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OF AGRICULTURAL RESEARCH

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AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 8, No. 2 SUMMER, 1961

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On the cover. This addition to the Animal Husbandry and Dairy Building at Auburn University is already being used. The new wing provides modern facilities for the departments of Animal Husbandry and Nutrition, Dairy Husbandry, and Poultry Husbandry. In addition to research laboratories and offices, there are classrooms and teaching laboratories. This addition is one of the buildings constructed with funds provided by passage of Amendment 5 in 1957.

Published by

AGRICULTURAL EXPERIMENT STATION of AUBURN UNIVERSITY

Auburn, Alabama

New and Timely PUBLICATIONS

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

Bul. 326. Corn Earworm Control presents effective methods of controlling this pest on sweet corn.

Bul. 328. Bermudagrass for Forage in Alabama covers research on common, Coastal, and other varieties of Bermuda being grown in the State.

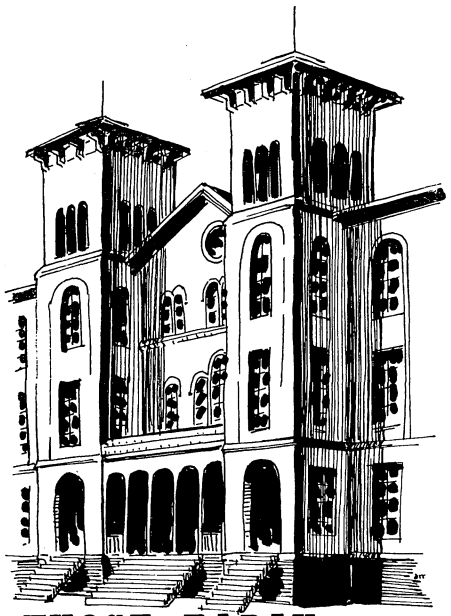
Cir. 138. Soybeans for Oil in Alabama presents information on varieties and production practices for soybeans.

Prog. Rept. 79. Controlling Chinch Bugs on St. Augustine Grass Lawns reveals how this pest can be controlled by using insecticides.

Prog. Rept. 80. Control of Ornamental Plant Diseases reviews latest methods of preventing damage to ornamentals.

Prog. Rept. 81. Low-Cost Greenhouse gives detailed instructions for building with reinforcing wire and plastic.

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



THOSE EARLY YEARS...

LILLIAN FOSCUE
Graduate Assistant

THE HAND OF POVERTY lay heavy on Alabama's countryside during the dark days of Reconstruction.

The once proud and wealthy cotton state was still proud but woefully impoverished. In the South of the 1870's, a man was lucky to have his land, a roof over his head, and his bare hands to scratch out an existence for himself and his family. A new economy being conceived demanded scientifically accurate agricultural practices. The need had become an extremely serious one.

Education was luxury beyond the means of most Alabama citizens. On the horizon, however, there was a ray of hope that was to increase in brilliance with each passing year.

Even in the midst of the chaos of civil war, there were men who had faith enough in the future of the United States of America to pass a bill providing assistance to each state to establish an agricultural and mechanical college, putting higher education for the first time within reach of the average American. It was the beginning of the Land-Grant College system.

Auburn's Beginning

In 1868 a Reconstruction Legislature in Alabama accepted a Federal grant for a land-grant college, but under the terms of the Morrill Act, buildings and grounds were to be provided by the State. Answer to the State's problem of providing its part came when the Methodist Episcopal Church South offered the State its East Alabama Male College at Auburn, chartered in 1856. Total assets included a 4-story brick building, equipment, and 200 acres of land. The Methodist Conference had found itself with a going college after the War but without funds to operate.

This article is one of a series on Auburn University and its Agricultural Experiment Station System—its founding and its contributions down through the years to the progress of Alabama's agriculture. The series is being published in conjunction with Auburn's Centennial Celebration.—*Editor*

The transition was "easy," the first president, the Rev. Issac Taylor Tichenor, said later. He was a Baptist minister in Memphis, Tenn., when called to head the new Alabama Agricultural and Mechanical College. Six students were graduated the first year from a student body of 103.

Five EAMC professors remained on the A&M faculty. One was the Rev. B. B. Ross, father of Bennett Battle Ross, first dean of agriculture.

Need for Research

Practical agriculture was taught by W. H. Jemison, a Georgian who left to become quartermaster at the University of Alabama in 1873 and President Tichenor also found himself professor of agriculture.

The idea of an "experimental farm, garden and orchard" was prominent in the minds of the first administrators from earliest days. In the first A&M catalogue of 1872, it was stated that experiments "with a view to advance the general farming interests of Alabama" would be conducted.

Establishment of Station

In 1883 the need for accurate crop production information, together with the necessity of regulating standards of commercial fertilizers being sold in the state, received the attention of the Legislature. A fertilizer tax was levied with one-third of the net proceeds to go to the A&M College for the establishment and maintenance of an agricultural experimental farm or station "where careful experiments shall be made in scientific agriculture." In return a state chemistry laboratory to test fertilizer samples was to be maintained at the college.

With the proceeds from the fertilizer tax, a 226-acre farm adjacent to the college was bought. J. S. Newman of the Georgia Agricultural Department was named director of the Station and special professor of agriculture.

Experiments were begun immediately and before the year's end the first bulletin was issued. Care and management of German carp was the principal subject of this bulletin, although some data on wheat experiments were included.

A number of experiments in fertilization, horticulture, and animal husbandry were underway when additional support to agricultural research was gained through the Hatch Act of 1887. This provided $15,000 a year for the Land-Grant College in each state for agricultural research. This marked the beginning of federal-state cooperation in a nationwide research program in behalf of farmers.

With Hatch Act funds many improvements were added. More and more emphasis was being laid on the scientific methods of study and research. Though the classical influence would never be curtailed at Auburn, the practical and scientific was coming into its own.

Dr. William LeRoy Broun, one of the foremost mathematicians of the country and a recognized authority on physics and astronomy, was at the helm as second president of A&M. The men who were to set the standards of excellence that would carry the institution and experiment station on toward fulfillment of its destiny in the 20th Century were beginning to assemble in the "village on the plains" – men such as biologist George F. Atkinson; Dr. P. H. Mell, Jr., botanist and meterologist; Dr. C. A. Cary, veterinarian and lecturer; and J. Fred Duggar, research professor of agriculture, administrator, and author.

From these beginnings grew Auburn University and its Agricultural Experiment Station System. "A gigantic agency, to whose wonderful resources no limits can yet be assigned" had been born – to borrow words of the first Alabama Commissioner of Agriculture, E. C. Betts.

Body cavity of this bird shows typical signs of CRD. The cheese-like substance (arrows) is characteristic of the disease.

S. A. EDGAR, R. N. BREWER, and E. C. MORA
Dept. of Poultry Husbandry

CONTROL NEEDED for Poultry Respiratory Diseases

POULTRY RESPIRATORY diseases – Newcastle, infectious bronchitis, laryngotracheitis, and CRD (chronic respiratory disease) – are of great importance to the industry.

This group accounts for the greatest broiler losses during the growing period and is responsible for more than 90% of USDA condemnations for disease reasons. The CRD complex, characterized by a general inflammatory process, is the greatest cause of condemnation.

Total loss from respiratory diseases – cost of medication, death, reduced weight and feed conversion, downgrading, and condemnation – was estimated at more than $100 million in 1960. Since one-third of the Nation's $3 billion annual poultry business and 72% of the broilers are in a dozen "broiler belt" Southeastern States, respiratory diseases are of prime importance to southern poultrymen.

In an Auburn Agricultural Experiment Station study, 2,788 condemned birds were studied. These were selected from 55,000 condemned birds from 211 flocks and represented more than 1,250,000 birds processed. The greatest cause of condemnation (more than 85%) was CRD, which agrees closely with USDA figures. However, results of the Auburn examinations (based on existing regulations) revealed that 1,260 of the 2,788 birds should have been passed, cleaned and passed, or parts passed.

Prevention and Vaccination

Prevention is the best method of controlling respiratory diseases. Three of the four can be controlled by prevention and vaccination. The other, CRD, is believed to be caused by complications following Newcastle disease and infectious bronchitis, and can be controlled by using stock that is free of PPLO (pleuropneumonia-like organisms). There is no known drug effective in treating virus diseases. However, some drugs are effective in preventing spread and development of secondary infections, such as those associated with CRD.

Chickens can be raised without having Newcastle disease, infectious bronchitis, or laryngotracheitis, and with little trouble from CRD. This is done by (1) starting with disease-free stock all from the same parent flock, (2) having but one age birds on a farm at a time, (3) eliminating all traffic between farms, and (4) keeping out wild birds and rodents. Although this is successful, the hazard of accidental transmission is great. In concentrated poultry areas where preventive measures are not enforced, control by vaccination should be used.

Killed vaccine is safest for vaccinating birds for prevention of Newcastle disease because there is no spread of the virus, but it seldom gives longlasting protection. For that reason, mild or less infectious live strains of virus vaccines are used. If the vaccine is applied individually in the eye at day old, fair protection through 21 to 28 days of age can be expected. A second vaccination at 3½ to 4 weeks will protect through 9 to 10 weeks. Protection lasts much longer if vaccination is delayed until chicks are 7 to 14 days old, when most parental antibody is gone and cannot interfere with immune response. One vaccination at this age usually protects for the remainder of the broiler-growing period.

Vaccination Methods

Mass vaccination for Newcastle disease is usually less effective than individual application. To be effective, the virus vaccine must be alive and all birds must get enough virus. Reasons that vaccination fails include: application in chlorinated water, failure of birds to drink, vaccine is in water too long before consumed, or vaccine is exposed too long to high temperatures.

Vaccination against infectious bronchitis is believed to work in much the same way. However, there is a common belief that a respiratory reaction from the virus or from a natural outbreak weakens birds. This weakening of birds with PPLO in their bodies is believed to result in development of a generalized inflammatory process involving the air sacs and causing CRD.

Incidence of laryngotracheitis is still limited to a few Alabama farms. Although vaccination protects against it, prevention of spread is the best control method at present. Vaccination can be done only with permission of the State Veterinarian.

Vaccination Sometimes Fails

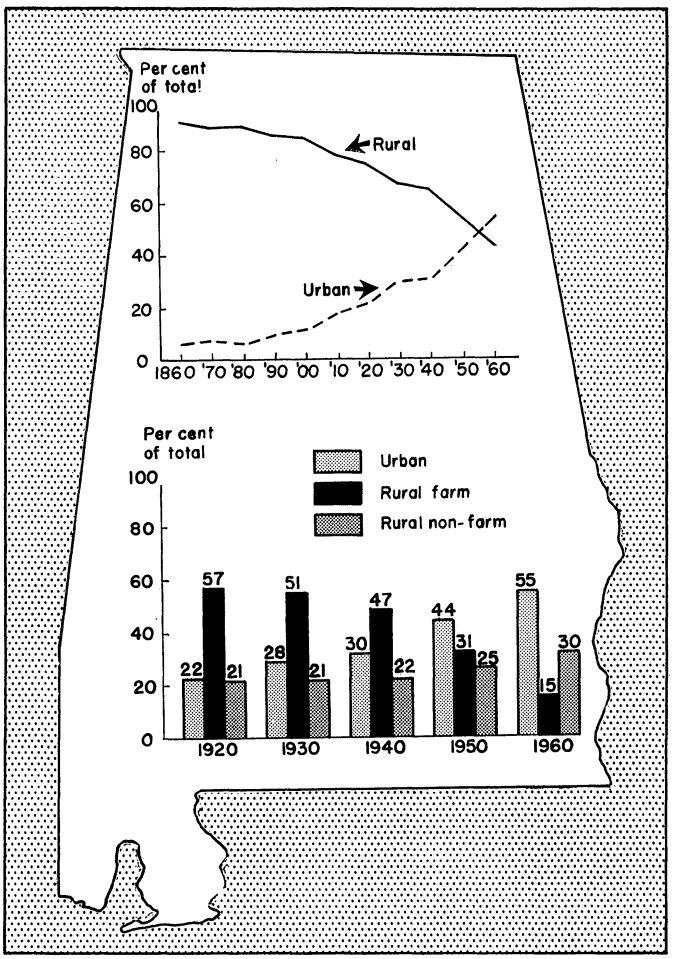
A vaccination or prevention control program may work for a while and then suddenly fail. This happens when the viruses are introduced to a farm – by contaminated service men or equipment, infected poultry, wild birds, or some other source. If chickens have no immunity, all birds may either die or have growth slowed. Natural outbreaks of infectious bronchitis are usually much less serious, particularly if birds are more than 2 or 3 weeks old.

Effective vaccination for Newcastle disease and infectious bronchitis are usually less of a "stress" than natural outbreaks. Although there is no available vaccine that gives 100% protection, vaccination reduces losses.

Once CRD is apparent, medication must be started immediately and continued long enough to help, usually 5 days or longer. Medication by injection is usually more effective than by mouth. Once infection is widespread, there is little hope that medication will effectively clear the infection.

STATE'S POPULATION— Constantly Changing

J. H. YEAGER, *Agricultural Economist*



Population changes in Alabama are shown by the graphs. Shift from rural to urban composition during the past century is shown at top. Percentage of urban, rural farm, and rural non-farm segment is shown at bottom for the 1920-60 period.

LIKE LADIES' CLOTHING fashions, Alabama's population changes every year. Some of the more noticeable changes include an increase in numbers, movement in place of residence, and shift in composition.

As listed in the 1960 Census, total Alabama population was 3,266,740. This puts Alabama in 19th place among all states, including Alaska and Hawaii. In 1950 the State ranked 17th.

Alabama's population growth from 1950 to 1960 was less than the U.S. average — 7% as compared with 18% for the entire nation. Top percentage increase was 39% in the West. Increases were 16% in the South, 16% in the North Central States, and 13% in the Northeast. Based on rate of change from 1950 to 1960, Alabama ranked 29th among all states.

Majority is Urban

Urban residents make up the majority of Alabama's population. In 1960, 55% were classified as part of the urban population. This means they lived in places of 2,500 or more population or in fringe areas of cities having 50,000 or more population.

The trend toward urbanization has developed rapidly since 1940 (see chart). Twenty years ago 70% of Alabama's population was classified as rural. Last year the figure was 45%.

Not only has the urban proportion increased, but changes have also taken place within the rural portion. Numbers of rural farm persons have declined along with the disappearance of farms. However, rural non-farm population has increased — from 25% of total population in 1950 to 30% in 1960 (see chart). As a percentage of the total rural population, the rural farm part made up 56% in 1950, but only 34% in 1960. The rural non-farm part grew from 44% in 1950 to 66% in 1960.

One out of every five persons in Alabama's 1960 population lived in the three cities of 100,000 or larger. Only 1 in 18 lived in places of 2,500 to 5,000 population.

Average density of population was 60 persons per square mile in 1950 and 64 in 1960. Concentration varied from 14 persons per square mile in Washington County to 568 per square mile in Jefferson County.

Leading counties in percentage increase in total population from 1950 to 1960, in order, were Madison, Dale, Mobile, Montgomery, and Calhoun. Counties with the highest percentage urban population in 1960 were Mobile 86%, Jefferson 85%, Montgomery 84%, Etowah 71%, and Tuscaloosa 70%.

Average size of households declined slightly in all sectors of the population from 1950 to 1960. Urban households averaged 3.4 persons and rural 3.9 persons in 1960.

The State population was 32% nonwhite in 1950 and 30% in 1960. Numbers of non-white residents increased 0.1% during the 10 years.

Fewer Young Adults

Almost 30% of Alabama's population was between the ages of 20 and 39 in 1950. This had dropped to 25% by 1960. The reverse was true for 50 and older, as shown below:

Age	*Pct. of total population*	
	1950	*1960*
9 and under	23.1	23.2
10-19	18.3	19.3
20-29	15.6	12.3
30-39	14.0	12.6
40-49	11.5	11.8
50-59	8.1	9.4
60-69	5.7	6.4
70 and older	3.7	5.0

The number of persons under 18 years of age increased 11% from 1950 to 1960. Those 65 and older increased 32% in numbers, about 3% per year.

Among the 19 years and younger group, there were more males than females in 1960. The opposite was true for those older than 20. The greatest difference was in the 70-year-old and over group, in which women outnumbered men by 25%.

Preliminary field evaluations of herbicidal activity of promising chemicals are made in plastic pools shown at left.

AQUATIC WEED HERBICIDES EVALUATED

J. M. LAWRENCE, *Assoc. Fish Culturist*
R. D. BLACKBURN, *Asst. in Fish Culture*
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S. L. SPENCER, *Asst. in Fish Culture*
P. G. BEASLEY, *Asst. in Fish Culture*

Weeds in fish ponds, irrigation and drainage canals, and water storage reservoirs cause untold losses in recreation, food production, and income. At present, chemical control is limited because of its ineffectiveness.

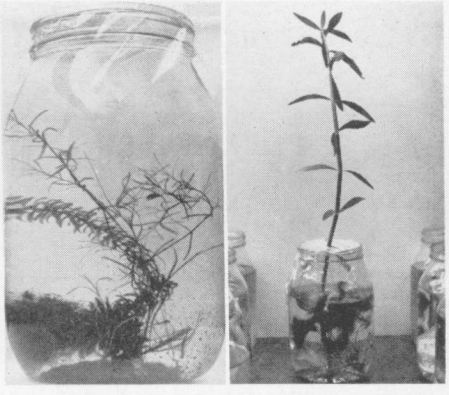
The Auburn Agricultural Experiment Station has contractual agreement with the USDA Agricultural Research Service and U.S. Army to develop means whereby promising chemicals can be evaluated for herbicidal properties on certain submerged aquatic weeds.

Research Conducted

This work, begun in April 1958, is the first attempt in the aquatic field to devise a technique capable of evaluating a large volume of chemicals for their herbicidal properties to plants. The tests are also to determine relative toxicities to fish and fish-food organisms.

The initial contract with the Agricultural Research Service was extended in 1960. In the meantime the U.S. Army Corps of Engineers contracted with the Station for additional research on techniques and evaluation of herbicidal activity of new chemicals on some troublesome emergent water weeds.

All evaluation techniques were developed in the laboratory under controlled lighting and temperature conditions. During the first 2½ years of work, more than 1,000 compounds were evaluated for their herbicidal activity on selected water plants. Over 10% of the chemicals have shown sufficient herbicidal properties to justify the determination of their toxicity to fish. Less than 20 of these selected herbicides were found "safe" to use where fish are present.



Test container at left shows method of stocking with submerged types of aquatic weeds and at right that of stocking with various emergent types of aquatic weeds. Saran covering over container prevents contamination of air with volatile chemical fumes.

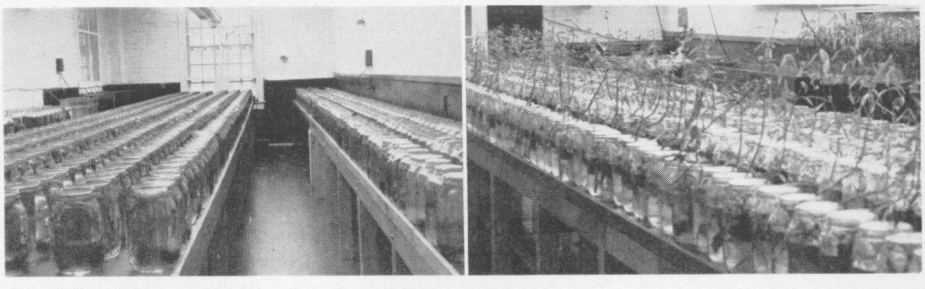
Outdoor Pools Used

In order to evaluate more fully the effectiveness of these "safe" compounds, a technique of testing in outdoor plastic pools was devised. These pools, to which a layer of soil is added when filled, closely duplicated earthen pond conditions but eliminate the hazard of sterilizing or otherwise damaging an earthen experimental pond.

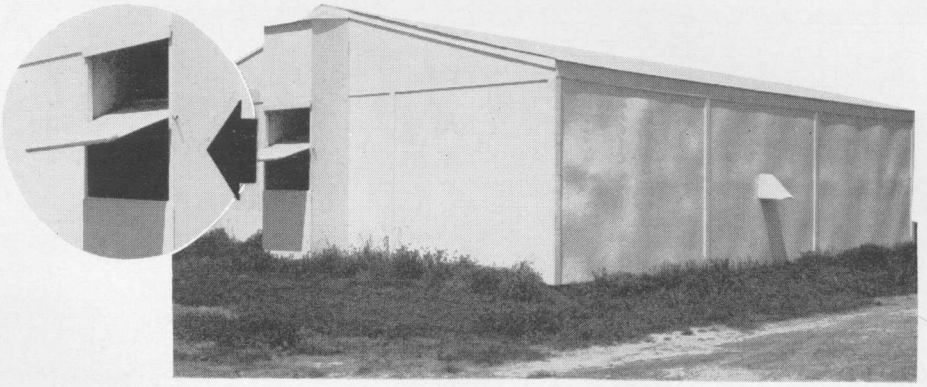
To date, eight chemicals have been checked in these plastic pools to compare the results from laboratory and pool-testing techniques. Also, more comprehensive studies on effects of chemicals on fish and fish-food production have been made.

Results are Preliminary

The results on promising herbicides given are preliminary. Before general recommendations can be made, extensive research under field conditions must be conducted by this Station, the USDA, and various other governmental and private agencies. However, results and techniques of this preliminary research are already being used by industry to develop more effective herbicides, and by many government agencies interested in aquatic weed control. Through these combined efforts, safer and more efficient aquatic herbicides will be available in the future.



Laboratory at left is used for evaluating herbicidal activity of chemicals on submerged types of aquatic weeds, at right for evaluating herbicidal activity of chemicals on emergent types of aquatic weeds. Both temperature and lighting are controlled.



At right is the windowless 30×32-ft. laying house used in air circulation experiment. Inset—closeup of thermostatic-controlled damper in vertical duct. Position of damper determines the amount of air expelled and amount of outside air pulled in.

Year-round COMFORT *for your* CAGED LAYERS

WALTER GRUB and C. A. ROLLO
Department of Agricultural Engineering

YOU CAN MAINTAIN your caged laying flock in year-round solid comfort in a windowless house without costly cooling or heating devices.

It is the product of research by the Auburn Agricultural Experiment Station. The purpose was to find a practical method for regulating temperature and humidity and keeping down odor level in windowless houses designed for controlling light. Earlier research by this Station showed that annual egg production was upped 4 to 5 dozen per pullet by light rationing, also called stimulighting.*

A major problem and factor affecting design of a light-tight laying house was body heat generated by the housed birds. This required almost constant removal of air if the inside temperature were to remain at a level favorable to high production.

Test Facilities

The test laying house measured 30 × 32 ft., with an 8-ft. ceiling. Two decks of 10-in. cages were installed in four back-to-back rows down the center portion of house, and double deck, single rows against the two side walls. At the rate of 2 birds per cage, the above arrangement provided cage space for 1,360 birds (680 per deck), or a population density of about ⅔ sq. ft. of floor area per laying hen.

A pressurized air distribution system was installed to provide positive circulation and ventilation. The air was drawn from the floor level, mixed with incoming air, and distributed through three uniformly spaced continuous ceiling openings 1-in. wide that paralleled the rows of cages.

Recirculation of interior air and mixing of outside air was accomplished with a damper located in the vertical duct that extended from the floor to the ceiling. The position of a single damper determined the amount of air expelled and the amount of outside air pulled in. At one extreme all inside air could be recirculated, whereas at the other extreme all the air could be expelled.

A continuously operating fan provided one complete air change per minute during summer months. The damper position was controlled with a damper motor connected to a differential thermostat. When the outside air temperature equalled or became hotter than the interior air temperature, the differential thermostat caused the motor to close the damper and the interior air to recirculate. As the outside air became colder than the inside air, the differential thermostat caused the damper to open and the interior air to be exhausted. A low-limit thermostat closed the damper whenever the inside temperature fell below a preset level.

Results

During the summer months the interior air temperature remained within 2° F. of the outside shade temperature. Humidity was no problem, the house remaining dry and free from ammonia vapor. In the winter months, the inside temperature varied within 2° F. of the outside shade temperature, except that it did not go below the preset, low-limit thermostat setting. The house moisture, odor, and ammonia remained at a low level during the entire cool weather season. Although considerable exterior wall condensation occurred during coldest nights, it did not accumulate on any other part of the structure. Bird mortality and egg production compared favorably with conventional cage layer houses.

Conclusions

The poultry house construction was satisfactory. However, a greater amount of wall insulation would have reduced condensation. A highly reflective exterior surface was required during the summer months to reflect solar, sky, and ground radiation.

The temperature, ventilation, and air distribution system was satisfactory. The requirements for air exchange varied with the outside temperature. This variance was met by changing the fan speed once each spring and fall. One air change every minute was ample during the hottest weather, whereas an air change every 2 minutes was satisfactory for the remainder of the year. Although the rate of air movement appeared high, the rate per bird was reasonable.

The conclusions drawn from this study are based on a bird density of less than 1 sq. ft. of floor area per laying hen. This was required to provide ample body heat during the cool seasons. The high ventilation rate during the summer months was needed to exhaust this heat and introduce exterior air.

* King, D. F. "'Stimulighting' hens—a new development for upping egg production." *Highlights of Agricultural Research.* Vol. 5, No. 1. 1958.

Alexandria Expermient Field

J. T. COPE,

Left: Comparative growth of rye (left) and oats (right) is shown in small grain variety trials. Right: These winter pea, clover, and vetch plots are in the winter legume variety tests at Alexandria.

RESEARCH ON special farm problems in northeastern Alabama was made possible by establishment of the Alexandria Experiment Field.

The Alexandria site was selected for the Field because it has both red and gray soils that are typical of the limestone valleys south of Sand Mountain. Calhoun County donated 90 acres to the Auburn Agricultural Experiment Station System for the Field.

Soils on the Field were eroded and in poor physical condition when the area was obtained for research. Yields without fertilizer were only 12 bu. of corn and 600 lb. of seed cotton per acre.

As a result of proper fertilization and good management, yields were raised in the first few years to about 40 bu. of corn and 1 bale of cotton. More recently, yields of 75 bu. of corn and 1½ bales of cotton have been produced when weather was favorable. Although these yields are not high, they are a great improvement. Physical problems of cultivating these soils limit their adaptability for row crop production.

Many Kinds of Research

The research program was designed to obtain information that would be of most value to farmers of the limestone valleys of Calhoun and surrounding counties. Kinds and amounts of fertilizer needed by all crops grown in the area have been studied. Greatest response, as in other areas of the State, has been from nitrogen. Response of various crops to phosphorus, potassium, lime, sulfur, and minor elements has been determined.

Research with fertilizers has shown that nutrient deficiencies in soils can be corrected rapidly by fertilizing according to soil test recommendations. Problems resulting from poor physical condition of the soils are more difficult to correct. Poor physical condition often delays plowing and planting, increases difficulties in getting good stands, prevents timely cultivation, and decreases infiltration of water into the soil, making crops subject to summer drought.

Variety tests with cotton, corn, oats, wheat, rye, barley, and grain sorghum have been of great value to farmers in determining varieties best adapted to northern Alabama. Other experiments include projects on time of planting, seeding rates, seedbed preparation, and placement and time of application of fertilizer for various crops.

In a forestry experiment with different species of pine trees planted in 1930, slash pines made good growth. This was the first time slash had been grown this far north in Alabama. As a result of this work, millions of these pines have been planted in the region.

Forage Research

Good yields of forage and pasture crops have been produced. As livestock production has increased in the area, research emphasis has been shifted to work with forage crops. Many tests have been done to determine best legumes and grasses to grow for cattle and hogs.

Crops that have been tested and are now being recommended include crimson and white clover, hairy vetch, alfalfa, sericea, Dallisgrass, Johnsongrass, orchardgrass, bluegrass, Coastal Bermuda, Pensacola bahia, Starr and Gahi-1 millet, sudangrass, forage sorghums, and corn for silage. Variety tests with these crops have resulted in recommendation of specific varieties.

Livestock

The growing importance of dairying in the area has led to development of a small Grade A dairy on the Field. Recommended practices developed from research are followed on a farm-size unit to demonstrate their effectiveness.

The 92-acre farm includes 35 acres of eroded hill land rented from an adjacent farm. About 25 grade Holstein and Jersey cows are averaging about 9,000 lb. of milk annually. The feed program is based largely on temporary grazing for summer and winter. Principal grazing crops are Starr and Gahi-1 millet in summer and Abruzzi rye, ryegrass, and crimson clover in winter. Dallisgrass and white clover permanent pastures and alfalfa for hay complete the forage program. Income to capital, management, and labor averages about $375 per month from this small dairy enterprise.

Y FIELD RESEARCH

Agronomist

Prattville Experiment Field

FORTY ACRES of plots! That's the area divided into 1/30-acre plots for agronomic research at the Prattville Experiment Field.

This field unit of the Auburn Agricultural Experiment Station System was established in 1929 on 40 acres donated by Autauga County. An additional 40 acres was purchased in 1937. The soil is a level, Greenville fine sandy loam. This and similar red-colored soils occupy about 600,000 acres in the Coastal Plains of southern Alabama. These soils are highly productive when properly fertilized and managed.

Fertility Studied

Many experiments have been conducted to determine response of various crops to nitrogen, phosphorus, potassium, sulfur, magnesium, minor elements, and lime. Results are being used in calibrating soil tests to give accurate fertilizer recommendations. Red soils like the Greenville have, as a rule, shown less response to phosphorus, potash, and lime than gray soils of similar texture. Past fertilizer and lime treatments, however, often have more effect on nutrient needs than does soil type.

Cotton at Prattville usually responds to about 80 lb. of N, 30 lb. of P_2O_5, and 60 lb. of K_2O. Corn needs 90 lb. of N and 30 lb. each of P_2O_5 and K_2O. Cotton responds to lime, but corn has not shown a need for lime at this location. Fertilizer placement studies on gray sandy soils near the Prattville Field showed that mineral fertilizers should be placed in the row for cotton. When applied 2 in. to the side and 2 in. below the seed, 200 lb. of 4-12-12 was equivalent to 600 lb. broadcast. Both treatments received equal amounts of N sidedressing.

Crops Evaluation

Variety and species tests with winter grasses and legumes are conducted each year. As new crops become available, they are compared with those already available to determine their adaptation to central Alabama. Small grain tests have shown that rye is superior to wheat, oats, and barley for early grazing. Crimson has been the most satisfactory clover for winter grazing and for seed production on this upland soil.

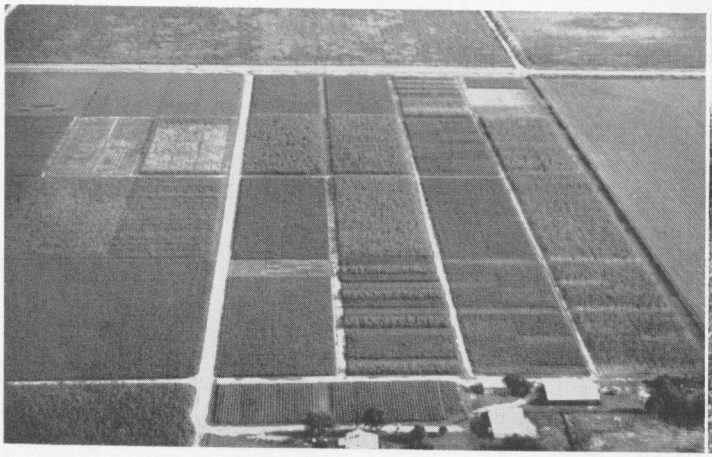
In vetch trials, Auburn Woolypod has been the top producer of forage and green manure. Warrior is equal to hairy and Williamette for herbage and is best for seed production. It averaged 1,433 lb. of seed per acre for the last 2 years.

In an alfalfa variety test conducted from 1954 through 1958, 13 varieties averaged more than 4½ tons of oven-dry hay per year. Best available varieties and their yields are: Oklahoma common, 9,741 lb.; Kansas Common, 9,616 lb.; Atlantic, 9,502 lb.; Narragansett, 9,456 lb.; Williamsburg, 9,389 lb.; Vernal, 9,332 lb.; and DuPuits, 9,260 lb. per acre.

For many years, experiments with summer crops were concentrated mainly on cotton and corn. In recent years, research has been expanded to include temporary and permanent summer forage crops, soybeans, and grain sorghum. Some summer forage crops that have been tested at Prattville and are now recommended are Coastal Bermuda, Pensacola bahia, Dallisgrass, Gahi-1 and Starr millet, Johnsongrass, and sericea.

Cotton-Hog Management Unit

Since 1945, 27 acres of land that is unsuitable for research plots has been operated as a small farm to demonstrate use of recommended practices on a farm scale. Five acres are planted in cotton, 19 acres in corn, and 3 acres in temporary and permanent grazing crops for hogs. Average sales for 15 years have been $2,914 and expenses $1,136. This leaves $1,778 – $66 per acre – return to capital, regular labor, and management. Cost of extra labor for cotton chopping and picking is included in expenses. This unit has demonstrated that a cotton-hog farm of this type can be profitable if managed properly.



Aerial view of Prattville Experiment Field shows arrangement of field plots that are used for all types of agronomic research.

Yields of small grains are measured when clipped to simulate grazing (foreground) and when managed for grain (background).

A consumer examines the quality of tomatoes shipped in by truck.

Marketing

TOMATOES for HIGHER RETURNS

D. R. STREET and E. E. KERN
Department of Agricultural Economics

LINEAR PROGRAMMING, a new tool in analyzing shipping routes, will help producers receive more for fresh vegetables because of lower transportation costs.

This technique provides a solution for efficient flow of commodities from shipping points to markets. Factors to consider in marketing produce include total supplies available, total demand, prices paid, and transportation costs.

Tomato Marketing Research

Recent research by Auburn Agricultural Experiment Station included this technique in marketing tomatoes, an important truck crop in Alabama. Sixteen shipping points and 22 major markets throughout the United States were included. These accounted for about 75% of total shipments reported during the third week in June, 1959. Important shipments from Alabama for the season were made during this period. A total of 1,285 carloads or equivalents was accounted for from all areas during the week, with 7% originating in Alabama. About one-half the total shipments was supplied by Texas and South Carolina. Other important shipping areas included California, Ohio, Georgia, and Florida.

Shipping Patterns Analyzed

Most of the shipments from Alabama were received in Birmingham, with smaller quantities supplied Louisville and Atlanta. The optimum shipping pattern, however, indicated that Alabama shipments should have gone to Atlanta, Baltimore, and Washington, with a small shipment to Columbia, S.C., see chart.

The programming technique may provide shipping patterns that appear unreasonable when viewed on the local level. It might seem reasonable to ship Alabama tomatoes from the Dothan area to Birmingham rather than to northern and eastern markets. However, competition from all other areas influence the total distribution of supplies. Local conditions and production changes from year to year change optimum shipping patterns for different periods. The general optimum pattern could be used as a basis for stabilizing ties between shippers and buyers in market areas through advance arrangements.

Problem Analyzed

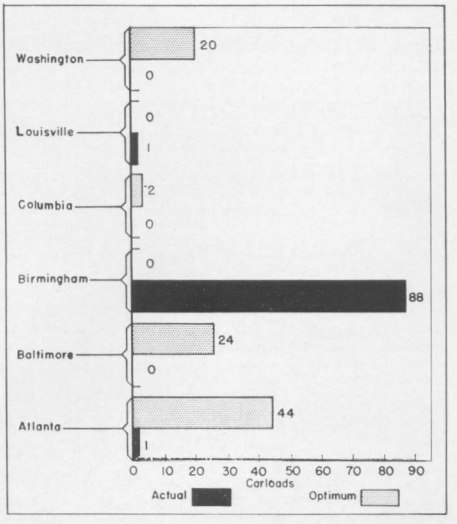
A hypothetical transportation problem was analyzed to show optimum shipping patterns if a 10% increase in demand were supplied by Alabama. Philadelphia and Pittsburgh were added as markets for Alabama tomatoes in the revised solution, receiving 19 and 52 carloads, respectively. Shipments to Atlanta, Baltimore, Columbia, and Washington would be increased by 22, 24, 9, and 2 carloads, respectively.

Alabama growers may soon realize greater benefits from expanding markets and more efficient allocation of supplies from programming techniques. Interviews with 62 wholesale vegetable firm managers in Alabama, including central buying offices for chain stores, brokerage firms, carlot receivers, and jobbers, showed that definite improvements in marketing machinery could improve opportunities. Firm managers seemed particularly concerned regarding the relationship between poor or improper grading of local produce and the lack of uniformity in supplies offered.

Improper packaging was also a factor of primary concern. Preference for the 20-lb. fiberboard carton was expressed for vine-ripe or pink tomatoes, and heavier and larger boxes were desired for large green tomatoes purchased for repacking or reshipping. The market preference was for ripe instead of green tomatoes. Primary causes of loss, other than price changes for tomatoes, resulted from improper holding temperatures, over-ripeness, and poor packaging.

Production and Marketing

Opportunities for expanding production and marketing of tomatoes in Alabama will depend upon the ability to compete with other producing areas. Dependable volume of uniform quality and pack are important competitive factors. Meeting trade requirements with these factors can mean expanded markets for Alabama tomatoes and increased returns from products sold.



Optimum and actual shipping patterns of Alabama tomatoes are shown in the above chart.

JAPANESE QUAIL for ECONOMICAL RESEARCH

W. D. IVEY, *Asst. Prof. Zoology-Entomology*
J. R. HOWES, *Asst. Poultry Husbandman*

THE COST of most research, like the cost of other things, has been steadily increasing. This is especially true of research in poultry and other studies involving birds.

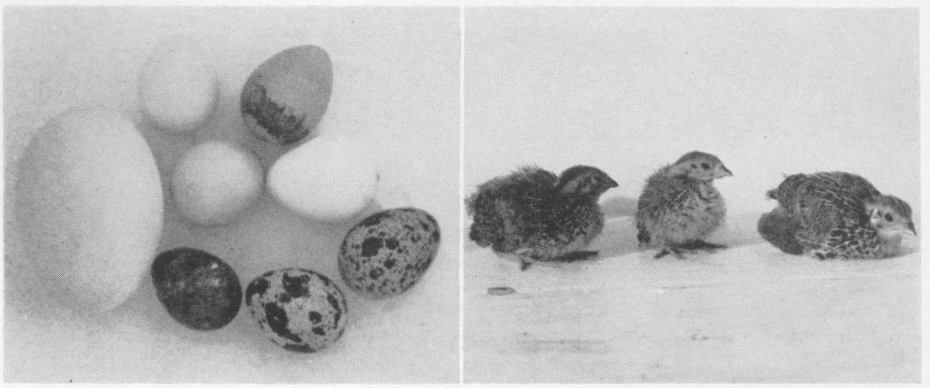
Until recently, the most suitable species for poultry research was the chicken. Now a laboratory bird, in the same family as the chicken, Japanese quail, *Coturnix coturnix japonica,* is considered by researchers of the Auburn University Agricultural Experiment Station more economical for much of the basic research work.

Japanese Quail

Several years ago the Japanese quail was introduced as a game bird by conservation departments of a number of states. Originally this quail seemed excellent as a game bird, but has not become established. This bird has received the attention of laboratory workers at Auburn, and other parts of the country, because of its advantages in certain research problems.

Research Advantages of Quail

What are the advantages of this quail? It is relatively small, one-half the size of a Bobwhite. It is inexpensive to keep; 20 to 30 birds can be maintained for the cost of one chicken. Space requirements for these quail are also less than for chickens. A total of 10 to 12 may be housed in the space required for one pullet. Furthermore, the life cycle under laboratory conditions is relatively short. Some quail may lay as early as 35 days of age and all are usually in full production by 50 days. The incubation period is 16 to 17 days and it is possible to obtain 5 generations per year as compared with 2 generations of the chicken. The hens are prolific layers and with proper use of light a hen may lay 250 or more eggs annually. The females continue to lay during molting at a reduced rate. The eggs are about the size of those from Bobwhite. The birds are hardy and not bothered by diseases under laboratory conditions.

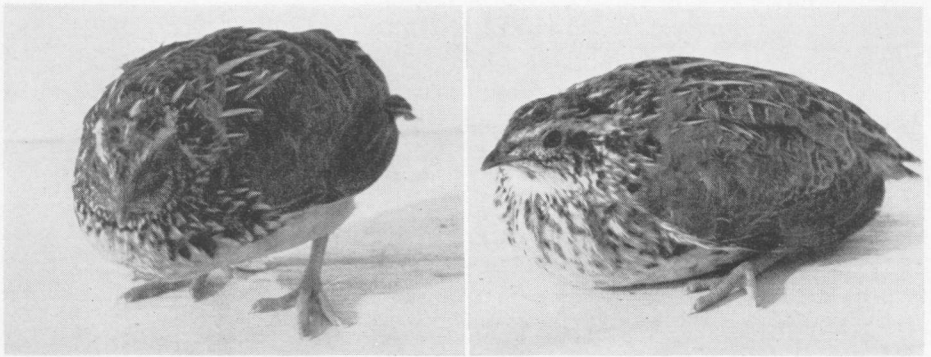


Coturnix quail eggs of various color patterns left, compared with an egg of the bobwhite quail, right of center and a medium large white Leghorn egg at extreme left. At right, 2-week old partial feathered Coturnix quail chicks.

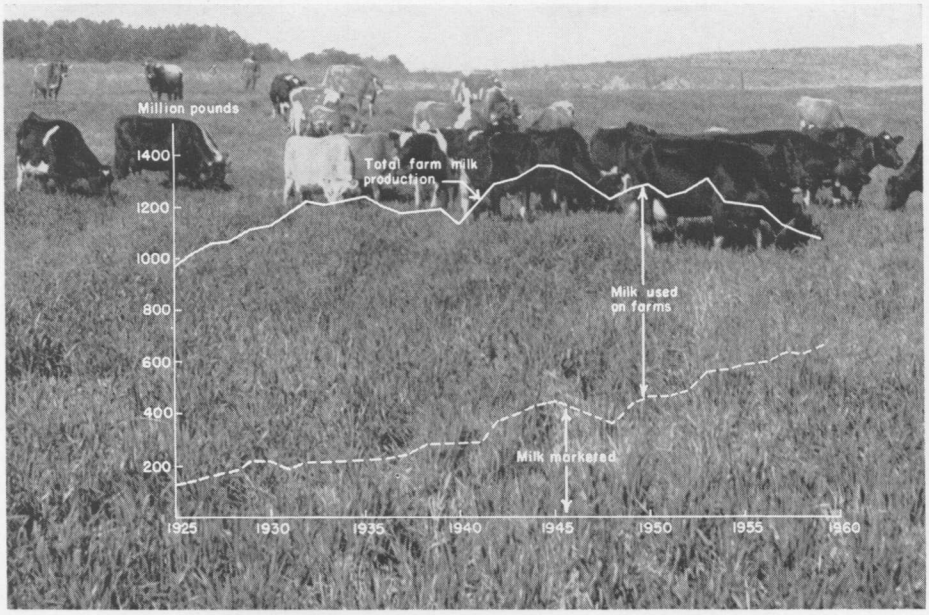
Research Possibilities

What research problems are adapted to the use of this bird? Chickens have been grown for thousands of years, yet certain basic facts about them are still unknown. For instance, how does heat, cold, or other stresses affect the hen and her ability to lay eggs. It is known that light is important but just how it affects the bird and its ability to lay or grow is not known. What improvements can be made in the nutrition of the laying hen or growing chicken? Answers to these questions are being sought at Auburn using the Japanese quail as an inexpensive laboratory animal to speed the research program. When answers are obtained, the principles can be applied quickly to chickens. The whole process will take less time and money than if all the research were done with chickens alone.

In addition to the use of these quail for poultry research at Auburn, they are being used as a basic laboratory animal in other laboratories for hormone research, embryological studies, genetic crosses, nutrition studies, germ-free work, and cancer investigations. In these and other areas of scientific research this bird is being recognized as an economical laboratory animal comparable to the well-known white rat.



An adult male Coturnix quail is shown at left and adult female at right.



Changes in volume of milk marketed, amount used on farms, and total milk production on Alabama farms during the 1925-59 period are illustrated by the graph.

DAIRYING—Coming of Age in Alabama

LOWELL E. WILSON, *Assistant Agricultural Economist*

Although Alabama is not considered a dairy State, sale of milk ranks high as a source of farm income. Accounting for $38 million in 1959 (7.4% of all cash farm receipts), dairying ranked fourth as a source of income for Alabama farmers.

Volume of milk sold by Alabama farmers has increased steadily since 1925. However, total production in 1959 was the lowest since the late 1920's. Total milk marketed in 1959 was 658 million lb., which was 60% of total State production. This is more than four times average sales during 1925-30. Marketings of milk in the State exceeded farm consumption for the first time in 1957.

Fluid Milk Important

Commercial milk production in Alabama, as in most Southern States, is primarily for fluid use. About 85% of income from dairying, about $33 million, came from sale of Grade A milk in 1959. Manufacturing milk sales accounted for most of the remaining dairy income.

There were 1,977 Grade A dairy herds in the State in 1958. Of these, 1,637 producers were licensed by the Alabama Milk Control Board to produce milk for fluid consumption in regulated markets in the State. Remaining producers sold to handlers in unregulated areas or to out-of-state handlers.

Grade A herds were located in 65 counties, but with most in a small number of counties. Except for those in the Black Belt, herds were concentrated around large markets.

Information about producers was obtained in November 1958 and January 1959 by a mail survey sent to all producers licensed by the Milk Control Board. Some 61% of producers licensed by the Board returned the questionnaires. This represented about half of all Alabama fluid milk producers.

Herds ranged from 10 to about 600 cows in milk, with an average of 51. Most of the smaller herds were in the Sand Mountain, Limestone, and Tennessee Valley Areas. Herds around Birmingham and in the Black Belt were larger, averaging 76 cows. Herds of 90 or more cows amounted to only 12% of all herds in the survey, but produced about 33% of the total milk volume.

Grade A Herds Decreasing

Data from the Milk Control Board and other sources reveal that number of Grade A herds has declined in recent years. Remaining herds have become larger and production per cow has increased substantially. At the time of the survey, farmers had about half as many heifers for replacement as cows in the milking herd. Owners of small herds apparently planned to increase herd size, since proportion of replacement heifers to cows was higher than for larger herds.

Use of bulk tanks increased rapidly during the 1950's, with 56% of the sample producers reporting use of tanks. Adoption of bulk tanks has been more rapid in some parts of the State. All producers in the Piedmont Area were using bulk tanks in late 1958. A high percentage of producers with large herds reported use of bulk tanks. Producers shifted to bulk handling when required by the plant handling their milk.

Almost half of the producers in the sample had been in the dairy business less than 10 years, and 76% less than 15 years. In general, producers with larger herds had been dairying longer than smaller producers. Because of the industry's youth and the desire of a high percentage to expand herd size, farm sales of milk for fluid use are likely to show large increases in the next few years.

Characteristics of Alabama Grade A Dairy Herds Studied, by Herd Size

Milk cows per herd	Number of herds	Cows in milk, av.	Production per cow, av.	Proportion using	
				Testing program	Bulk tanks
	No.	*No.*	*Lb.*	*Pct.*	*Pct.*
Under 30	300	20	6,643	34	42
30 to 49	314	37	6,836	42	56
50 to 69	166	56	6,818	57	61
70 to 89	84	77	7,041	55	69
90 and over	117	140	7,055	53	76
Total or average	981	51	6,829	45	56

STARR MILLET — *as a supplemental grazing crop for* SLAUGHTER CATTLE

R. R. HARRIS, *Asst. Animal Husbandman*
W. B. ANTHONY, *Animal Nutritionist*
J. K. BOSECK, *Supt. Tenn. Valley Substation*
E. M. EVANS, *Assoc. Agronomist*

PRODUCING a 1,000 lb. fat steer from a 450 lb. stocker calf can be efficient when using small grain-clover grazing followed by a period of drylot fattening. Can the same be accomplished with a grazing program alone?

Grazing System Tested

The Auburn Agricultural Experiment Station sought to answer this question in a 3-year experiment. Yearling steers were moved to permanent pasture at the end of a small grain-clover grazing period. The grazed area was then seeded to Starr millet. As soon as forage growth permitted, the steers were returned to the millet and growth performance was measured. The purpose was to determine if grazing two crops in sequence would (1) materially increase weight of the animals, and (2) improve their slaughter finish over the weight gain and finish produced by one crop (small grain-clover).

Although the test was for a 4-year period, the millet in 1956 was a complete failure because of dry weather; results summarized in Table 1 are averages for only 3 years. The average grazing time was 44 days and the average gain per animal was 48 lb.

TABLE 1. PERFORMANCE OF ANIMALS GRAZED ON STARR MILLET,[1] 1956-59[2]

Total no. animals involved	48
Average grazing season, days	44
Average daily gain, lb.	1.11
Average seasonal gain per animal, lb.	48
Average slaughter grade end of grazing	Utility +

[1] In 1956 Starr millet crop was a complete failure because of dry weather. These data are averages for the 1957, 1958, and 1959 grazing seasons.

[2] In 1957 animals grazed June 26-Aug. 12, 45 days; in 1958, July 11-Aug. 19, 39 days; in 1959, millet was grazed June 19 to Aug. 3, 45 days.

For the 3 years that millet was seeded following oats-clover, there was a 44-day interval between oats-clover grazing and millet grazing. During this interval the steers grazed excellent grass-clover pasture. The gain during this period averaged 51 lb. per animal. The yearling steers after grazing oats-clover gained an average of 99 lb. per head on the pasture and millet. In general the steers graded low Standard at the end of oats-clover grazing. Further grazing of millet did not improve the grade. The results show that finish on the steers was not improved and the gain was small for the added labor of disking the land and seeding millet after oats-clover grazing.

Pros and Cons of Millet

The per acre gain and carrying capacity data for millet are summarized in Table 2. An important advantage of millet is that it provides grazing for a large number of animals. When sown on land following oats-clover grazing, this study showed that millet provided 44 days of grazing at the rate of 3 animals per acre.

TABLE 2. PERFORMANCE OF CATTLE ON STARR MILLET FOLLOWING SMALL GRAIN-CLOVER GRAZING, 1957-59

	Per acre
Live weight gain, lb.	136
Total animal grazing days	136
Average daily stocking rate	3.12

Millet and other summer annuals can be used as temporary grazing crops for carrying animals during late summer until an alternate feed supply is available. The feasibility of using millet as a grazing crop for fall-dropped calves during the period immediately after weaning but prior to beginning of cool-season grazing has not been adequately tested.

Results show that performance of yearling steers on millet has been somewhat lower than that on lush, spring, grass-legume permanent pastures. Therefore, millet grazing is relatively unsatisfactory for production of slaughter beef.

Steers are shown grazing Starr millet at the Tennessee Valley Substation in mid-July.

SUMMER GRAZING and FEEDLOT FINISHING of 2-Year-Old Steers

L. A. SMITH and H. W. GRIMES, *Black Belt Substation*
T. B. PATTERSON, *Associate Animal Breeder*

TRADITIONALLY a cow-calf program has been the most popular management system of Black Belt cattlemen. Under this system, calves are marketed off cows at 6 to 9 months of age.

Until recent years, most commercial herds lacked sufficient beef quality to produce a two-way calf – one that could go either to slaughter or to feedlot. However, this situation has changed and large numbers of Alabama calves now go to midwestern feedlots.

Management Studied

Research by the Auburn Agricultural Experiment Station has revealed a number of practical programs that can be profitably used to finish steers for market in Alabama.

One program that has been studied at the Black Belt Substation involves summer grazing and feedlot finishing of 2-year-old steers. In the study, 2-year-old Hereford steers that had been carried two winters and grazed during the intervening summer were used. Objective of the study was to compare two groups of steers under different management.

Group I steers were grazed on Dallisgrass pasture during spring and early summer when permanent pasture grasses usually have their highest nutritive value. Following grazing, the group was finished in drylot.

Group II steers grazed throughout the growing season and were supplemented with ground shelled corn at the rate of 1% of body weight. Both groups were slaughtered at the same time – in late October.

The test steers were Good and Choice feeders. They were divided equally between lots according to weight and grade. Initial value per steer was determined by a local buyer. The study covered 2 years (1958 and 1959) with the same procedure followed each year.

In 1958 the steers were placed on grazing April 26. Group I steers went into drylot on June 20 and the test ended October 14. The following year the corresponding dates were May 7, July 24, and October 28.

One and one-half acres of pure Dallisgrass pasture was allotted per steer in each of the 2 years. Grazing in both seasons was of average quality. To eliminate differences in forage quality caused by intensity of grazing and location, the steers were rotated between pastures every 2 weeks. Each year, as Group I steers were placed in the feedlot, steers of both groups were implanted with 36 mg. of stilbestrol.

The 1958 drylot ration consisted of long Caley pea hay fed free choice plus a 12 to 1 mixture of ground shelled corn and 41% cottonseed meal. Drylot ration fed in 1959 was a blend of 50% ground snapped corn, 26.5% No. 2 Johnsongrass hay, 12.5% cottonseed meal (36% protein), 10% molasses, and 1% salt. The mixture was full fed.

Results Obtained

Despite starting the steers on feed gradually in 1958, a few mild cases of founder occurred. Although the founder was not serious, it probably lowered daily gains and increased feed required per cwt. Gains of 2.9 lb. daily with 1,216 lb. of feed required per cwt. of gain were obtained in 1959. No founder occurred that year even with steers placed on full feed at the beginning of the feeding period. Not all differences in gain can be attributed to the occurrence of founder, since there were differences in ration components and method of feeding between the 2 years.

Based on the 2-year average, Group I steers gained faster – 2.03 lb. per head daily as compared with 1.87 lb. for Group II steers. In addition, faster gain was reflected in a higher degree of finish – low Choice as compared with Good. Return per steer was only slightly greater for the drylot group (see table), which was largely an indication of lower feed cost for the pasture group.

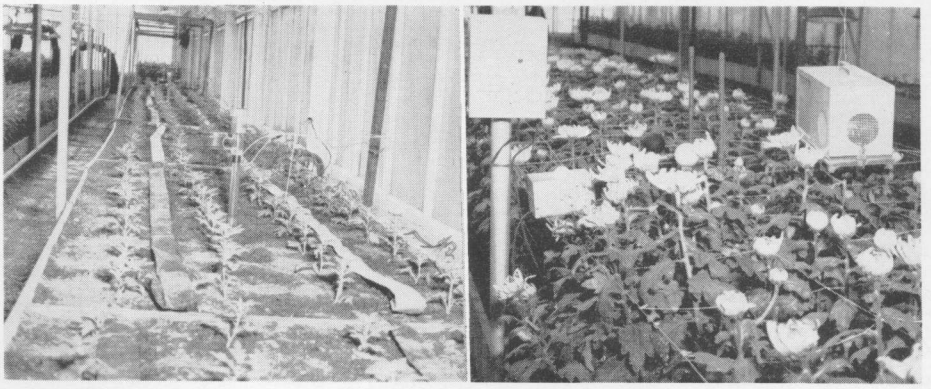
Although it is generally recommended that steers go to market at younger ages and at lighter weights, 2-year-old steers finished by utilizing pasture and grain may show additional profit. In the experiment, there was some advantage to utilizing the pasture during early season, followed by a short feeding period in drylot.

DRYLOT VS. PASTURE FINISHING OF 2-YEAR-OLD STEERS, 1958-59 AVERAGE

Item	Resultant[1]	
	Group I	Group II
Steers per group, no.	22	21
Av. initial weight, lb.	817	816
Av. gain on pasture (67 days), lb.	90	----
Av. gain in drylot (106 days), lb.	262	----
Av. gain on pasture + supplement (173 days), lb.	----	324
Total gain per steer (173 days), lb.	352	324
Av. final weight, lb.	1,169	1,140
Feed and pasture cost per steer[2]	$ 77.58	$ 62.92
Initial value per steer	$187.92	$187.45
Total cost per steer	$265.50	$250.37
Final value per steer	$289.81	$273.83
Return to labor and investment	$ 24.31	$ 23.46
Av. slaughter grade at end of test	low Choice	Good

[1] Group I steers were on pasture before finishing in drylot. Group II received supplement while on pasture.

[2] Feed cost averaged $41.39 per ton in 1958 and $39.50 in 1959, including grinding and mixing. Pasture charge was $3 per steer per month (1½ acres per steer).



Plastic tubing at left is used in applying fertilizer-water solution. Plants grown by this system are shown at right.

FLOWERS *can be watered and fertilized* AUTOMATICALLY

TOKUJI FURUTA, *Assoc. Horticulturist*

HIGH QUALITY greenhouse flowers produced under a system of automatic irrigation and fertilization is now a reality.

Studies at the Auburn Agricultural Experiment Station show that this system can be used commercially. Applications are practical and cost of equipment is more than offset by savings in labor. The system may also be adapted to the home grounds or other landscaped areas.

System Not New

The technique of sand and/or solution culture has been used for years in studying fertilizer requirements of plants. Laboratory methods for these tests have been developed, many automatically controlled. From this developed the idea of commercially growing plants without soil, supplying the fertilizer in a water solution. This procedure has been called "gravel culture," "soilless culture," and "hydroponics." Various limitations have prevented widespread use of this method to commercial plant culture.

Liquid fertilization (fertilizers dissolved in water) has long been used by commercial flower growers and by some farmers. Better distribution of fertilizers, rapid manipulation of amounts of each element added, and savings in labor requirements are reasons for using this system.

Within recent years, inexpensive, accurate, automatic metering devices have been developed for this purpose. These devices inject into the irrigation water a preset amount of a fertilizer stock solution and, within the limits of the device, the water flow does not alter the concentration. The device may be installed permanently into an irrigation system and starts automatically when water begins to flow.

Also within recent years, irrigation equipment has been developed specially for greenhouse conditions. The two main types are: (1) a special nozzle that sprays water parallel to the soil surface, and (2) perforated plastic tubing that permits small jets of water to fall on the soil surface at regular intervals. Although these have permitted application of water to large areas simultaneously, the operation has usually been manual.

Automatic application of water alone to growing crops is not a new idea and suitable equipment has been developed and proposed for a number of years. However, there has not been widespread acceptance of any of the proposed systems.

Application Tests Conducted

Tests were conducted to study the application of water and fertilizer together to crops with an automatically controlled system. Commercial equipment used included: irrigation equipment (both perforated plastic tubing and the nozzles for comparative purposes), fertilizer injection device that did not require an outside source of power, magnetic water valves, and electric time clocks.

Crops grown to date are snapdragons and chrysanthemums for cut flowers. Lime and superphosphate were incorporated into the soil before the crops were planted. A dilute fertilizer solution (complete plus minor elements) was applied each time the plants were irrigated. Plants grew equally well in soil mixtures of ½ clay loam and ½ peat moss or ½ bank sand and ½ peat moss. Poorer results were obtained when only bank sand was used. Constant fertilization applied manually each time plants were irrigated has been successfully used on a number of soil mixtures and types. Automatic control has been equally successful at Auburn.

Test Results Cited

Irrigation equipment did not influence the effectiveness of the method. Water was applied in small streams to only small areas of the entire soil surface when perforated plastic tubing was used. There was enough lateral movement of the water and fertilizer so that all plants were affected equally. With nozzles, plastic pipes apply water uniformly on the entire soil surface.

Daily irrigation was not necessary. Water applied this frequently was detrimental to growth of some crops. During early growth of plants, irrigation every 3 to 4 days was superior to daily irrigation. Later irrigation frequency of 2- to 3-day intervals was best. Plants irrigated every 4 days made poorest growth. The volume of soil was limited to a depth of 6 in. While the plants were small, enough water was available without frequent irrigation. More frequent irrigation was needed as plants grew larger. Examination of roots showed that plants growing in plots irrigated every 3 days had the best root systems.

Once the crop was planted and initially irrigated, it was possible to grow it to maturity with automatic applications of water and fertilizers.

EARLY- *vs.* LATE-DROPPED EWES

W. W. COTNEY and E. L. WIGGINS*

EARLY EWE LAMBS grow into ewes that produce early lambs!

Results of experiments at the Upper Coastal Plain Substation, Winfield, from 1955 to 1960 show that flock replacements should be selected from lambs born in October, November, or December. During the first three lambing seasons, these replacements consistently produced more early lambs than did replacements born between January 1 and March 15.

The research was done to provide Alabama sheep growers with information on whether to select replacements (1) from late-dropped lambs, or (2) from more expensive early-dropped lambs.

Experimental Procedure

In April and May of 1955, 15 early-dropped ewe lambs were bought from Alabama growers. Fifteen late-dropped lambs were purchased in July. This was repeated in 1956 and again in 1957, making a total of 45 each of early and late lambs.

All were kept through three lambing seasons. Most of these lambs were from Dorset sires crossed on various breeds. The early lambs weighed 70 to 85 lb., whereas the late lambs ranged from 60 to 75 lb.

The flock had adequate to excellent grazing most of the time. This was supplemented with alfalfa hay and grain when grazing was short. During winter months, each ewe received ¼ lb. of cottonseed meal pellets per day. The ewes had access to phenothiazine salt mixture and were drenched three or four times each year. Three Dorset rams were placed with the flock during the first half of May each year and remained in the flock until about October 1.

Results

Results are summarized in the table. During their first lambing season, 19 of the 45 early ewes lambed before January 1. None of the late ewes dropped lambs before January 1. This was to be expected because the late ewes were still immature. In the second lambing season, 37 of the 42 early ewes remaining in the flock dropped early lambs as compared with 21 of 43 late ewes. The early ewes in the third season continued to drop a higher percentage of early lambs than did the late ewes. However, the differences were not as great as in the first 2 years.

Survival of lambs from early and late ewes did not differ appreciably. Death losses ranged from about 22% to slightly more than 30%, with an average death loss of 25.9% from early ewes and 26.2% from late ewes. Neither was there a significant difference in number of twin lambs from early and late ewes. Of the ewes that lambed, 23.3% of the early ewes and 16.1% of the late ewes produced twins. The lamb crop raised from early ewes ranged from 48.9% for the first season to 93.5% for the third season. For the late ewes, the range was from 6.8% to 70.3%.

Conclusions

It is generally agreed that Alabama sheep growers have a better chance of being successful if they follow a breeding program that will result in lambs being born in October, November, or December. These lambs are ready for market in April or May and bring a better price than lambs born in January, February, or March and go to market in July or August. Even though the early lambs are more expensive, these experimental results show that they are a better investment as ewe replacements for the grower who is producing lambs for early sale. Late lambs, even at less cost, are poor investment as replacements.

REPRODUCTIVE PERFORMANCE OF EWES FROM EARLY-DROPPED LAMBS AS COMPARED WITH EWES FROM LATE-DROPPED LAMBS

Item	Total ewes[1]	Ewes Lambing			Lambs dropped		Lamb crop
		Early[2]	Late[3]	Total	Born	Raised	
	No.	*No.*	*No.*	*No.*	*No.*	*No.*	*Pct.*
First season							
Early ewes	45	19	10	29	32	22	48.9
Late ewes	44	0	2	2	3	3	6.8
Second season							
Early ewes	42	37	0	37	45	35	83.3
Late ewes	43	21	2	23	27	19	44.2
Third season							
Early ewes	40	36	1	37	50	37	92.5
Late ewes	37	30	1	31	35	26	70.3

[1] Number of ewes in flock at beginning of lambing season.
[2] Born before January 1.
[3] Born after January 1.

* Superintendent, Upper Coastal Plain Substation, and Associate Animal Breeder, Main Station.

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