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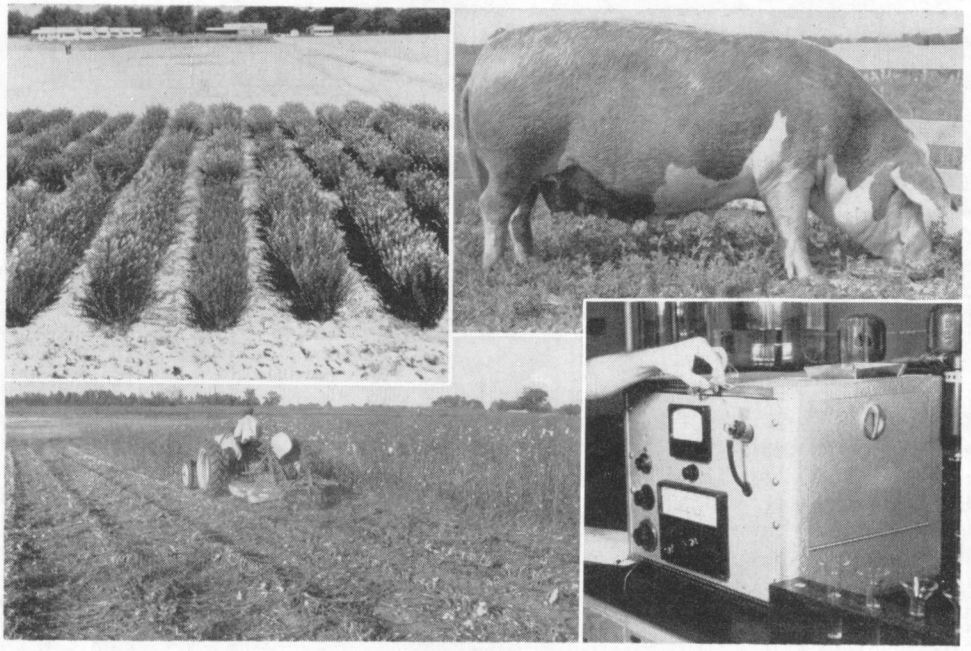
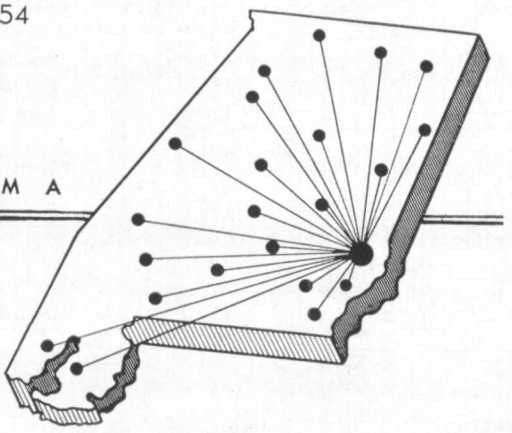
HIGHLIGHTS *of* AGRICULTURAL RESEARCH



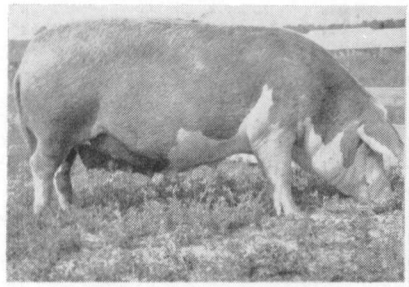
In this issue—A More Tasty, Nutritious Sericea Now Possible . . . Soil Testing . . . Land Selection and Preparation for Mechanized Cotton Production . . . Egg Profits or Losses . . . Irrigation . . . Superior Hogs Sought in Breeding Program . . . Out of the Past.

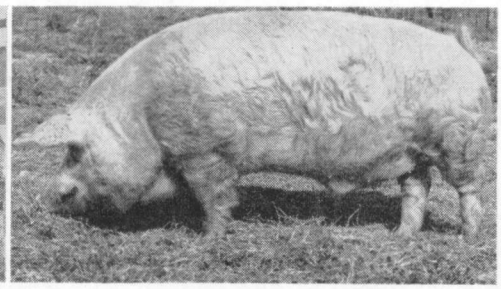
VOL. 1, No. 3 — WINTER, 1954

SERVING ALL of ALABAMA



AGRICULTURAL EXPERIMENT STATION SYSTEM
of the
ALABAMA POLYTECHNIC INSTITUTE





SUPERIOR HOGS
Sought in Breeding Program

C. D. SQUIERS, *Associate Animal Breeder*

How can uniformly high performance in hogs be obtained?

That is a question State Experiment Station and USDA researchers have been attempting to answer for more than 17 years. Using closed herds of Durocs, Hampshires, Poland Chinas, and other breeds, these workers have accomplished only slight improvement in such traits as number of pigs raised, growth rate, and feed economy. Only carcass quality has been consistently improved, even though rigid culling has been done for all important traits or characteristics. Consistently superior performance has been obtained only when certain unrelated inbred strains have been crossed.

Hog breeding research at the API Agricultural Experiment Station is based on the theory that the combining ability of certain carefully chosen strains can be improved by selecting directly for it. In this program, three strains will be systematically crossed to determine which individuals in each have the desired combining ability as measured by: (1) number of pigs raised, (2) rate of growth, (3) economy of gain, and (4) carcass quality.

Selected individuals will then be used to carry on the three pure strains. This procedure will be repeated until it is determined whether the method is working. If successful, the three lines produced can be utilized through a sire-rotation program. For example, a boar of Line 1 would be crossed with any group of sows. Gilts would be saved from this mating and bred to a boar of Line 2, gilts from which would in turn be bred to a boar of Line 3. Repeating this procedure would soon make full use of the combining quality of the three lines.

Results thus far indicate that t' Landrace and Hampshire breeds w probably be used in forming two of the strains. Sows of this cross have the ability to farrow and raise large litters. (See table.) It is pointed out that 14 litters last spring averaged about 95 pounds heavier than that required for production registry in the pure breeds.

Further testing must be done before a breed can be chosen to form the third line.

Shown at left in the title pictures is a Hampshire-Landrace sow. Her top production was a 556-pound litter of 12 pigs (weaning weight). In 1952, for example, Alabama's spring pig crop averaged 6.6 pigs per litter and 6.4 pigs per fall litter. (Division of Agricultural Statistics, Alabama Department of Agriculture and Industries Report, 1953.) At right is a Landrace boar that is being used in the hog breeding research at Auburn.

Performance of Landrace-Hampshire Sows

Season	Pigs weaned per litter	Weaning weight per litter	Weaning weight per pig
	No.	*Lb.*	*Lb.*
Spring, 1953[1] (gilt litters)	9.6	341.5	35.6
Fall, 1953[2]	8.9	389.1	44.9
Spring, 1954[3]	9.2	415.7	45.2
Requirement for production registry in the pure breeds (gilts)		275.0	
(sows)		320.0	

[1] Average of 14 litters.
[2] Average of 13 litters.
[3] Average of 14 litters.

out of the PAST

While nematodes have been with us many years, the problem of control is increasing in economic importance. The onetime small list of "worms" attacking plants has grown to several hundred, with more being identified each year.

Cotton wilt now is being associated with nematode injury – that nematodes provide "ports of entry" for the wilt organism. It is for this reason that some cotton experts single out nematodes as the No. 1 problem in the field of cotton diseases.

As early as 1889, the API Agricultural Experiment Station at Auburn brought to public attention in its Bulletin 9 a nematode species attacking roots of Irish potatoes, tomatoes, parsnips, and salsify. Geo. Atkinson, biologist and author, reported on the life history of a root-gall nematode, described the injury, and suggested soil sterilization by starvation as a method of combating the pest.

Atkinson wrote, "The cheapest an probably at the same time the most effective mode of sterilizing the soil will be to starve out the worms by rotating system applied to the selection of fields, or plats of ground, upon which are grown only such plants as are positively known to be insusceptible to attack." He further points out the need for trials in some cases to determine what plants are insusceptible. After 65 years, Atkinson's suggested system of rotation is still a good practice. However, rotations involving corn, sorghum, and small grains as less susceptible crops do not fit all types of farming. Consequently, they are not used extensively.

The idea of soil "sterilization" advanced by Atkinson, however, has gone beyond crop rotations with the development of chemicals as soil fumigants in recent years. Tests of fumigants on some sandy loam soils in Alabama resulted in considerably higher yields of certain vegetable crops, cotton, an peanuts.

With growing importance of the problem, a broad program of nematode research has been started at Auburn pointing to more simple, effective and economical controls.

A More Tasty, Nutritious SERICEA Is Now Possible*

E. D. DONNELLY, *Associate Plant Breeder*
G. E. HAWKINS, *Associate Dairy Husbandman*

WE CAN'T afford to write off sericea! Even though cattle have less taste for it than some other forages, sericea offers certain important advantages that farmers and scientists alike cannot ignore.

Sericea produces hay and grazing during our hot summers. Many farmers credit it with carrying their cattle through drought periods of the last several years. Sericea, a perennial legume, will grow on eroded soils that are low in fertility. There are no important diseases that limit its production or reduce its persistence. It is comparatively inexpensive to establish. These serve to explain why there is more than a half million acres of the crop in Alabama.

As to disadvantages, cattle do not eat sericea as readily as they do such crops as alfalfa, white clover, and Dallisgrass; nor do they produce as well as when fed certain other feeds. Nevertheless, the desirable characteristics tend to outweigh the disadvantages.

Continuing Research Program

It is for this reason that research dealing with sericea has been a continuing program of the API Agricultural Experiment Station. Since 1950, inbred lines have been developed that appear promising for use in producing a more palatable and nutritious variety by plant breeding.

The earlier work, begun in the early 1930's, was concerned with determining fertilizer and lime requirements of sericea, dates and rates of planting, yields of hay and seed, time of cutting, and seed scarification.

More recently the research has been directed at the causes of lower palatability and lower production of animals fed sericea, and at improvement of the crop through plant breeding. For instance, dairy cows fed sericea produced 20% less milk than when fed alfalfa or Sudangrass. In other experiments, it was found that the tannin content of sericea could not be reduced by higher fertilization or by liming.

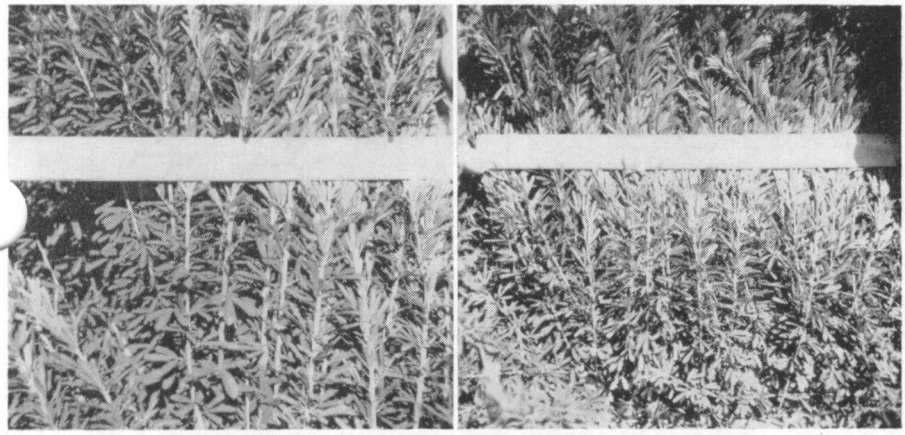


FIGURE 2. Two leafy inbred sericea lines showing thickness of stems. The line at left is a coarse-stemmed type like common sericea, while line at right is fine stemmed, a characteristic that is being bred into a new variety for Alabama.

Improvement By Breeding

Turning to plant breeding, a number of inbred lines having fine, pliable stems have been developed (Fig. 1). Subsequent field and laboratory studies showed that sericea plants and inbred lines varied from fine to coarse and pliable to rigid stems, and in lignin, tannin, and protein content. Results of a "taste test" indicated that cattle prefer sericea having fine, pliable stems. In still another study, leaves and stems of commercial sericea were fed separately to dairy animals. Stems of the common sericea were found to be much more digestible than the leaves. These results further establish fineness of stem as a reliable measure for animal preference or acceptance. Variation in fineness of stems (Fig. 2) may also affect digestibility.

FIG. 1. Fine stemmed, leafy sericea lines growing at the API Experiment Station's Plant Breeding Unit near Tallassee.

The sericea plant contains about 80% as much protein as alfalfa. However, the protein in sericea is only about 50% as digestible as that in alfalfa. Laboratory analyses of inbred sericea lines under study showed certain lines to be relatively high in digestible protein. These lines appear promising for development of a more nutritious variety by plant breeding. To further check the laboratory estimates, animals are being used to test the digestibility of the protein of the inbred lines.

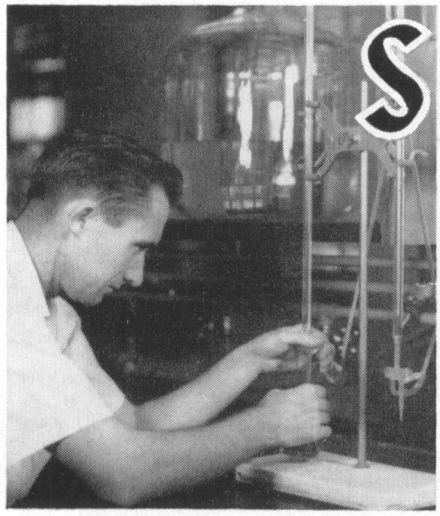
A variation of 15% in leafiness was found among the fine-stemmed inbred lines. In most forages, plants having the higher percentage of leaves would be preferable because leaves are the most digestible and most nutritious part of the plant. The 15% spread in leafiness of the sericea lines indicates the possibility of developing a more leafy variety. However, the greater leafiness will be beneficial only if their digestible dry matter and digestible protein are greater than those in common sericea.

To date this Station has developed inbred sericea lines that have (1) fine, pliable stems; (2) relatively high digestible protein content; and (3) more leaves. The combination of these lines to bring together these qualities, and the testing of the resulting variety are the next steps.

The production of a new, more palatable and nutritious variety that retains the advantages of common sericea is now out of the realm of speculation.

EDITOR'S NOTE: There are no seed of these inbred lines available.

* Present research on sericea improvement is supported in part by TVA funds.



SOIL TESTING—

Makes It Possible for Alabama Farmers To Get the Most from Their Fertilizer Dollars

C. M. WILSON, *Associate Soil Chemist*

DO YOU KNOW the fertilizer and lime needs of each field on your farm? And do you get the most out of your fertilizer dollar?

The answers to these questions become increasingly important as the price squeeze on farm income tightens.

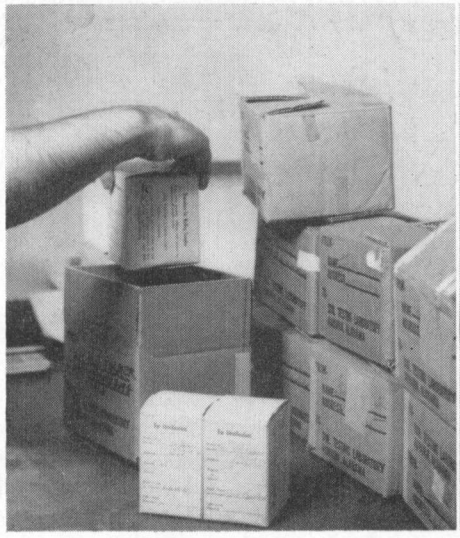
The Soil Testing Laboratory of your API Agricultural Experiment Station at Auburn is prepared to help you stretch your fertilizer dollar, without risk of reducing yields because of lack of fertilization. The idea is to get your fertilizer on the fields and under the crops where needed. So by spending a few dollars for soil testing, you can use fertilizer where it will pay most, especially if money is limited. For example, a certain field might be low in potash and have an abundance of phosphorus built up in the soil from past treatments. In such case, money available for plant food can be spent for only the elements most needed, thereby eliminating possibilities of waste that often occurs when no specific basis for fertilization is followed. Also, in many soils the lack of lime limits crop yields or may cause crop failure in spite of liberal applications of fertilizer. A soil test is the only accurate way for your lime needs to be determined.

All soil samples sent to the Soil Testing Laboratory are tested for available phosphorus and potash, and for acidity and lime requirement. Where peanuts are to be grown, available calcium is also determined and used in making recommendations for this crop. There is a charge of $1 per sample to help cover the cost of analysis.

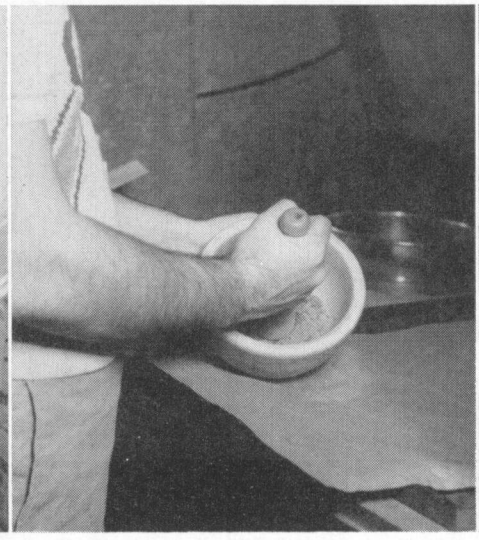
Recommendations

After analysis is completed, the farmer is supplied with a report showing the fertility levels of his soils, and recommendations are made to bring the level up to the requirements for specific crops. Recommendations are

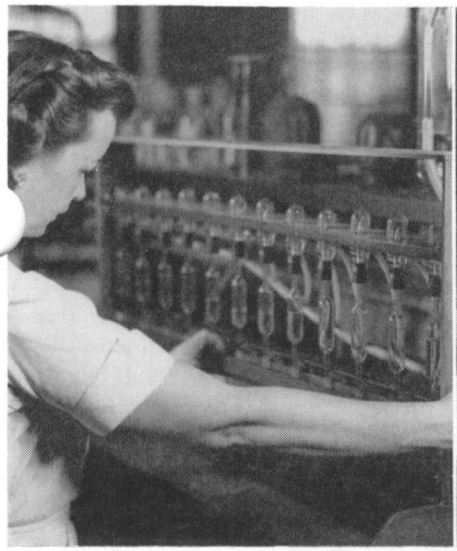
1 **As soon as soil samples arrive at the Soil Testing Laboratory, they are unpacked and given a number.**



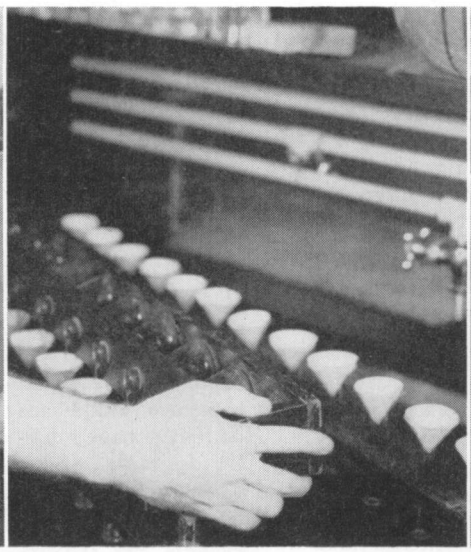
2 **Samples are pulverized and passed through a 10-mesh sieve to remove stones and other material.**



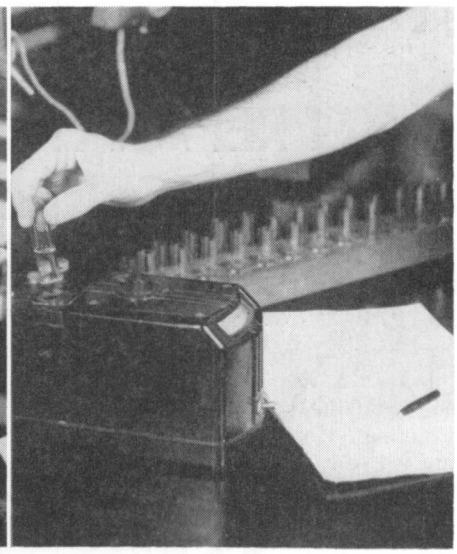
3 **After samples have been ground and screened, they are accurately weighed for analysis.**



4 **A dilute acid solution is added to the samples to dissolve the available phosphorus and potash.**



5 **Samples are filtered to separate the soil from the solution that contains the available phosphorus and potash.**



6 **The amount of available phosphorus present in the soil is measured with a colorimeter.**

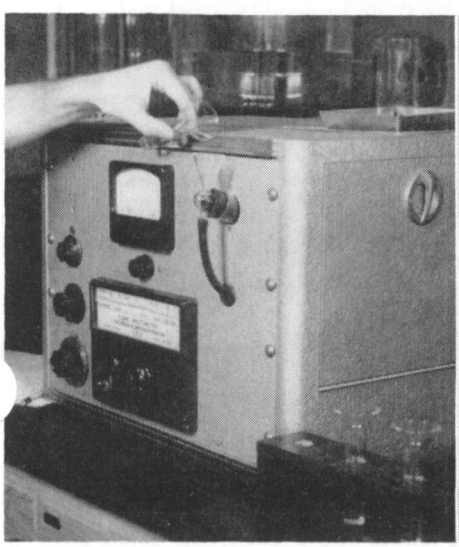
given in pounds per acre of a particular grade (4-10-7, etc.) of fertilizer except the nitrogen is given as pounds of N rather than a particular source like nitrate of soda. The report has a table on the back showing the amounts of various nitrogen materials to give the recommended pounds of N. Lime is recommended where the soil tests indicate it is needed.

Sample Volume

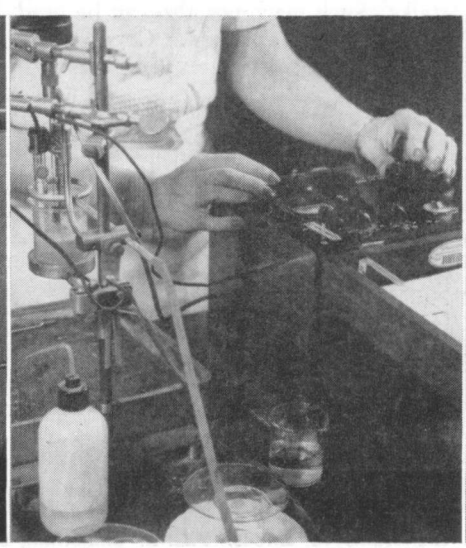
In 1953, the first year that the soil testing program was available to Alabama farmers, 3,340 samples were analyzed by the Soil Testing Laboratory; over 8,500 samples have been received this year. The greatest problem from the standpoint of being able to give rapid and efficient service is that a majority of the soil samples are received during a 3- to 4-month period just prior to time of spring planting. To spread the sample load over more months of the year, *farmers are urged to start sampling for spring crops as early as November and for fall crops as early as July.* To be certain that the proper balance in fertility level is maintained, it is recommended that soils be sampled every 3 to 4 years. Supplies and instructions for taking samples properly are available in the offices of all county agents.

It is especially important that sampling instructions be followed closely, since the value of the results of soil tests depends on how well the sample represents the field to be fertilized.

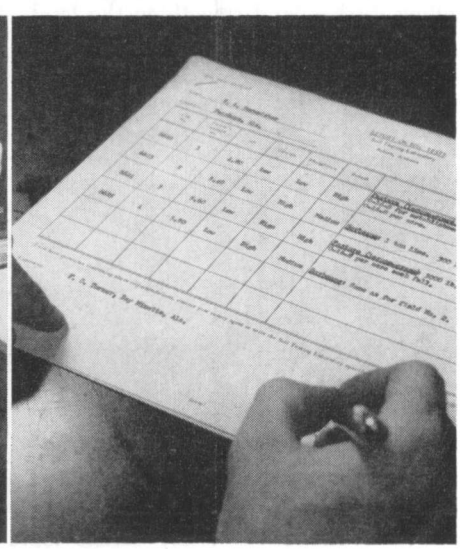
7 **The amount of available potash present in the soil is measured with a flame photometer.**



8 **Soil acidity (pH) and the amount of lime needed are determined with a potentiometer.**



9 **A report of the results and fertilizer recommendations are mailed to the farmer and county agent.**



LAND SELECTION and PREPARATION Are First Steps in Cotton Mechanization

T. E. CORLEY, C. M. STOKES, F. A. KUMMER
Department of Agricultural Engineering

TRACTOR FARMING is precision farming; and the key to success is proper planning. Gone are the days when you shifted the plow handles to miss a rock or stump, or when you uncovered plants by a kick of the foot.

Proper planning is essential for the successful production and harvest of cotton with mechanical equipment. Results of cotton mechanization studies at the Sand Mountain, Tennessee Valley, and Wiregrass Substations and at Auburn have shown that every phase of mechanized cotton production from land preparation to harvesting has a direct effect on the successful performance of each succeeding operation. Consequently, it is important to get off to a good start by carefully selecting the land and properly preparing the seedbed.

Selection of Land

Wherever possible, good land that lends itself to the efficient operation of all types of machinery should be selected. Where such land is not available, it usually is possible to prepare fields for machinery operations by reworking the terraces, changing roads, filling ditches, and smoothing the land. On contoured land, broad-base terraces that will accommodate four rows on each side of the terrace ridge are needed. Large fields that permit a layout of long rows are desirable. Often it is possible to increase the size of fields by eliminating hedge rows and ditches and by changing the fencing and road systems. Rocks and stumps that cause machinery breakdowns and interfere with planting, cultivating, and harvesting operations must be removed. The savings from machine repairs and the increased efficiency of the machinery will soon pay for the cost of removing rocks and stumps. The land should be well drained because a few wet spots in a field will often delay production operations for the whole field and hinder mechanical harvesting because of non-uniform maturity.

Crop Residue Disposal

Proper disposal of crop residue will reduce clogging of machinery when plowing, planting, cultivating, and harvesting. As soon as the crop is harvested, stalks should be cut close to the ground and into small pieces. Power-driven rotary cutters (Figure 1) have proved very effective in shredding stalks. Such machines also can be used for clipping pastures. Cover crops should be turned under in time to allow them to decay before planting time.

Seedbed Preparation

The seedbed is the root of many evils of planting, weed control, and harvesting. One phase of seedbed preparation that greatly improves the planting and weed control is smoothing the soil surface. A smoothing operation eliminates unevenness of the soil surface caused by tillage tools, making it possible to plant at a uniform depth throughout the field, and resulting in uniform emergence. A smooth seedbed improves the performance of rotary hoes, mechanical cotton choppers, sweep cultivators, and equipment for applying chemicals for weed control. Homemade drags pulled behind harrows will eliminate many of the soil irregularities and are the most widely used smoothing tools. Although any kind of a drag will help, land levelers (Figure 2) are excellent tools for smoothing the seedbed. While the use of land levelers in other areas is usually confined to land leveling operations, their use in Alabama is intended primarily for smoothing the land.

To avoid hard spots that will interfere with machinery operations, the land should be broken to a uniform depth of at least 6 inches. Seedbed preparation studies in Alabama show that those areas where treatments most completely inverted the soil surface had the fewest weeds at harvest time. Harrowing just before planting will often eliminate many weeds.

Based on the soil type and topography, implements that will turn under plant residue, pulverize and firm the soil, and smooth the soil surface should be used for preparing the seedbed.

FIG. 1. Power-driven rotary cutters leave the stalks in shreds.

FIG. 2. Smoothing a terrace with a land leveler before planting.

EGG PROFITS or LOSSES?

Profitable Operation Hinges on Good Management and Marketing Practices

J. H. BLACKSTONE, *Agricultural Economist*
H. A. HENDERSON, *Assistant Agricultural Economist*

COMMERCIAL EGG PRODUCTION is a highly competitive farm business, with egg supplies and prices fluctuating within seasons and from year to year. All of this means that good management and marketing practices are a ıust for profitable operation.

At best a laying hen will return about a penny a day to labor, management, and capital. A few mistakes or a little carelessness will wipe out this small profit margin.

Commercial egg production has an advantage over other farm enterprises for the reason that good management practices are clearly defined. Egg producers who know and follow these practices are in a better position to weather low-price periods due to over production in some seasons, large shipments from other states, and competition with other products for the consumer's food dollar.

Alabama has not produced enough eggs to satisfy consumer demands. Practically every year since 1945 this shortage of Alabama-produced eggs has increased, reaching 15 million dozens by 1953. While such deficits have represented opportunities for expansion by Alabama producers, they have actually ›sulted in shipping in eggs from other ates.

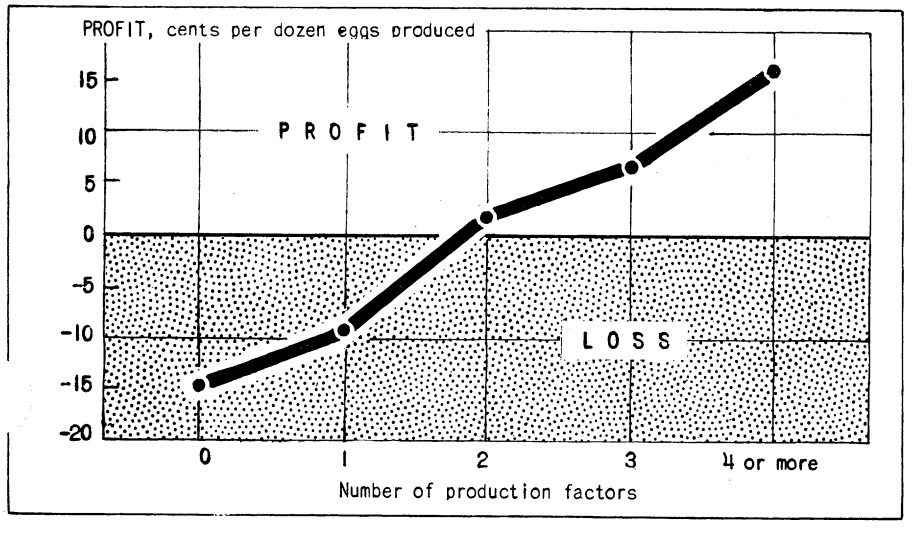
To make the most of the Alabama market, operators will have to produce more eggs and at a lower cost per dozen. There are two distinct groups of factors that affect costs and profit margins. One pertains to production, while the other group relates to marketing and related methods. Production factors include such variables as flock size, rate of lay, feed and labor efficiency, and death losses. How each of these affects success is revealed in a study of 130 commercial egg producers in Alabama during 1951-52.

Size of Flock

The study shows that the smallest size flock for profitable commercial egg production is about 500 layers. Of the 130 producers studied, 48 averaged 1,400 layers and made a profit of 9¢ per dozen eggs produced; 49 farms averaging 500 layers made a profit of 7½¢ per dozen; 33 farms averaging only 300 layers produced eggs at a loss of nearly 4¢ a dozen.

Rate of Lay

Based on this study, the minimum goal should be 180 eggs per layer per year. Of the 130 producers studied, 54 reported 200 or more eggs per bird and a profit of 14¢ per dozen eggs produced; 53 producers reporting 150 to 200 eggs per bird made a 4¢ profit on each dozen; 23 producers who reported less than 150 eggs per layer lost almost 11¢ per dozen.



Egg profits depend on the number of production factors in which flock owners excel.

Feed Efficiency

It was found that market egg flocks should produce a dozen eggs for 6 or less pounds of total feed fed. About half of the producers studied used more than this amount. Feed costs made up about 63% of the total costs of producing eggs. Market egg producers who used 7 or more pounds of feed and hatching egg producers who used 9 or more pounds per dozen eggs produced usually lost money.

Labor Efficiency

The study showed that no more than 6 minutes of total labor should be used per dozen eggs produced. Adjustments could be made in building arrangement, location of equipment, and methods of performing daily chores and handling eggs that would increase labor efficiency on many farms. On the 130 farms studied, profits per dozen eggs produced decreased as the minutes of labor required to produce a dozen eggs increased.

Death Losses

The producers who held mortality to 10 per cent or less made 14 cents profit per dozen eggs produced, while those who had 30 per cent or more mortality lost 7 cents per dozen.

As producers excelled in the foregoing production factors, their profits per dozen eggs produced increased, see chart. Thirteen of the 130 producers were below average in all five factors and lost 15 cents per dozen. In contrast, 28 producers, who were above average in four or more of the factors, made a profit of 16 cents per dozen.

Although highly competitive, producers who do a good job in all phases of production and marketing find it to be profitable.

EDITOR'S NOTE: For complete details of this study, write API Agricultural Experiment Station, Auburn, Ala., for Station Bulletin 290, "Costs and Returns to Commercial Egg Producers."

HIGHLIGHTS
of
AGRICULTURAL RESEARCH

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New and Timely PUBLICATIONS

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

Bul. 291. Marketing Practices of Commercial Egg Producers in Alabama is a report of marketing and related production practices in use, and the relationship of these practices to financial rewards of producers.

Bul. 292. Factors Affecting Handling Costs of Cottonseed at Gins in Alabama is a discussion of practices affecting the costs of handling cottonseed at gins and suggested improvements for increasing efficiency and lowering costs.

Leaflet 28. Poultry Range Shelter is an illustrated report telling the advantages and how to construct movable range shelters.

Leaflet 29. Suggestions for Planting Slash and Loblolly Pine in Alabama's Piedmont tells how, when, and where to plant and the spacing for these two species.

Free copies may be obtained from your county agent or by writing the API Agricultural Experiment Station, Auburn, Alabama.

IRRIGATION? Depends on Reliable Water Source, Costs of System and Operation, and Use of Good Methods

COYT WILSON, *Assistant Director*

DID YOU, like many an Alabama farmer, watch your crops and pastures parch and dry up last summer? And, did you ask yourself the question — what about irrigation?

It is a serious and very important question. Involved are a number of points that must be considered, such as dependable water source, right to use water in streams, use of good farming practices in connection with irrigation, and cash outlay for an adequate system and cost of operation.

Dependable Water Source

Year-round streams are one of the most dependable sources of irrigation water. However, many farms are not situated on stream banks. Farm ponds offer a means of storing surplus water for use during dry periods. However, there are many farms on which the use of ponds is not practicable because of the lack of suitable pond sites. In some areas, too much water is lost by seepage. In others, the area that can be drained into a pond is not large enough to provide enough water for irrigation. Wells offer a solution in the southern and possibly some other portions of the State. However, in the Piedmont and Upper Coastal Plain regions, the capacity of the well is likely to be too low to provide water for irrigation. Information on the availability of groundwater supplies in various parts of the State may be obtained from the Alabama Geological Survey at Tuscaloosa, Alabama.

Right to Use Streams

Alabama does not have laws that define clearly the right of individuals to use water from streams. In some instances, two or three farmers may be able to use all the water that flows through a stream. In such case, those people living farther down the stream may attempt to prevent, by court action, the removal of water for irrigation. The right to use the available water should be investigated before investing in irrigation equipment.

Follow Good Practices

If a crop is to be irrigated, the grower should plant an adapted variety, use adequate fertilizer, and follow good cultural practices. Weeds, insects, and diseases may become more destructive when water is applied as needed by the crop. The grower who invests in irrigation equipment cannot afford a crop failure caused by poor management.

Outlay and Operation Costs

The cost of applying water with portable overhead sprinkler systems is not great. Most published figures fall between $1.50 and $2.50 per acre-inch of water. Even though these figures include interest on investment, they do not indicate the high initial cost of the system. The cost varies depending upon distance that water is to be moved, height to which it must be lifted, and size of system. In most cases, the cost will be at least $2,000 and may be considerably more. Some banks are financing this type of investment, and the Federal Government has passed legislation providing for long-time loans for this purpose.

FREE Bulletin or Report of Progress
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