,441	2,388	-----
Solid	1,050 lb.		-----	-----	1,603	2,734	2,788	2,375	-----
4 in-4 out	600 lb.	Inside	1,125	-----	-----	-----	-----	-----	-----
lespedeza		Outside	1,457	-----	-----	-----	-----	-----	-----
in middle		Average	1,290	-----	-----	-----	-----	-----	-----
4 in-4 out	900 lb.	Inside	1,125	-----	-----	-----	-----	-----	-----
lespedeza		Outside	1,384	-----	-----	-----	-----	-----	-----
in middle		Average	1,254	-----	-----	-----	-----	-----	-----

[1] Fertilizer was 6-8-4 in 1956 and 8-8-8 in remaining years.

ALABAMA'S BROILER INDUSTRY

MORRIS WHITE,
Agricultural Economist

MOST ALABAMIANS know that broiler production in the State is big business. But few are aware of the cooperative efforts on the part of those in the industry that have contributed to making the business what it is today.

No accurate estimate of the total value of the broiler industry in Alabama is currently available. Recent expansion, however, reflects the rapid adjustment that has been made.

Production of broilers in Alabama in 1961 was 198.1 million, or 41 times the number grown 15 years earlier in 1947. Because the average market weight of broilers has increased from 2.4 to 3.4 lb., total pounds of broilers sold by growers in Alabama has increased more than numbers, and was 59 times greater in 1961 than in 1947.

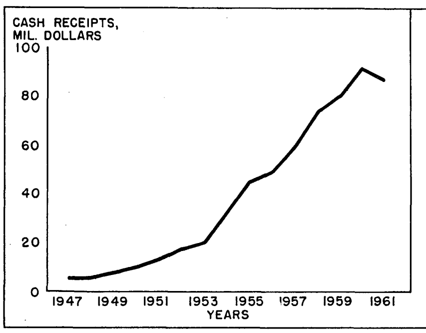
Significant changes have taken place in the relative importance of states as broiler producing areas. Almost 2.0 billion broilers were produced in the United States in 1961, more than 3 times the number in 1950 and nearly twice as many as in 1955. Although broiler production increased in 27 states between 1955 and 1961, most of the expansion was in Alabama, Arkansas, Georgia, Mississippi, and North Carolina. During this period, the number of broilers produced in these states increased an average of 160% and they contributed 55% of the country's broilers in 1961. Production in Alabama increased 243%, which boosted the State from 10th to 3rd place among states.

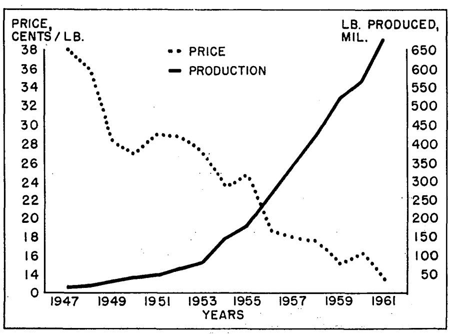
Increases in production resulted in the need for increases in hatching egg supply flocks, hatcheries, feed mills, transportation facilities, and service personnel. Combined capacities of hatcheries in Alabama exceeded 20 million eggs, and slightly more than 204 million chicks were hatched in 1961. Had all houses been of 10,000 bird capacity and had 4 batches been grown in each house during the year, approximately 5,000 houses would have been needed. To grow the 673.3 million lb. of broilers required in excess of 800 thousand tons of feed, most of which was an output from mills located within the State.

The broiler industry is among those for which overall costs for supplying a finished product to the retail market are lower when processing takes place in or near areas of production. This has led to the construction of modern processing plants in major producing areas of the State. There are 22 plants in Alabama with capacities ranging between 3,600 and 7,500 birds per hour, operating under the Poultry Products Inspection Program. In addition, a number of plants with lesser capacities are processing broilers for sale within the State.

Changes in organization within the industry have occurred during its rapid expansion. A most significant change has been the merging of firms that previously performed different operations. Coordination of production, processing, and marketing functions was achieved and control passed to operators of the fewer and larger firms.

Rapid development and adoption of improvements in type of bird, housing, feeds, medication, processing, and management have lowered production costs and have enabled those in the industry to continue increasing numbers of broilers produced at a time when prices were continually dropping, see chart. Annual average price for broilers has dropped below the price for the previous year in 12 of the past 15 years. However, increases in production have been sufficiently large to result in an increased total income for broilers. The trend was changed in 1961 when production was increased by only 12% and price decreased 20% from the previous year. Total cash receipts by producers from the sale of broilers dropped from $91.6 million in 1960 to $87.5 million in 1961. Returns to the industry, obtained by multiplying the average price paid by retailers times the pounds of dressed broilers purchased from processors, increased from $125.5 million in 1960 to $130.7 million in 1961. These are gross return estimates and do not indicate profits.





Shown at left are cash receipts from broiler marketings 1947-61 and at right price and production of broilers in Alabama for the same period.

Per capita consumption of broilers has increased each year since 1946, and was reported to be 25.5 lb. in 1961. This was approximately 12% of the total per capita consumption of all meats. To maintain or improve this relative position, participants in the broiler industry will have to continue efforts to improve their product. Those in the industry in Alabama have proved in the past that they can produce broilers competitively. Future progress of the industry will depend more heavily upon the ability and willingness of industry people to make whatever adjustments are necessary to provide a competitively priced high quality product, attractively packaged, and with a maximum of convenience for consumers.

NUMBER AND POUNDS OF BROILERS PRODUCED, PRICE, AND CASH RECEIPTS, ALABAMA, 1947-61

Year	Number broilers produced	Pounds produced	Farm price	Cash receipts
	Millions	*Millions*	*Cents*	*Million dollars*
1947	4.8	11.5	38.0	4.4
1948	6.0	15.0	36.0	5.4
1949	10.5	27.3	28.3	7.7
1950	13.1	35.4	27.0	9.6
1951	16.7	45.0	29.1	13.1
1952	23.5	63.4	28.8	18.3
1953	28.4	73.9	27.0	19.9
1954	47.7	143.2	22.8	32.7
1955	57.8	179.1	24.5	43.9
1956	82.5	255.7	18.7	47.8
1957	103.9	332.4	18.0	59.8
1958	131.6	421.2	17.6	74.1
1959	158.2	522.2	15.1	78.9
1960	176.7	565.3	16.2	91.6
1961	198.1	673.3	13.0	87.5

Yearling steers are shown grazing cool-season crop at the Tennessee Valley Substation.

COOL-SEASON GRAZING FOR YEARLING STEERS

R. R. HARRIS, W. B. ANTHONY, J. K. BOSECK, and E. M. EVANS*

COOL-SEASON grazing crops are more suitable in a slaughter beef production system than are warm-season pastures.

The greatest potential in producing market beef appears to be through increased utilization of cool-season grazing and use of intensive farming methods such as confinement feeding. Less dependence can be placed upon warm-season pastures in such systems, according to research results at Auburn University Agricultural Experiment Station.

Three grass-legume forage combinations have been evaluated with yearling beef steers in a 7-year study (1956-1962) at the Tennessee Valley Substation, Belle Mina. The influence of irrigation on beef yields, stocking rate, and rate of gain was measured for each test sward for the first 6 years.

The combinations evaluated were: (1) Dallisgrass-white clover; (2) alfalfa-orchardgrass-white clover; and (3) Coastal Bermudagrass-hairy vetch. The Dallis-clover ratio was highly variable during the test and definitely not ideal during the later years. Alfalfa did not withstand continuous grazing and the combination where it was included became essentially orchardgrass with variable amounts of clover. Difficulty was encountered in establishing Coastal swards suitable for grazing until the 1959 grazing season; thus, the Coastal-legume combination has been studied only 4 years.

Animal performance data for the test swards are summarized in Table 1. Irrigation had no substantial effect upon animal performance for any sward; however, carrying capacity of the pastures was increased slightly by the application of an average of 6 in. of supplemental water during the grazing season. The average April-August rainfall was 20.1 in. during the 6 years irrigation was studied. The range was 13.9-25.0 in. Based on these results irrigation can not be recommended as an economical practice in growing pastures for production of slaughter beef.

* Assistant animal nutritionist, animal nutritionist, superintendent, Tennessee Valley Substation, and associate agronomist, respectively.

TABLE 1. SUMMARY ANIMAL PERFORMANCE DATA, IRRIGATION—GRAZING STUDY, 1956-1962[1]

	Dallis-grass-white clover		Alfalfa-orchard-grass-white clover		Coastal Bermuda-vetch or crimson clover[2]	
	Irr.[3]	Not irr.	Irr.[3]	Not irr.	Irr.[3]	Not irr.
Beef yield per acre						
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Season total	389	373	408	371	369	407
Average daily gain						
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Season av.	1.33	1.37	1.32	1.26	1.23	1.21
Stocking rate per acre per day						
	No.	*No.*	*No.*	*No.*	*No.*	*No.*
Season av.	1.54	1.36	1.59	1.47	2.37	2.13

[1] Each value is an average of 2 replications per year.
[2] Each value is an average of 2 replications for 4 years instead of 7 as indicated for the other forage combinations.
[3] Irrigation applied as required in all years except 1961 and 1962. In 1961 supplemental water was not applied because an adequate amount and distribution of natural rainfall occurred.

The forage combinations tested were essentially equal in beef produced per acre, 369 to 408 lb. Since irrigation had no major effect upon animal performance, the data are combined without regard to irrigation treatment. Yearling steers grazing test pastures had average daily gains of 1.35, 1.29, and 1.22 lb. respectively for Dallis, orchard, and Coastal swards. The ranking of these forages in average seasonal carrying capacity was in reverse order: Coastal, 2.25; orchard, 1.53; and Dallis, 1.45 animals per acre daily. The biggest advantage of the Coastal sward is its ability to support heavy stocking rates – 3.75 animals per acre at peak growth.

The most useful measure of the relative value of swards in producing slaughter beef is performance of animals grazed continuously for the season. These data reveal the true worth of the forages in terms of the ultimate end product, a saleable animal. Such data for this test are given in Table 2. The total seasonal gain per animal for Dallis, orchard, and Coastal was 222, 199, and 194 lb., respectively. These gains were made in grazing seasons of approximately 150 days in length. The cattle grazed for the season usually made slightly faster gains than the average of all cattle on the particular sward, Table 1. The resultant daily gains of 1.24, 1.38, and 1.44 lb. must be recognized as growth gains. All animals came off these forage combinations grading Utility and required finishing in drylot to demand a competitive market price.

TABLE 2. PERFORMANCE OF STEERS GRAZED CONTINUOUSLY FOR SEASON, 1956-1962[1]

	Dallis-grass-white clover	Alfalfa-orchard-grass-white clover	Coastal Bermuda-vetch or crimson clover
Number of animals	45	53	46
Length of grazing season, days	155	144	154
Average daily gain, lb.	1.44	1.38	1.24
Total season gain per animal, lb.	222	199	194
T.D.N. per cwt. gain, lb.	638	672	694
Slaughter grade—end of grazing	Util. +	Util.	Util.

[1] Each value is an average of 4 replications for each year except for Coastal-legume; it is an average of 4 replications for 1959-62, inclusive. Since irrigation had no pronounced effect upon animal performance, 2 replications which were irrigated and 2 not irrigated were combined for each sward.

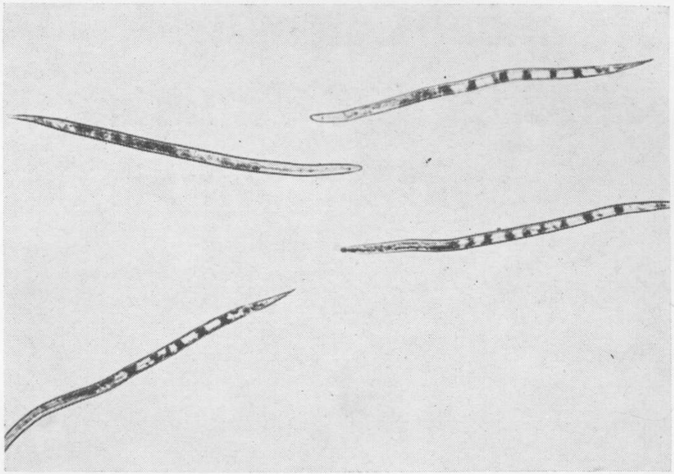


Photo of magnified root-knot nematode larvae shows effects of using up food reserves. The clear areas of varying sizes are portions of tissues from which the reserve food has been utilized. These areas serve as a quantitative guide to infective potential of larvae.

FOOD RESERVES— Factor in Plant Infection by Root-Knot Nematode Larvae

E. J. CAIRNS and E. BOLMAR
Department of Botany and Plant Pathology

MUCH OF THE research on plant parasitic nematodes at Auburn is concentrated on the root-knot nematode. This nematode is so widespread throughout Alabama that it is found in most soil samples sent to the Nematology Laboratory for examination. Prevalence and importance of the pest justifies the concentrated effort.

Occasionally annual crop and ornamental plants succeed in soils known to be infested with root-knot nematodes and even where losses have occurred previously. Number of larvae may not differ greatly between areas where plants do satisfactorily and where they may be harmed. Thus, information about nematodes present in a soil sample is necessary to accurately predict if planting will be safe without soil treatments.

To provide specific information needed to determine probability of infection by root-knot larvae, a special study was begun by Auburn University Agricultural Experiment Station. Efforts are being made to accurately determine not only how many infective larvae are present, but also their condition as it may influence ability to find and enter roots.

Food Reserves Measured

An important fact about root-knot larvae is that after hatching they are unable to feed until they invade roots of a suitable host plant. Their only source of energy is the supply of reserve food in their bodies at hatching. How rapidly this reserve is used depends on factors over which the nematode has no control. If soil moisture and temperature conditions are suitable, the larva consumes its reserves to the point of death unless a root tip is encountered. Finding a convenient measure of the food reserve of infective larvae in soil was the first step in attacking the problem.

Observations of root-knot larvae allowed to age showed a definite pattern of progressive development of clear areas in their bodies. Distinctiveness of these clear areas and way in which formed, shown in the microscope photograph, were found to be different in root-knot larvae than in other common plant nematodes.

On the basis of observations of larvae under various conditions, a pictorial scale was developed. This scale utilizes the number and shape of the clear areas that formed in bodies of nematodes as reserve food was expended. The scale was found to be practical and easily applied by technicians to rapidly judge conditions of larvae at time of identifying and counting them from soil samples.

Relation of Reserves to Infection

The second step was to determine the relationship of amount of reserves in the larvae to their ability to enter plant roots. A series of experiments was developed that enabled this point to be tested with least interference from other complicating factors.

Results confirmed that ability of larvae to infect roots is related to amount of remaining food reserves. The data showed that no appreciable decline in infectivity occurred in the larvae until their reserves had been depleted to the point that five large clear areas were apparent in their bodies. Infectivity declines from this stage on as the remaining reserves were used. Eventually the nematodes were no longer able to penetrate the roots, although still capable of movement and still having a small quantity of reserves remaining. Death from starvation was the final result.

Microscopic examination of nematodes and root tissue revealed some unexpected results of food reserve depletion. It appeared that amount of food reserve had little to do with time necessary to enter plant roots. All larvae entered roots in about the same length of time regardless of amount of food reserves, until the amount dropped to the point that the five clear areas developed. This was the point at which infection was no longer possible. Once the larvae entered the root, however, amount of food reserve had an effect. Rate of larval development in roots seemed to be in relation to amount of food reserves.

Development of the workable guide to estimating larval food reserves, which is a measure of infective potential for root-knot nematode, should prove valuable. This additional information will add to accuracy of routine laboratory examinations for soil samples for these pests. Such specific information can be profitably used by careful growers in Alabama.

Chemical Control of Johnsongrass, Annual Grasses in Cotton Fields

V. S. SEARCY, *Assistant Agronomist*

JOHNSONGRASS IS DIFFICULT to control in Alabama cotton fields. However, control would be much easier if seedlings could be killed with a pre-emergence herbicide. Old plants from rhizomes could be killed and further infestation prevented by control of seedlings.

Recommended pre-emergence herbicides (diuron and CIPC) have usually given excellent control of most small seeded annual weeds. However, if used at high enough rates to control Johnsongrass seedlings satisfactorily, there is danger of injury to cotton plants.

A relatively new compound, Dacthal (Dimethyl ester of tetrachloroterephthalic acid), shows promise of effectively controlling Johnsongrass seedlings in cotton. It was found effective against many seedling grasses during germination and some broadleaf weeds. Dacthal is a wettable powder and must have rain or irrigation to be effective.

Dacthal was used in a 1962 experiment on the Agronomy Farm at Auburn on a Chesterfield sandy loam soil. Objectives were to determine effect of Dacthal on Johnsongrass seedlings and other weeds, and on cotton plants. Dacthal was compared with no treatment, plowing and hoeing, and a recommended pre-emergence herbicide.

Before planting cotton, Johnsongrass seed were broadcast at the rate of 12 to 15 lb. per acre and lightly disked in. All herbicides were applied broadcast. Two rates of Dacthal were applied to the soil and disked in just before planting. Other herbicide treatments were made just after planting cotton on April 20. On April 24 there was .05 in. of rain and on April 29 rainfall measured 1.45 in. Photographs shown were made 38 days after planting. Weeds and cotton plants were counted 40 days after planting.

Diuron reduced Johnsongrass seedlings about 57% when compared to the untreated check (see table). Dacthal at all rates reduced number of Johnsongrass seedlings much more than diuron. Diuron greatly reduced annual grasses but was not as effective as Dacthal. None of the herbicide treatments affected cotton plants or yield.

The high counts for annual weeds in the incorporated treatments probably reflect poor incorporation with the disk harrow. All treatments gave good control of broadleaf weeds. However, broadleaf weed infestation, mostly Florida pusley, *Richardia scabra*, was light.

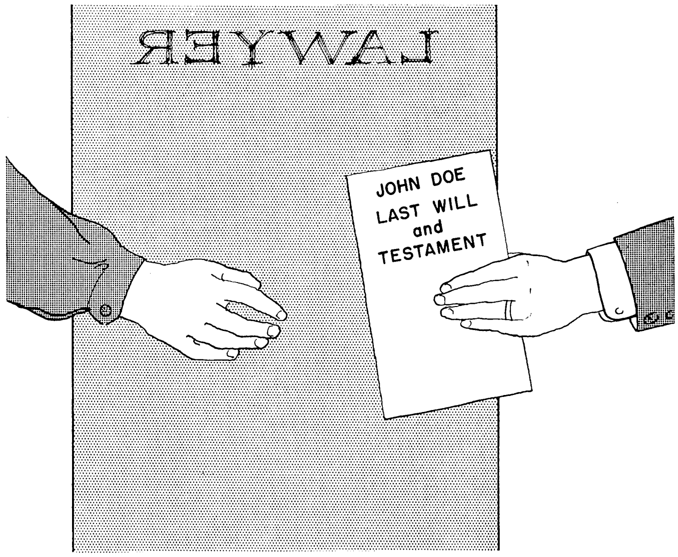
In a similar experiment at the Tennessee Valley Substation, there was no rain for several weeks after planting. Consequently, all treatments looked alike.

WEED CONTROL AND COTTON YIELDS FOLLOWING PRE-EMERGENCE TREATMENTS WITH DIURON AND DACTHAL

Pre-emergence treatments, lb. per acre broadcast	Weeds per 100 sq. ft. Johnson-grass seedlings	Annual grasses[1]	Broad-leaf weeds	Cotton plants per acre	Seed cotton yield per acre
	No.	*No.*	*No.*	*No.*	*Lb.*
Plowed, hoed check	5	23	1	42,600	2,201
Untreated check	474	1,849	15	93,500	-----
Diuron on surface, 0.83 lb.	203	240	2	110,900	2,182
Dacthal on surface					
4.0 lb.	25	10	4	101,500	2,479
6.0 lb.	9	1	1	96,800	2,274
8.0 lb.	7	1	2	100,500	2,323
Dacthal disked in					
6.0 lb.	5	29	2	102,900	2,593
8.0 lb.	6	30	2	97,500	2,553

[1] Mixture of crabgrass, *Digitaria saguinalis*, crowfootgrass, *Dactyloctenium aegyptiacum*, and goosegrass, *Eleusine indica*.

YOUR WILL– Important Legal Document



J. H. YEAGER, *Agricultural Economist*

EVERY ADULT should have a will. Surveys indicate, however, that a relatively low percentage of farmers have made wills.

It is commonly thought that making a will is desirable only for those who have accumulated considerable wealth in the form of real estate, machinery, livestock, stocks, bonds, or other things of value. In these days of large lawsuits that may arise from such things as an automobile accident, a person may be placed in a position that a will would be desirable. Also, one may have a potential estate through inheritance.

Some think that a will is a document to be prepared after reaching age 65. This is not the case. A young farmer or businessman who is in debt and has minor children should be concerned about leaving his wife in the best possible condition regarding control over property that she must depend on for income.

What is a will? A will is a plan or document that directs disposal of a person's property at death. If a person dies without a will, his property is distributed according to state laws, known as laws of descent and distribution. These laws may or may not distribute wealth as the owner desires. Every person has a right to direct how he wishes his property to be distributed.

Who can make a will? In Alabama, every person of age 21, of sound mind may, by a will, direct disposition of land or interests in land. Persons over 18 years of age and of sound mind may, by making a will, direct disposal of personal property.

Must a will be in writing? Generally, a will must be in writing, signed and witnessed. Under Alabama law, an unwritten will covering personal property is valid only when the property willed does not exceed $500 in value. A will conveying land or interests in land must be in writing.

At least two witnesses must sign the will in the presence of the person who makes the will. It is desirable that witnesses be younger than the person making the will. Also, witnesses should be persons not mentioned in the will.

Can a will be changed? A will does not take effect until death. A person may revoke or change his will any time before his death. When a new will is made, a statement should be included that expressly revokes the old will in whole or in part.

If only a few minor changes are needed, it may not be necessary to make a new will. Changes may be made by preparing a codicil that is a separate addition to a will. Changes in a will should not be made by cross-outs, insertions, and erasures.

It is not wise to prepare a will and forget it. Changes occur in family composition and situation. A will should be reviewed periodically to see that it provides for the disposition of property as desired.

How can a will be used in farm transfer? To farmers, a will is important in planning the transfer of a farm to a son or sons. A will can provide for keeping a farm in the family rather than selling it outside the family. It may provide for a farm operating son or sons to buy the interests of other heirs. Consideration to heirs who have contributed more to the farm and building up farming operations and to care of parents in declining years may also be set forth in the will. It is possible for parents to keep control over a farm through transfer by will rather than outright sale.

A farm operating son may feel that a will fails to provide the security desired since changes may be made in the will. Also, a son may not want to wait the number of years required in order to gain ownership of a farm and home.

Should I get help in making a will? If the will to be prepared is relatively simple, it may not be necessary to get help. Since legal requirements must be met, however, it may be wise to get the services of a competent attorney for preparing a complicated will. Cost of an attorney's services may be insignificant relative to financial and personal difficulties that may otherwise occur. An attorney should be instructed as to desires for distribution of the property and the person making the will should read it carefully. The will should be stored in a safe place.

One should plan ahead on his property, its use, and what is likely to happen in event of his death. It may not be wise to wait in making a will – probably it is later than you think.

CALCIUM Requirements of LAYING HENS

J. R. HOWES, *Assistant Poultry Husbandman*

MORE PEOPLE fail to receive the recommended levels of dietary calcium than any other nutrient.[1] This mineral element is even more important for the laying hen because it is not only required for bone and other tissue but a dietary deficiency will result in thin-shelled eggs and eventually no eggs at all.

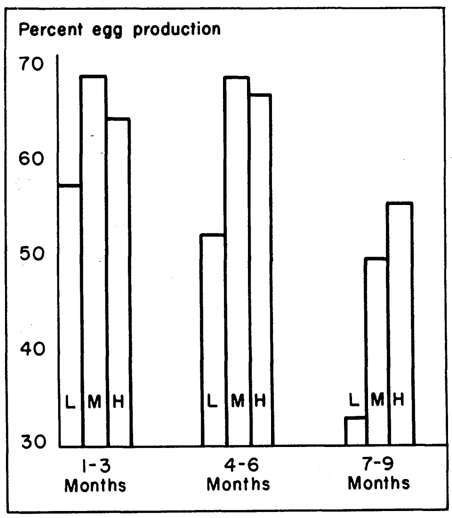
Apart from dietary intake, calcium metabolism in layers is also affected by simultaneous intake of other nutrients, such as phosphorus and vitamin D, by disease, age, and environment. Egg producers in the Southeastern United States are plagued with thin-shelled eggs during summer months often caused by older birds finishing their laying period in the summer.

Experiments Conducted

In 1961 research was begun at Auburn University Agricultural Experiment Station to investigate diet, age, strain, and environment as factors affecting calcium metabolism in the laying hen. Results of the first year's work with different dietary levels of calcium and phosphorus are being analyzed. Since the National Research Council recommendations for dietary calcium in layer diets is 2.25%, this level was chosen as a control diet. Using over 1,000 individually caged H3W strain pullets, the effects of 3 dietary levels of calcium, 2.25, 3.75, and 5.5%, were evaluated. Some factors evaluated over one laying cycle included egg production, egg size, egg quality, mortality, feed efficiency, egg shell thickness, egg shell strength, fertility, and hatchability.

Research Results

Figure 1 shows that the 2.25% dietary calcium level, as presently recommended by the N.R.C., resulted in poor egg production. These results compare with those found in the cooler and drier areas of this country. The most persistent good egg production was obtained with the 5.5% dietary calcium. Egg production was adversely affected by the medium calcium diet during the last 3 months.



Egg production over a 9-month period for 3 calcium diets is shown here. (L = 2.25%; M = 3.75%; and H = 5.5%).

Egg Shell Thickness

When egg shell thickness was evaluated by specific gravity, Figure 2, egg shells were progressively thinner over the experimental period and appeared to be directly related to calcium intake. Research is now being conducted at Auburn to determine the breaking strength of egg shells in terms of shell thickness. A thick egg shell has been largely accepted in the industry as being stronger, but this relationship may only be true for a limited range.

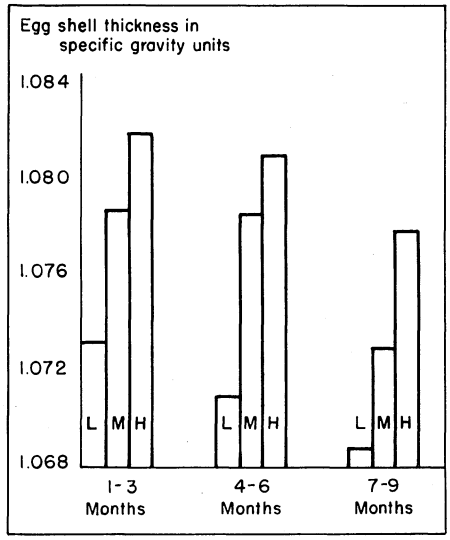
Egg Shell Strength

Egg shell strength as measured by impact and crushing tests appeared to be directly related to the dietary intake of calcium. The high mortality among birds receiving the 2.25% calcium diet was very pronounced when compared with the low mortality of the other 2 groups.

Calcium Level Low

Tentative results confirm that in the hot humid Southeastern United States the currently N.R.C. recommended level of dietary calcium is inadequate for high-producing layers. However, a large increase in dietary calcium should be viewed with caution since especially in breeding stock high calcium diets may result in other dietary imbalances, infertility, and poor hatchability. Furthermore, at a time when more and more feed ingredients are being selected largely on a price basis by linear programming, it may become difficult to produce high calcium diets without impairing dietary protein and energy intakes. More emphasis, therefore, should be placed on ingredient quality to allow the production of diets that compensate for their higher price by giving a better feed efficiency and lower bulk transportation costs.

Since many workers are finding differences in response to protein and energy by different breeds and strains of poultry, it is quite possible that such differences may also apply to mineral requirements. However, these differences will probably be relatively small but work now in progress will attempt to evaluate breed and strain differences.



The average egg shell thickness for the 3 calcium diets over a 9-month laying period is shown above. L, M, and H represent the 3 dietary levels of calcium.

[1] World Health Organization.

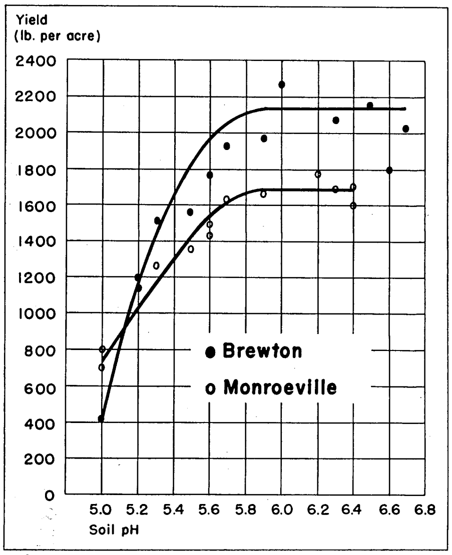
LIME and COTTON

FRED ADAMS, *Associate Soil Chemist*

LIMING SOIL for cotton is an old, often neglected practice. The penalty for such negligence can be costly because present-day farming practices increase soil acidity at a much faster rate than did the practices of 2 decades ago.

The use of fertilizers probably affects soil pH more than any single practice. At one time Alabama cotton farmers primarily used sodium nitrate as the source of nitrogen. In addition, low rates of phosphorus and potassium fertilizers were used. These fertilizer practices did not greatly affect soil acidity. Consequently, lime applications every 5 to 10 years were adequate, as shown by earlier research of the Auburn Agricultural Experiment Station. With the use of higher rates of fertilizers new research was needed to determine present-day lime needs, especially where higher rates of ammonium fertilizers are used.

Field experiments were established at Brewton, Monroeville, and Prattville in 1957 and 1958 to determine the effect of various lime rates and nitrogen treatments on soil pH and cotton yields.



This chart shows yields of seed cotton at various soil pH levels at both the Brewton and Monroeville Experiment Fields.

Data in Table 1 show that soil pH is greatly affected by kind and amount of nitrogen. Although these soils were uniformly limed with dolomite limestone 3 years before, the soil pH levels differed greatly. Data show that soil pH was affected by the amount and kind of nitrogen fertilizer used and by soil type. The increase or decrease in soil pH was determined by the kind of nitrogen, but the magnitude of pH change was determined by amount of nitrogen used and soil type. This is an example of how lime requirement can be determined only by a soil test.

TABLE 1. EFFECTS OF RATES AND SOURCES OF NITROGEN AFTER 3 YEARS ON SOIL PH OF DIFFERENT SOIL TYPES

Total N per acre	N source	Kalmia sl Brewton	Magnolia fsl Monroeville	Greenville fsl Prattville
Lb.		*pH*	*pH*	*pH*
0	----	5.9	5.9	6.2
180	amm. nit.	5.6	5.7	6.0
720	amm. nit.	5.3	5.5	5.4
720	amm. sul.	5.2	5.0	4.7
720	sodium nitrate	5.9	6.3	6.7

Soils and pH

Generally clay soils require more lime or acid to change soil pH than sandy soils. Therefore, nitrogen fertilizers alter the pH of sandier soils more. However, data in Table 1 show the effect of nitrogen was less marked on more sandy soil at Brewton than on heavier soil at Prattville. The soil at Monroeville is intermediate in texture between the above two soils and so was the change in soil pH. This was a result of greater leaching of nitrogen from sandier soil before nitrification or denitrification occurred. Thus, the direction of change in soil pH with the use of a particular nitrogen fertilizer may be predictable but the amount of change is not. A periodic soil test is necessary to determine such soil pH changes.

Yields and pH

The effect of soil pH on yield of seed cotton in 1961 in experiments at Brewton and Monroeville is shown in the Figure. Regardless of lime rate or nitrogen fertilizer, cotton yields depended upon soil pH. The minimum soil pH value that did not reduce cotton yield was about 5.8 in both cases. Yields were about the same at all pH values above 5.8, but were progressively less as soil pH values decreased below pH 5.8. At Brewton, yields were only 1/5 as much at pH 5.0 as at pH 5.8, see Figure.

TABLE 2. YIELD OF SEED COTTON IN 1961 ON DIFFERENT SOIL TYPES AT 2 PH VALUES

Location	Soil type	Yield of seed cotton per acre	
		pH 5.3	pH 5.8
		Lb.	*Lb.*
Brewton	Kalmia sandy loam	1,520	1,980
Monroeville	Magnolia fine sandy loam	1,260	1,650
Prattville	Greenville sandy clay loam	2,180	2,270

Soil Properties Vary

More than one property of acid soils is responsible for poor growth at low soil pH values. Since these properties vary, the extent to which yields are reduced at a specific soil pH varies. For example, even though cotton yields are generally less at pH 5.3 than at pH 5.8, the actual decrease in yield varies with the soil. Data in Table 2 show yields were increased much more at Brewton and Monroeville than at Prattville by raising soil pH from 5.3 to 5.8.

Subsoil pH

One of the factors that determine the amount of yield reduction at low soil pH is the depth to which the low pH extends. The subsoils at Brewton and Monroeville are considerably more acid than the subsoil at Prattville. The subsoil at Prattville has a pH of about 6, within the optimum range for cotton.

These cattle are grazing plots at the Experiment Field that are used to determine effects of nitrogen fertilization on palatability of grasses.

Emphasis on Forage Crops at Tuskegee Experiment Field

J. T. COPE, JR., *Agronomist*
F. E. BERTRAM, *Superintendent*

THE TUSKEGEE EXPERIMENT Field is devoted primarily to research on production of forage crops. This unit of Auburn University Agricultural Experiment Station System is located in Macon County on 230 acres of Susquehanna and Boswell soils. These soils occupy over 2 million acres in the Coastal Plain regions of Alabama. Most of this is in the "clay hills" area surrounding the Black Belt.

The Field was established in 1938 for research on all crops grown in the area. Early experiments included work on many crops, such as cotton, corn, peanuts, soybeans, grain sorghum, sweet sorghum, sweet potatoes, cowpeas, alfalfa, lespedezas, oats, white clover, crimson clover, button clover, bur clover, caley peas, and vetches. Much valuable information was obtained on row-crop varieties, fertilizers, and cropping systems.

Emphasis on Forage Crops

Early research indicated that soils of the area were better adapted to production of forage crops and small grains than to row crops. During the last 20 years, row cropping on this type land in Alabama has decreased and most of it is now used for production of cattle and trees, for which it is better suited. Because of this trend and the need for information on this type farming, emphasis in recent years has been on forage and small grain studies.

In forage crop species and variety tests, Coastal Bermuda, Bahia, and Dallisgrass have been found well suited for permanent pastures. Coastal Bermuda is the most practical hay crop. It grows best on well drained upland soils with a sandy surface. Coastal has been difficult to establish on eroded slopes where clay is exposed. Both Pensacola and Argentine Bahia are well adapted to these soils, growing best on moist lowlands. Dallisgrass is difficult to maintain because of competition from carpetgrass.

Tall fescue, Hardinggrass, and Reed Canarygrass have grown well on bottom land in experiments with cool-season perennial grasses. Work is in progress comparing production and palatability of these grasses at different nitrogen fertilization rates.

Crimson and white clovers have been the best legumes for use with perennial grasses. Crimson is used with Coastal Bermuda on uplands and white clover with other grasses in lowlands.

Renovation experiments have shown that dalapon sprayed in summer at 5 lb. per acre will kill carpetgrass and leave most of the Dallisgrass. White clover can then be established without land preparation by seeding with a grain drill on the killed sod.

Sericea lespedeza has been highly productive for both grazing and hay when properly managed. Hay yields have averaged 3¾ tons when correctly fertilized and limed. Stands have been maintained at least 10 years when cut twice per year for hay. A new variety, Serala, recently released by the Auburn Station, has been superior to common sericea.

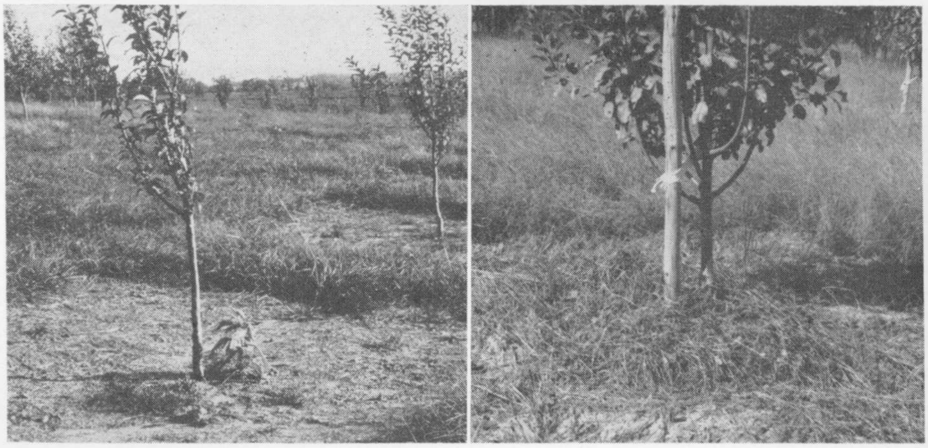
Small grains provide creep grazing for beef calves during winter and spring. In variety tests with small grains, Wren's Abruzzi rye has been the most productive crop for this purpose. It produces earlier forage and more total forage than oats or wheat. The same areas used for small grains in winter are planted in Gahi-1 and Starr millet for temporary summer grazing during periods of drought. About 1 acre is provided for each five brood cows.

A small sprinkler irrigation system is used to apply water to experiments when needed. Coastal Bermuda has not responded to irrigation in 2 years of research, although several dry periods occurred. Quality of Coastal Bermuda hay has been improved by frequent nitrogen application and clipping at 4-week intervals. Average hay yields without irrigation have been 4½ tons when 200 lb. of nitrogen was applied.

Beef Cattle Studied

A herd of grade Hereford cows is kept on the Experiment Field to utilize the pastures. For the past 3 years this herd has been used to compare performance of high and low gaining bulls selected from the Animal Science Department's bull performance test. Weaning weight of calves from the high gaining bulls has averaged 503 lb. and those from low gaining bulls averaged 483 lb. at weaning. At 25¢ per lb., this difference is worth $5 per calf in favor of the bulls that performed well prior to weaning and during the feeding period.

About 3 acres of land are used to produce grazing and hay for each cow in the beef cattle operation. All expenses and sales are recorded. For the 3 years, 1959-61, an average of 31 calves and cull cows has been marketed. After all cash expenses were paid, return to capital, labor, and management was $2,100 per year. After subtracting 6% on the $17,000 investment, return to labor and management has been $1,080 per year.



The use of Simazin for pre-emergent chemical weed control, left, is contrasted to Paraquat, an experimental herbicide, used in post-emergent weed control tests, right.

Growing DWARF — SEMI-DWARF APPLES in Alabama

H. J. AMLING and JACK TURNER,
Department of Horticulture

CERTAIN SPECIFIC orchard management operations must be carried out for successful production of apples in Alabama. Failure to carry out these operations will jeopardize the return on investment necessary to initiate the establishment and maintenance required in apple growing.

In recent years mutations in growth habit of Red and Golden Delicious and Lodi varieties have been found that give an increase of spurs over normal forms. These mutations are referred to as spur types. The spur type has greater fruiting potential per linear foot of growth than the original type. Its ultimate size approximates that of the original type on Malling VII or Malling Merton 106 rootstock.

The planting of Lodi and Golden Delicious spur types is preferable over non-spur types on semi-dwarf rootstocks. However, because of uncertainty of color development of the red sports of Red Delicious under Alabama conditions, only limited plantings of spur types of red sports of Red Delicious should be made. Evaluation of these spur type Red Delicious planted at Auburn University Agricultural Experiment Station has not progressed sufficiently for recommendations.

The advantages of a spur type over that of a non-spur type on semi-dwarf rootstocks are two fold: (1) larger root system and consequently better anchorage; and (2) the problem of blind wood (long portions of shoots without leaves, a characteristic of certain apple varieties, such as Lodi, when grown in the South) would be overcome considerably.

Color development of red apples is highly influenced by sunlight, variety, temperature, moisture, and tree vigor. Considerable variation exists between red sports of Red Delicious in respect to color development in the lower half of the apple-growing-area of Alabama. Vance Red Delicious is at present considered the most promising of the non-spur types in this respect.

Adequate moisture and good but not excessive tree vigor is also needed for good color development.

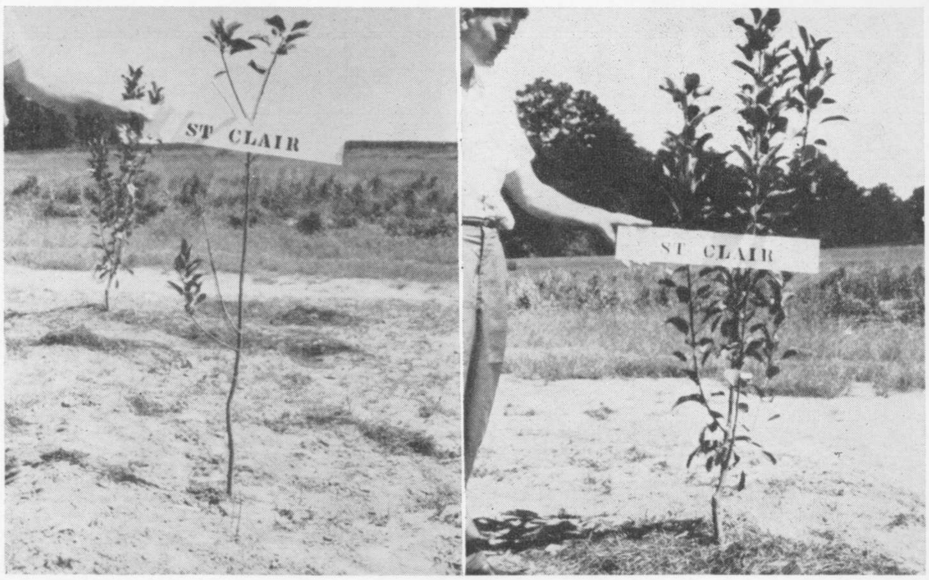
As apples approach maturity, the tendency to drop increases. The losses from this can be overcome by application of the so called stop-drop sprays. Napthalene acetic acid and 2-4-5 TP are such materials that have been used in Alabama.

Shown here is the growth and fruiting characteristics of spur-type Delicious.

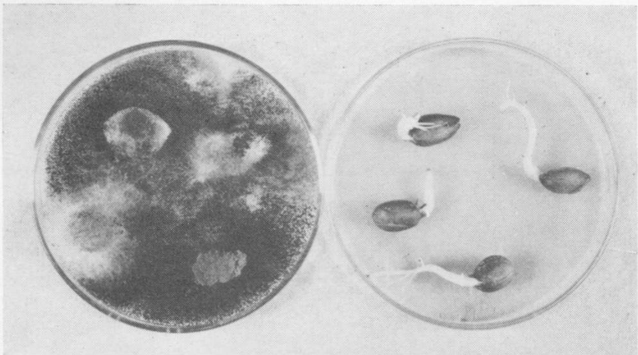
The use of stop-drop sprays should be a standard procedure with all the varieties recommended for Alabama with the exception of Lodi.

The semi-dwarf rootstocks currently recommended require a mulch that will lower soil temperatures in the root zone. Research results obtained at Auburn indicate that 6 to 8 in. of pine straw will lower soil temperatures 10° F. and improve soil moisture conditions.

Most orchards would benefit from supplementary irrigation. Since apples are a high return per acre crop, irrigation would more than pay expenses in increased fruit size, color, and tree vigor.



The influence of mulch on tree vigor and leaf retention is shown here.



Shown here is effective control of seed-and soil-borne fungi affecting peanut seed germination. Seed at left untreated; seed on right treated.

PEANUT SEED TREATMENTS
new vs old

J. A. LYLE, *Dept. of Botany and Plant Pathology*
C. A. BROGDEN, *Supt., Wiregrass Substation*

A NUMBER of diseases affects peanuts early in the growing season. Individually many of these do not appear important; collectively, however, they are often serious.

Of these, pre-emergence diseases probably most directly affect stand establishment. Planted seeds and very young plants are subject to two types of diseases before emergence. The entire seed may be decayed, or the developing embryo may be attacked by saprophytic or damping-off fungi, see photo. The organisms associated with pre-emergence diseases have not been studied extensively. Soil-borne parasitic and saprophytic fungi may decay seeds, especially if germination is delayed or if seed are damaged.

Losses from pre-emergence diseases of peanuts may be reduced effectively by seed treatments. Properly applied seed fungicides will be effective against seed-borne parasites and saprophytes, and if germination is not delayed by adverse weather conditions these fungicides will be effective also against soil-borne fungi. Most benefits from seed treatment result from prevention of decay prior to germination.

Of materials used at the Auburn University Agricultural Experiment Station Arasan, 2% Ceresan, and Spergon have been tested so frequently that their effectiveness is definitely established. Other newly introduced seed fungicides have been tested during the last 7 years to determine their effectiveness in control of pre-emergence diseases.

All materials used have usually improved the stands, but some have given better results than others. The response to seed treatment of peanut varieties is about the same. In tests at the Wiregrass Substation, Headland, Dixie Runner and Early Runner peanut seed have been used. Thirty-seven different materials, applied to peanut seed at different dosage rates, have been tested since 1956. Included among the seed protectants have been experimental compounds and those commercially available, Table 1. Dust and liquid seed treatments have been used with equal effectiveness.

The older materials, Arasan, 2% Ceresan, and Spergon, have proved their effectiveness as chemical seed treatments for peanuts. Recent seed-treating fungicides, such as Metasan E and Panogen 15, have also been effective chemical seed treatments for peanuts, Table 2. Orthocide 75, at the rate of 3 oz. per 100 lb. of shelled seed, and Hercules 3944, at the rate of 2 oz. per 100 lb. of shelled seed, suggest future consideration with additional testing. Other seed-treating fungicides that suggest future consideration include: Emmi, Memmi, Metasan E, Omadine 1563, and Ortho LM applied at the rate of ½ or 1, ½, ½, 2, and 2 oz. respectively, per 100 lb. of shelled peanut seed.

Such materials as 2% Ceresan, Metasan E, and Panogen 15 contain mercury and are poisonous. These materials must be handled with caution, and seed treated with them should be planted or destroyed. In addition to the danger to people and livestock, there is the hazard of using too much of these materials on seed. Overdosage with any mercury compound can cause abnormal germination. As a result the seedlings die.

TABLE 2. EFFECT OF VARIOUS CHEMICAL SEED TREATMENTS UPON EMERGENCE OF DIXIE RUNNER AND EARLY RUNNER PEANUTS AT THE WIREGRASS SUBSTATION, HEADLAND, ALABAMA

Chemical seed treatment	Rate of application per 100 lb. shelled seed	Increase in emergence	
		Dixie Runner	Early Runner
	Oz.	%	%
Arasan	3	53	36
Arasan	4	62	43
Arasan 75	2	55	36
Arasan 75	3	52	39
Ceresan, 2%	2	76	36
Ceresan, 2%	3	57	15
Hercules 3944	2	59*	28
Hercules 3944	3	55*	19
Metasan E	1	64	40
Orthocide 75	3	42	24
Orthocide 75	4	47	15
Panogen 15	1½ fluid	48	28
Panogen 15	2¼ fluid	49	35
Spergon	3	43	24
Spergon	4	48	20

* One year data only; all other at least 3 years.

TABLE 1. CHEMICAL TREATMENTS USED ON PEANUT SEED FOR DISEASE CONTROL

Seed treatment	Ounces per 100 pounds of shelled seed	Seed treatment	Ounces per 100 pounds of shelled seed
Arasan	2, 3, 4, 5	Memmi	½, 1, 2 fluid
Arasan 75	1, 2, 3, 4, 5	Merculine	1, 2 fluid
Arasan 75 + Gibrel	3	Metasan E	½, 1, 2
B 720-75W	3, 6	Metasan M	2
Ceresan M	1½, 2	Metasol M	1, 2 fluid
Ceresan, 2%	1, 2, 3, 4, 5, 6, 7	Morven	1½, 2, 3 fluid
Ceresan, 2% + Gibrel	3	Omadine 1563	2, 3
Ceresan 75	1½, 2 fluid	Omadine 2129	3
Ceresan 100	1, 2, 3 fluid	Orthocide 75	1, 2, 3, 4, 5
Chipcote 75	1, 2, 3 fluid	Ortho LM	¾, 1, 2, 3, 4, 5, fluid
Delsan A-D	2, 3, 4	Panogen	¾, 1 fluid
Dow	3, 4	Panogen 15	1½, 2¼, 3, 3¾, 4½, 5¼ fluid
Elcide 73	1, 3 fluid	Panogen 15 + Gibrel	2¼ fluid
Emmi	½, 1, 2 fluid	Phimm	½, 1, 2, fluid
EP-176	2, 3, 4	Spergon	2, 3, 4, 5
EP-177	2, 3, 4	Spergon + Gibrel	4
EP-204	1, 2	Thiram	2, 3, 4
Hercules 3944	1, 2, 3, 4	Untreated Check + Gibrel	2
Hercules 4233	2, 3, 4		

DAYLILIES—Valuable Perennial for Southern Landscape

HENRY P. ORR and W. C. MARTIN, JR.
Department of Horticulture

DAYLILIES (Hemerocallis) offer a wealth of landscape use possibilities for southern gardeners.

In a climate where summer-flowering perennials are scarce, the diversity and durability of daylilies are welcomed by the home landscaper. Often the hobby gardener with a few good standard daylily varieties becomes interested in hybridizing and becomes a specialist in his own back yard. Each year hybridizers offer plants of greater ruggedness, with a wider range of colors and heights and increased beauty.

Various Uses

There are numerous landscape situations where daylilies can be used effectively. They are equally at home in formal or informal developments. Countless color combinations are available. Herbaceous and woody companion plants combine easily as foreground, intermediate, or background plants with a choice of daylilies in varying heights. Through use of early, mid-season, or late blooming varieties of daylilies, an exceptionally long season of bloom can be attained. Interesting color combinations can be worked out for the entire season.

Daylilies are particularly effective if grown in front of dark foliaged evergreens in bays in the shrub border. Repeat bloom can be expected with many varieties. A few choice varieties can give the needed amount of color in the dark bays throughout much of the summer.

Clumps of daylilies are effective bank covers. Their use on roadsides is being explored by the State Highway Department.

Another effective use for daylilies is in bold, mass plantings. The larger the mass of selected compatible colors, the more striking the effect. Lighter colors are generally more effective in mass plantings.

The naturalistic, graceful foliage effect of daylilies combined with picturesque stalks (scapes) topped with gay-colored flowers forms the perfect scene in combination with water. Daylilies are particularly adapted for well drained locations near water.

Little Attention Required

If the garden bed is well prepared and planting done properly, daylilies require less attention than practically any other perennial garden flower. Preferably the soil should be loose and friable and contain organic matter. Soil acidity should be in the range of pH 6.0 to 6.5, and phosphorus level should be medium to high.

Incorporating 2 to 3 lb. of 0-12-12 in each 100 sq. ft. of bed area at planting time aids in promoting effective root growth. After vegetative top growth is apparent, 1 to 2 lb. of a complete fertilizer, such as 8-8-8 or 10-10-10, per 100 sq. ft. of bed area is needed monthly during April-August to sustain top growth and flowering.

Daylilies can be planted practically any time of the year. The two best seasons are: (1) in fall, beginning about when seeds have matured and extending until winter; and (2) in late winter and early spring just before vegetative growth begins.

For individual plants, a hole measuring at least 15 in. deep and 20 in. wide is prepared. Roots of the plant are spread and slanted down at a slight angle. The hole is filled and water is added to settle the soil closely around the roots. Where root and stem of the plant join should be about 1 in. under the surface after soil settles. To plant growing specimen, leaves are cut back 4 to 5 in. from soil level.

In test gardens at Auburn University Agricultural Experiment Station, the only severe insect infestation has been from thrips. By using systemic insecticides, this pest can be easily controlled. Di-syston was highly effective in 1962 studies. DDT dust or spray can be used with satisfactory results, but repeated applications are necessary.

The following varieties are recommended for planting in any home garden.

Yellow
Fairy Wings
Green Valley
Cradle Song
Summer Love
Colonel Joe
Delta Girl
Sideshow
Revolute
Cartwheels
Lime Frolic
Lady Bountiful
Cathedral Towers
Cosette

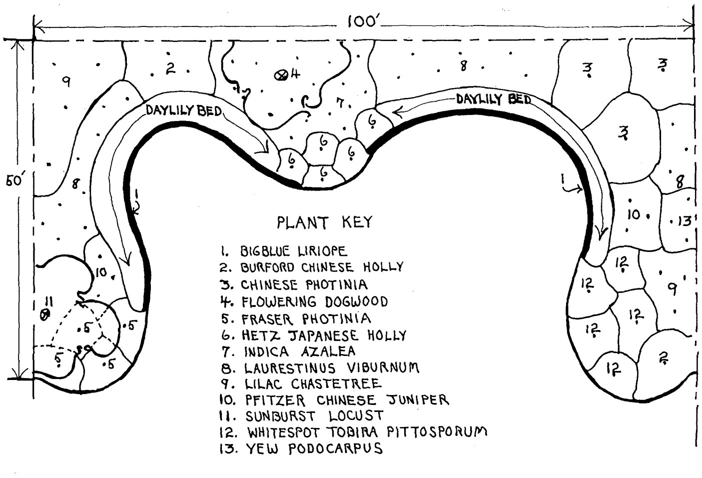
Red
Bess Ross
War Eagle
Crimson Glory
The Doctor
Black Falcon
Flanders
Potentate

Yellow Orange
High Noon
Cibola
Jake Russell

Rose Pink
Neyron Rose
Marie Wood
Picture
Cherokee Rose

Pink
Evelyn Claar
Coral Mist
Pink Orchid
Pink Damask
Pink Prelude
Pink Dream

Apricot
Multnomah
Capri
Colonial Dame



Shown is a landscape plan for informal development of rear border of a small home featuring mass beds of daylilies against background of adapted woody ornamentals.

That old devil Poverty Wore COTTON'S face in 1860

LILLIAN FOSCUE, *Graduate Assistant*

OLD TIMERS will tell you this State has been poor since the Civil War, but before that? "Why, there was easy living. Cotton grew lush on virgin soil, unmolested by boll weevils. There was no cash outlay for labor wages and every man was a king on his thousands of acres."

Was there really easy living? One hundred years later let's look at the facts. In 1860 there were more than 50,000 farms in Alabama, but almost half were less than 50 acres in size. Only 700 contained 1,000 or more acres.

Was labor without cost? Almost half the State's population of one million people were slaves, an estimated investment of about $275 million. Annual upkeep even of a slave cost at least $15 a year. Only 1 out of every 15 free persons could afford a slave.

How fertile was the virgin soil? Studies have cast doubt that much of the South ever had deep, fertile, heavy soils such as those that cover much of the Middle West, although the Mississippi Delta area is an exception. Much of the South's land had considerable slope; erosion started as soon as the forests were cleared. Fairly heavy rainfall plus extensive use of row crops that left no cover on the soil in winter contributed to erosion. Millions of acres along the coast were thin and sandy, leached easily, and held humus only with difficulty. There were millions more acres in mountainous areas and in swamps and bogs.

The cost-price squeeze was felt in the Cotton South as early as 1830. Fresh, fertile soil was demanded as a steady sacrifice at cotton's altar and the costs of clearing land and securing additional slaves squeezed profits tighter each year. Average price of a prime field hand in 1860 had reached more than $1,000.

No boll weevil problems? True, the boll weevil didn't reach Alabama until after the turn of the century, but there were plenty of pests. Members of the Alabama Agricultural Society complained in 1884 that one-tenth of the State's cotton crop was destroyed by worms in a single year, amounting to a loss of 3½ million dollars.

Counting both free and slave population, annual per capita income amounted to about $250 in today's dollars. Not counting slaves, dividing income only among the free, per capita income was about twice as much. However the status of slaves was changed almost overnight to that of free men, but Alabama's income did not double with free population, so $250 is a more realistic estimate of prewar per capita income.

Per capita income dropped even lower in the South during the war and Reconstruction. It was still low in 1883 the year the Auburn University Agricultural Experiment Station was founded. A "generally run-down" farm of 226 acres was bought with the first State appropriation to the Land-Grant College. Experiments were started even before the underbrush was completely cleared from the farm and all the gullies filled. At that time Alabama's population totaled slightly more than 1 million people, with more than 95% of them farmers.

Soil fertility, cotton variety tests, and pest control measures were among the earliest research projects as Station personnel worked to meet the State's needs. Appeals to diversify were lost on farmers whose only basis for credit was cotton and whose only markets were for cotton. Between 1875 and 1890 Southerners doubled their cotton production and tripled it in the next decade.

Today the Agricultural Experiment Station System of Auburn University serves three times the number of people it did in 1883, with the State's population passing the 3 million mark. Slightly more than half the population is urban. The Agricultural Experiment Station has grown to encompass the Main Station and 23 outlying research units. Per capita income in Alabama today amounts to $1,409, almost six times that of 1860. National per capita income, though it still exceeds that of Alabama, has increased only about four times.

In the words of Dr. Coyt Wilson, associate director of the Experiment Station: "For many years our most pressing problem was low production. Therefore, we concentrated in earlier years on production practices that would result in higher yields per acre. Acreage controls, made necessary by surpluses, placed limits on the amount of income individual farmers could realize from cotton and created a need for information on the possibilities of adding other enterprises to the farm operation. As a result of these needs, we expanded our research on horticultural crops, on soybeans, and on livestock. An adequate agricultural research program is one that serves the needs of the part-time farmer, the rural resident who does not farm, the urban dweller, and the full-time farmer. Our goals remain the same. Since 1883 the Agricultural Experiment Station of this State has been dedicated to: (1) developing more efficient production, harvesting, and marketing practices for agricultural products; (2) improving the quality of agricultural products; (3) conserving our physical and human resources; and (4) making farm life more attractive and rewarding."

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