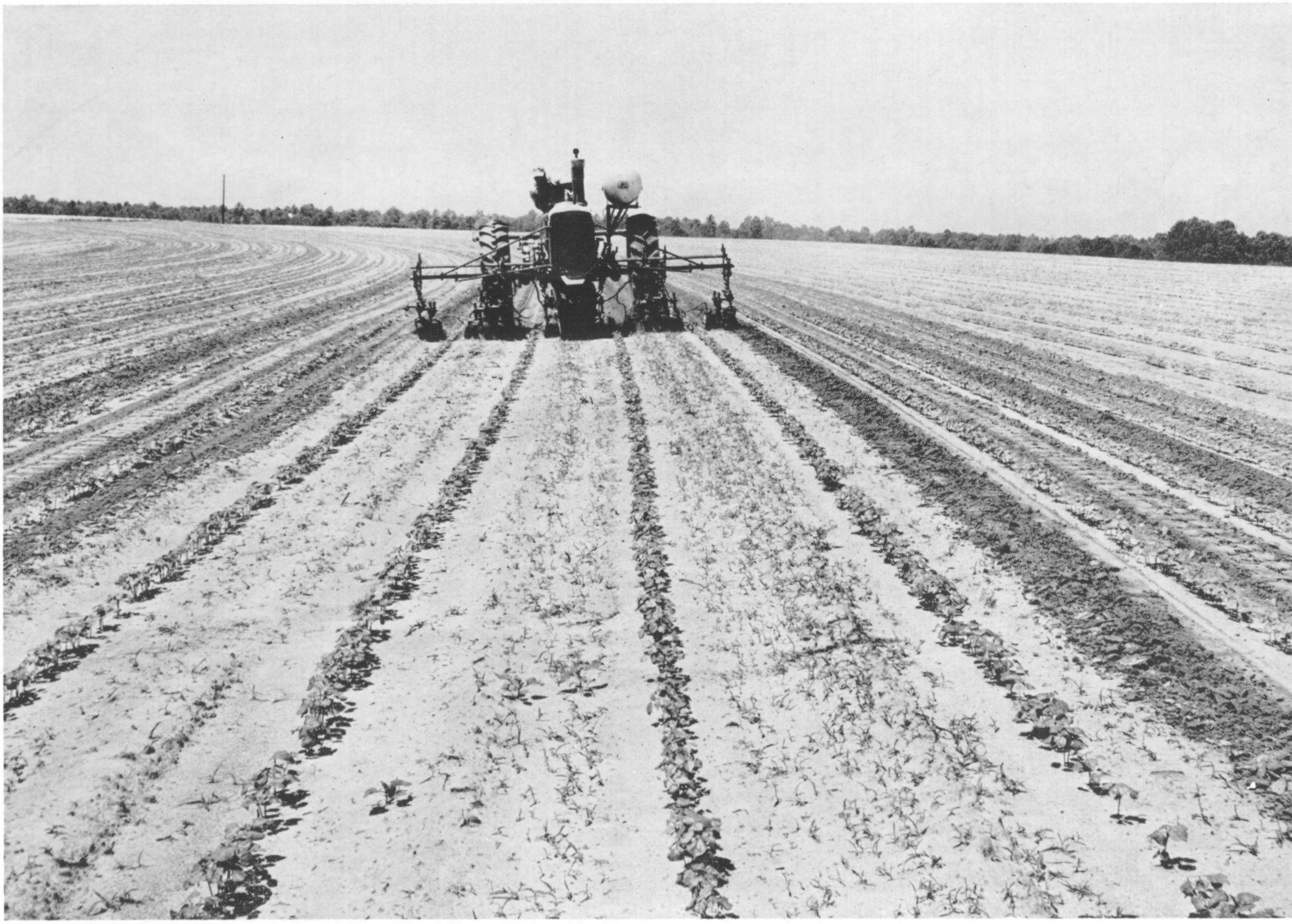
SUMMER 1965

HIGHLIGHTS OF AGRICULTURAL RESEARCH

VOLUME 12
NUMBER 2



AGRICULTURAL EXPERIMENT STATION, AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 12, NO. 2 SUMMER 1965

In this issue . . .

On the cover. Field capacity of row-crop machines is influenced by row length. Parallel terraces are conducive to long rows thereby reducing machine time in the field. Fields without terraces or with parallel terraces and long rows favor increased ground speeds of machinery. Also parallel terracing systems tend to reduce per cent turning for row-crop machines. The influence of terraces on row length, row direction, and row-crop machine capacity is being studied at the Auburn University Agricultural Experiment Station.

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New and Timely PUBLICATIONS

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

Bul. 332. Management of Irrigated Cotton.

Bul. 337. Nitrogen and Moisture Requirements of Coastal Bermuda and Pensacola Bahia.

Bul. 348. Relationships of Marketing Methods to Costs of Assembling, Grading, and Packaging Table Eggs.

Bul. 357. Optimum Farm Organization with Different Livestock Prices, Limestone Valley Areas of Alabama.

Cir. 136. Nitrogen for Dallisgrass Pastures in the Black Belt.

Cir. 146. Precision Irrigation with Solar Energy.

Leaf. 22. Raising Crickets for Bait.

Leaf. 63. Cooler Homes from Attic Ventilation.

Leaf. 70. Serala—A New Sericea Variety.

Prog. Rept. 84. Rainfall Distribution in Alabama.

Prog. Rept. 85. Early Thinnings from Pine Plantations.

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

Parallel terraces are conducive to long rows and reduce machine time in the field.

Row-Crop MACHINE CAPACITY in TERRACED FIELDS

E. S. RENOLL, *Department of Agricultural Engineering*

FIELD CAPACITY of row-crop machines is influenced by row length. Row length is related to field size and shape and in a specific field can be influenced by the number of terraces and terrace arrangement.

The influence of terraces on row length, row direction, and row-crop machine capacity is being studied at Auburn University Agricultural Experiment Station. The study considers the number of terraces per acre, the physical layout of the terraces as well as the average row length associated with this arrangement.

Terraces and Row Length

Terraces have been used for years as a soil conservation practice on sloping row-crop land. Their usefulness is well known. Unfortunately, from the standpoint of machinery utilization, terraces can adversely influence field row length.

Conventional terracing systems with uneven intervals between terraces cause short point rows. Short rows reduce the average row length per field and increase the number of rows per acre. This increases turning time and reduces total productive machine time in the field.

Parallel terraces are conducive to long rows and thereby reduce machine time in the field. A 2-row cultivator study points out the importance of row length. When used in a field with rows 300 ft. long, 20% of the total field time was spent in turning. In a field with rows 1,050 ft. long only 3% of the total time was spent turning.

Machine Capacity

The influence of terraces on machine capacity is shown in Table 1. In 1963 in a field with 9 terraces, the cultivator capacity was 5.3 acres per hour, whereas in 1964 with 4 terraces the capacity was 6.1 acres. The field machine efficiency increased from 85.3% to 90.0% and turning time dropped from 14.7% to 10.0%.

TABLE 1. CULTIVATOR OPERATION AND TERRACE LAYOUT

Item	Field A 1963	Field A[1] 1964
Number of terraces	9	4
Turning time (%)	14.7	10.0
Adjustment time (%)	8.5	4.4
Field machine efficiency (%)	85.3	90.0
Machine capacity (acres/hr.)	5.3	6.1

[1] Same field as in 1963 but with new terracing system.

Turning the cultivator on short point rows in the terrace channel frequently causes sweeps to dig into the terrace ridge. This requires additional time to keep sweeps correctly adjusted and is reflected in the difference in adjustment time for 1963 and 1964.

Analysis of a 4-row cultivator operating in a field with nonparallel terraces, parallel terraces, and without terraces is given in Table 2. Cultivator capacity was

TABLE 2. CULTIVATOR OPERATION ANALYSIS (4-ROW)

Item	Non-parallel terraces	Parallel terraces	Without terraces
Effective cultivator[1] capacity (acres/hr.)	5.0	6.4	7.6
Row end turning time (%)	14.0	8.3	8.5
Field length (ft.)	1,250	1,175	1,125
Average speed (MPH)	4.0	4.5	5.3

[1] Capacity determined for actual time spent in the field. Includes all field stops and adjustments. Does not include daily tractor service, changing cultivator sweeps or lubrication.

2.6 acres per hour more in the area without terraces than in nonparallel terraces. Capacity in the parallel terrace area was greater than in the nonparallel terrace area, but was less than the capacity in the area without terraces. Even though the length for all fields was nearly the same, row arrangement for the nonparallel terrace area not only resulted in some short point rows, but also increased the number of rows per acre.

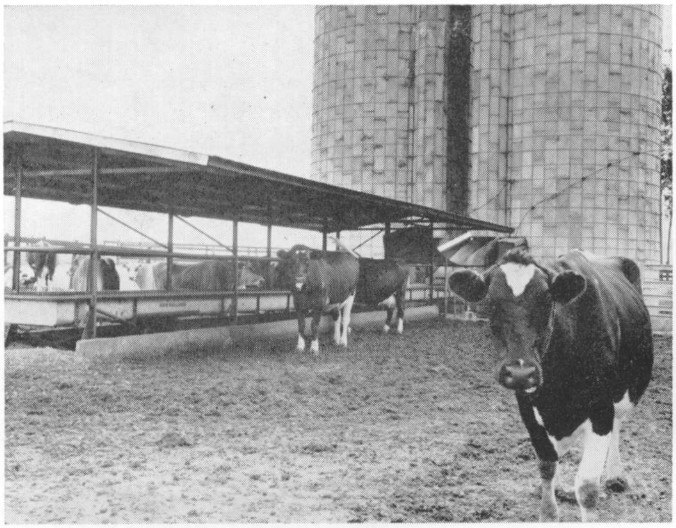
The time per turn for these short rows was greater than for long rows primarily because the turn area for short rows was on the terrace slope. This condition made it somewhat difficult to complete the turn and increased the turning time. The greater turning time of 14% reflects the extra time needed per turn for point rows and extra turns per acre. Turning time per cent for the parallel terrace area and the area without terraces was essentially the same and indicates a similarity of row numbers and lengths per acre.

Reduced cultivator capacity in terraced areas is a reflection of lower average speed for all rows in the area. Operating the tractor and cultivator on sloping area of the terrace usually calls for extra caution on the part of the operator. Caution helps prevent damage to plants but often requires a reduction in speed.

When cultivating short point rows in the nonparallel terrace area, the tractor operator tends to drive at a slower rate than on long rows. This is reflected in the difference in average speeds for the two terraced areas.

Conclusions

Capacity of row-crop machines is influenced by terraces. Terrace layout and number per acre are involved. Cultivator speeds along the row are influenced by the presence of terraces. Fields without terraces or with parallel terraces and long rows favor increased ground speeds. Field machine efficiency is directly related to row length and per cent turning time. Parallel terracing systems tend to reduce per cent turning for row-crop machines.



PASTURE vs. DRYLOT

Systems for dairies in the Gulf Coast Area

J. H. BLACKSTONE, *Dept. of Agricultural Economics*
K. M. AUTREY, *Dept. of Dairy Science*
HAROLD YATES, *Gulf Coast Substation*

THE ALABAMA DAIRYMAN may choose one of several ways of providing forages for his dairy herd. But, there hangs the story!

Each of several feeding systems that may be used has differences in requirements for land, labor, capital, and management. Because of these variations, normally there are differences in feed costs per cwt. of milk produced. Such has been the case with pasture and corn silage in the Gulf Coast Area.

Two Systems Under Test

Two forage systems are now being used in a controlled experiment at the Gulf Coast Substation, Fairhope, a unit of Auburn University Agricultural Experiment Station. One-half the herd is held in drylot and fed corn silage as the only source of forage (yield average 15½ tons per acre per year). The remaining cows have grazing crops and Coastal bermuda hay. Grazing crops include various combinations of small grains, ryegrass, and clover for fall and winter pasture. Millet is the only crop available for summer grazing. The fall and winter grazing provides pasture for about 7 months, with millet being used for the other 5. Coastal hay is available daily to the pasture cows. While some cows eat hay each day, the heaviest consumption occurs at times when quantity or quality of grazing is low.

A simple grain ration of ground shelled corn and soybean meal is used as the concentrate feed for both groups of cows. It is about 16% protein. Both groups of cows are fed grain at the same ratio – approximately 1 lb. of grain to 3 lb. of milk. Cows in the drylot, however, are fed 1 lb. of 41% soybean meal per day per cow in addition to the grain ration. The additional meal is fed in the silo bunks ahead of silage feeding.

At the end of a lactation period, each cow changes groups. This change-over is done in order to eliminate individual cow differences. Corn silage is fed free choice twice daily to cows in the drylot. Milk is measured weekly, while butterfat and solids-not-fat content of the milk are measured monthly.

Results Show Little Difference

Differences between treatments in production level and milk composition have been small. This is shown in the following table as an annual average for the 2-year period of the study:

Item	*Drylot group*	*Pasture group*
Number of cow years	24.7	23.8
Production per cow, 4% FCM, lb.	10,343	10,475
Percentage butterfat	4.19	3.93
Percentage solids-not-fat	8.98	8.95
Acres, winter pasture	----	32.4
Acres, summer pasture	----	28.9
Acres of corn silage	25.9	----
Pounds of concentrates fed per cow	4,180	3,802
Feed cost per cwt. of milk produced:		
1963	$1.96	$2.07
1964	2.07	2.27
2-year average	2.02	2.17

The lower feed cost of milk produced by the drylot cows is directly related to corn silage yields. Increased costs for both groups in the second year resulted largely from increased prices for various input items used for production. For example, corn, soybean meal, some fertilizers, and seed were more costly the second year. At the same time, there were some changes in the inputs used to produce a cwt. of milk.

The drylot feeding arrangement is relatively simple for holding and providing needed attention to dairy cows. Approximately 25 cows are held on ¾ acre of land. Labor and management needs for holding, feeding, and moving cows to and from the milk barn are simple and standardized. Providing forage on a year-round basis is less risky and requires less land than use of a pasture system. The capital investment is some higher for the drylot.

There is some indication that the drylot arrangement places some added stress on the cows. For instance, the drylot cows consumed twice as much of a mineral and salt mixture as did the cows on pasture. Also, the 2-year study indicates that culling will be slightly higher for the drylot group.

May Choose Best Adapted System

Either system can be used by most dairymen in the Gulf Coast Area. Each system provides an opportunity to make some substitutions between land, labor, capital, and management. Each dairy farmer would need to consider his alternatives before shifting from one system to the other. Dairymen who are interested in these feeding systems for their own farms would profit by developing a plan or budget of each system for their unit. A comparison of the two budgets should answer questions about the relative profits from these two systems on individual farms.

BOLLWORMS are as much a threat as Boll Weevils

T. F. WATSON, *Department of Zoology-Entomology*

M. C. SCONYERS, *Wiregrass Substation*

THE BOLLWORM AND TOBACCO BUDWORM may cause as much or more damage to cotton than the boll weevil!

The two, commonly referred to as bollworms or bollworm complex, have been economically important for many years. Recently, outbreaks have become more frequent and severe. In addition, populations in some areas of the Cotton Belt (exclusive of Alabama) have developed resistance to some of the chlorinated hydrocarbon insecticides.

Nature of Damage

Damage is caused only by the larval stage, which feeds on tender terminal foliage, squares, and bolls. To prevent damage, control measures must be applied while the larva is still small, particularly during the first 3 or 4 days. If not controlled, the larva may completely strip a cotton plant of its bolls and squares. Damaged squares usually drop from the plant and damaged bolls are often destroyed, either by larval feeding or by fungi, which act as secondary invaders.

Two Generations Important

Bollworms, as a rule, complete 3 to 4 generations in a year. Usually though, only 2 are of any importance to cotton production. Eggs are laid individually on various parts of the cotton plant by the gravid moth. Under summer conditions, hatching occurs within 3 to 4 days. Upon hatching tiny black-headed larvae begin feeding almost immediately on tender leaf tissue. Six larval instars (stages), each becoming heavier feeders than the previous, are passed in a period of 12 to 16 days. Upon completion of feeding period, the larvae drop to the ground, burrow into the soil, and pupate. This resting period is completed in 14 to 18 days and moths emerge to begin anew. A female is capable of laying 1,000 to 3,000 eggs in her lifetime.

Field Experiments Conducted

Separate field experiments were conducted by Auburn University Agricultural Experiment Station at its Wiregrass Substation, Headland, Ala., to: (1) control bollworms, (2) control boll weevils, and (3) compare application schedules for most effective control of both pests. These experiments were done in the same field of cotton and all treatments in each experiment were randomly repeated 4 times. In one experiment – application-schedule test – the check plots received no insecticides. Thus, cotton losses resulted from activity of both boll weevils and bollworms. In the boll weevil control experiment, all plots were treated with DDT to standardize bollworm control. Therefore, most or all losses in the check plots were from boll weevil damage. The last test was concerned with control of bollworms; all plots received malathion to standardize boll weevil control. Thus, most or all check-plot losses in this experiment resulted from bollworm damage.

To show the additive effect of controlling both weevils and bollworms, a treatment from the application-schedule test that was begun at the same time as the previously described experiments is included for comparison with no control or control of either pest. This treatment consisted of Guthion®-DDT applied on schedule after 10% of the squares were punctured.

TABLE 1. INFESTATION COUNTS OF BOLL WEEVIL AND BOLLWORMS ON UNTREATED COTTON, WIREGRASS SUBSTATION, HEADLAND, ALA. 1964

Infestation	Dates of observation								
	July		August				Sept.		
	23	29	6	12	18	27	1	10	17
Boll weevils*	14	48	65	54	66	92	85	89	93
Bollworms**	2	22	22	8	14	4	6	2	10

* Per cent boll weevil-punctured squares.
** Number of bollworms per 100 terminals.

TABLE 2. YIELDS OF SEED COTTON PER ACRE, WIREGRASS SUBSTATION, HEADLAND, ALA., 1964

Treatment	1st harvest	2nd harvest	3rd harvest	Total yield
	Lb.	*Lb.*	*Lb.*	*Lb.*
No control	850	154	31	1,034
Bollworm control	1,577	362	52	1,991
Boll weevil control	706	596	405	1,708
Bollworm + boll weevil control	1,544	946	339	2,829

Results Point to Controls

Both bollworms and boll weevils caused significant yield losses unless control measures were applied. Heavy infestations of both occurred in the field during the latter half of July. Given in Table 1 are the seasonal infestation counts.

Yields from the various treatments are presented in Table 2. A comparison of yields from the first harvest shows that bollworms caused all of the yields losses sustained from that part of the total crop. In the second picking, however, yield losses were about the same, whereas boll weevil damage was considerably greater in the third harvest.

Results in Table 2 further show the additive effect on acre yield – 2,829 lb. of seed cotton – when both bollworms and boll weevil were controlled. In contrast, when only bollworms were controlled, the acre yield was 1,991 lb., while the yield from control of boll weevil was 1,708 lb.

This and other similar experiments at the Wiregrass Substation have shown conclusively that the bollworm complex can reduce cotton yields as much or more than the boll weevil during years when the weevil does not reach the economic infestation level until midseason or later.

GERMINATED SEED EXTRACT STIMULATES ROOT GROWTH

J. C. MOORE, *Department of Horticulture*

GERMINATED SEED of certain plants are known to contain substances that stimulate either stem growth or root development.

In China cuttings lined out over germinating corn seed showed root stimulation. An old method used in America was to split the base of cuttings and place a number of mustard seed or a barley seed in the split before lining out the cuttings. Several years ago Dr. F. C. Went, then at the California Institute of Technology, showed that cuttings were stimulated by dipping their bases in water in which germinated barley seed had been soaking. More recently Dr. Charles E. Hess of Purdue isolated four cofactors from stem tissue that contained initial root growth. These cofactors had a stimulatory effect upon root development.

It has been shown in tests at the Auburn University Agricultural Experiment Station that cuttings of many widely different plant species were stimulated when grafted into germinated chestnut and Camellia seed. This was accomplished when careful union was made between the cambium of the cutting and the cambium of the cotyledon petioles of the seed.

The structure of the union between cuttings of different species of plants, with cotyledon petiole of the chestnut is being studied under a grant-in-aid project.

In tests made to date, cuttings grafted into germinated chestnut seed have usually made weak unions and failed to maintain the initial stimulation. A few have made good union and have grown well. The weak unions may be a result of the difficulty in obtaining satisfactory cambium contacts or from damage caused by inserting the knife between the cotyledon petioles during the grafting operation.

To avoid the tedious operation of grafting and poor unions that caused later failures, a cutting was stimulated by a water extract of the germinated chestnut seed. The extract was made by grinding the germinated seed and mixing the pulp with equal weight of water. This mixture was allowed to stand for 30 minutes and strained through cheese cloth.

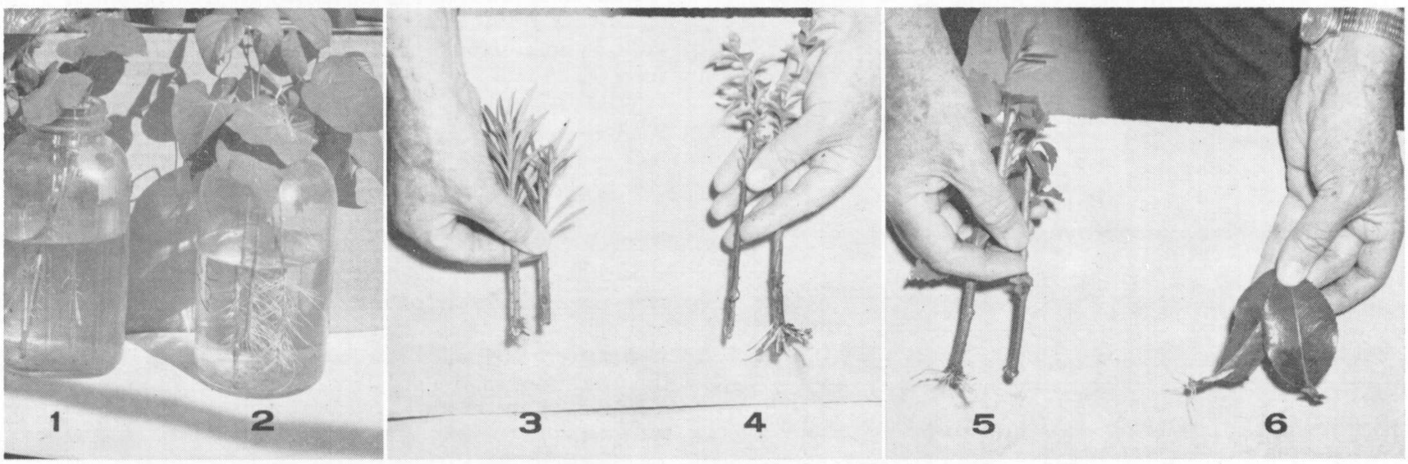
The water extract was used on many widely different plant materials and showed stimulating action on all plants tested. Soft herbaceous tissue was damaged by the concentrated extract, but responded noticeably by using a more dilute solution of the extract or by shortening the time of exposure. This fresh germinated seed extract ferments rapidly and is not stable at room temperature. However, the extract still exhibits its stimulating effect after 12 months storage at 0°F.

Another method being tested for improving stability of the product is a dry powder that can be stored at room temperatures. The chestnuts, after germination, are chipped into small pieces, dried to a constant weight in an oven at 120°F., and ground in a micro grinder with a No. 20 screen. A sample of this material has not lost any of its stimulating effect after 3 months in storage.

Bean hypocotyls, willow stem cuttings, and elderberry stem cuttings have been used in preliminary work because they are known to root rapidly. The figure shows treated and untreated bean hypocotyls in jars of tap water. The well-rooted hypocotyls were dipped in dry germinated chestnut seed powder before being placed in water. The poorly rooted ones were not treated. The figure also shows contrasting results between treated and untreated cuttings of a number of plant materials used in the experiments. Cuttings were taken on January 25, 1965 and one-half treated with the powder made from dry germinated chestnut seed. The other half was left untreated. The treated and untreated cuttings were placed under ideal rooting condition with heat of 70°F. underneath in a medium of ½ peat moss and ½ sand by volume, and sprayed with intermittent mist, 5 seconds out of each 2 minute cycle from 7 a.m. until 5 p.m. These conditions are not essential for stimulation of roots on cuttings, but the results are obtained faster.

One must remember that growth promoting substance whether auxin, enzyme, gibberellins, kinnins, phytochrome, proenzymes, cofactors, naphthyls, rhizocalin, indoles, phytohormones, amino acids, or a combination of certain of these materials cannot substitute for good propagation practices. These materials and many others have been reported as having stimulatory effects upon plant growth.

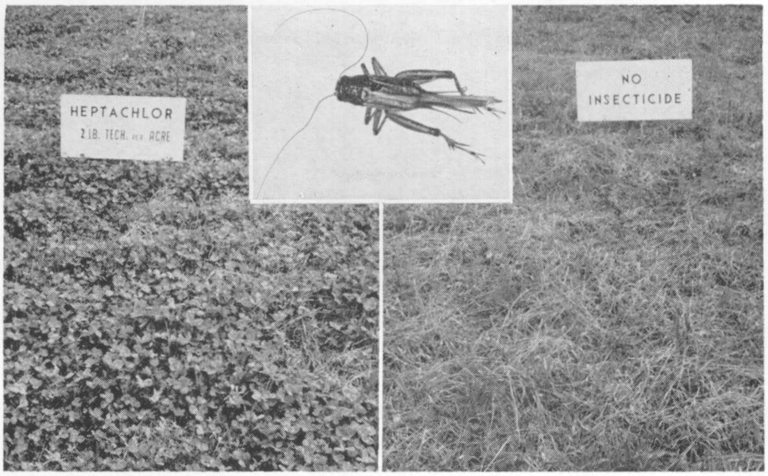
Chestnut seeds, such as used in these experiments, are easily obtained.



Photos above show (1) untreated hypocotyls, (2) hypocotyls treated with germinated chestnut seed extract, (3) cuttings of yew, left treated, right untreated, (4) crepemyrtle cuttings, left untreated, right treated, (5) cuttings of althea, left treated, right untreated, and (6) two leafbud cuttings of camellia, left treated, right untreated.

Pygmy Crickets—Guilty of Damaging White Clover

E. M. EVANS, *Dept. of Agronomy and Soils*
MAX BASS, *Dept. of Zoology-Entomology*
L. A. SMITH and H. W. GRIMES, *Black Belt Substation*



How pygmy crickets damage newly planted white clover is dramatically illustrated by this Black Belt Substation comparison. Heptachlor treated area (left) has good stand of clover, but none can be seen on untreated plot. Insect that causes the trouble (shown in inset) is dark brown to black and only about ½ in. long when fully grown.

THE CHEERFULLY CHIRPING cricket may look like the model of innocence, but appearances can be deceiving. Research shows that the pygmy cricket can be a destructive pest of white clover.

During recent years white clover has practically disappeared from pastures where it was formerly highly productive. Establishment of new clover stands has become difficult, both from plantings and natural reseedings.

Failures with clover plantings have been blamed on bad weather, pollination failures, seed destruction by the clover head weevil, fungal diseases, and competition from dense grass sods. No doubt many of these factors are involved, but for several years insects have been suspected of destroying clover seedlings. Early evidence came from observations of areas treated with persistent insecticides for fire ant control at the Black Belt Substation. White clover on the treated areas was larger, more abundant, and bloomed earlier than on adjoining untreated areas.

Observations of new plantings at the Substation revealed a characteristic damage pattern on areas not treated with insecticide. Many clover seedlings were eaten soon after emergence, leaving only the stem. Larger plants often had semicircular areas eaten from the leaf. Both types of damage are typical of chewing insects, such as the cricket. In greenhouse tests last fall, pygmy crickets destroyed white clover seedlings when confined to the plants. Damage was like that observed in the field.

To further define the problem of white clover establishment and persistence, experiments were established on dallisgrass pastures on Houston and Vaiden soils at the Black Belt Substation during summer 1964. These incorporate a wide range of treatments, including: (1) degrees of pre-plant grass sod destruction and soil preparation with tillage and chemicals; (2) rates of seeding clover, varieties of white clover, and use of companion crops; and (3) subsequent use of insecticides and differential fertilization.

Pre-plant treatments were done in strips 25 x 255 ft. in mid-August. Treatments other than insecticidal were applied in 20-ft. strips across the pre-plant preparation strips. Three insecticidal treatments were applied in bands a minimum of 25 ft. wide. One band got no insecticides. Seeding and insecticidal treatments were made September 9 and 10.

Moisture was favorable for early clover germination on strips having complete soil preparation and these showed insecticidal effects by mid-October. Plots with no insecticide had fewer clover seedlings. Those treated with 2 lb. of technical heptachlor (40 lb. of 5% granules) per acre had good clover stands. Pygmy crickets were numerous in the surrounding pasture and on untreated areas, but scarce where heptachlor had been applied.

EFFECTS OF INSECTICIDES ON WHITE CLOVER STANDS

Pre-plant preparation[1]	Clover plants per square foot: Untreated	Clover plants per square foot: 2 lb. heptachlor
1. plowed, disked, and fumigated	2.8	12.4
2. plowed and disked	5.0	12.0
3. light disking	0.8	20.0
4. ½ lb. paraquat	0.4	19.6
5. 1 lb. paraquat	0.4	13.8
6. close mowed in late summer	0.4	17.0
7. 2½ lb. dalapon	1.0	18.4
8. 5 lb. dalapon	2.0	22.0
9. 5 lb. dalapon	0.4	19.2

[1] Amounts of herbicides are per acre. Treatments No. 4 through 8 were broadcast sprays; No. 9 was strip spray in 18-in. bands, but rate is for broadcast.

By January 7, 1965, effects of insect control were evident on plots with all degrees of pre-plant preparation. Stand counts on adjacent plots on the Vaiden soil are recorded in the table (averages of five random 1-ft.-square quadrat readings per plot).

Thoroughness of pre-plant preparation had a definite effect on stand, but this was slight compared to that from insecticide application. Similar results were noted on Houston soil.

Results reported are preliminary and additional work is needed to determine extent of the problem and to find better control methods.

Crickets were numerous last fall in Wilcox, Macon, and Lee counties, in addition to those in Dallas County. Survey entomologists reported extensive feeding of crickets on white clover in Clay County on November 6.

Available information describes the cricket as a "one generation per year insect" that is susceptible to many insecticides. With proper timing of applications relative to time of seeding, it may be possible to control the pest by treating relatively large areas with less persistent insecticides. Under current regulations heptachlor cannot be recommended.

POSSIBILITIES STUDIED—

Cooling Layers to Overcome Depressed Egg Production Caused by Heat Stress

J. R. HOWES, *Dept. of Poultry Science*
WALTER GRUB and C. A. ROLLO, *Dept. of Agricultural Engineering*

How HIGH TEMPERATURE affects the well-being and productivity of domestic poultry has only recently been investigated critically. Much of the detailed knowledge now available has been obtained at Auburn University Agricultural Experiment Station from long term studies with growing and laying birds.

It is essential that such research be done in the Southeastern United States because this region has more heavy breeder and broiler flocks than anywhere else in the world. Furthermore, the region is increasing its turkey and laying hen flocks at a rapid pace and, before long, the majority of these birds grown in America may be found in the Southeast.

Detrimental effects of constant temperatures above 80°F. on growth and production were indicated by previous studies. However, certain advantages in carcass quality and feed efficiency are apparent with broilers grown at high temperatures.

It has long been suspected that heat stress may be cumulative, and that long periods of relatively high temperature may be equal to shorter periods of extreme heat. Auburn data presented in Figure 1 indicate such a reaction for flocks of one strain of S.C.W.L. (Single Comb White Leghorn) pullets. When fed identical diets and maintained constantly at 60% relative humidity with 14 hours light daily, equal depression of egg production resulted from 64 days at 100°F, 108 days at 90°F., and 224 days at 80°F.

In further studies during the past 2 years, birds were maintained in chambers in which the temperature never went below 50°F. or above selected upper limits. For one test group, the temperature varied freely between 50° and 70°. Another group experienced temperature variations between 50° and 85°, and a third group was exposed to fluctuations between 50° and 100°F. Results from a full laying cycle are presented in the table.

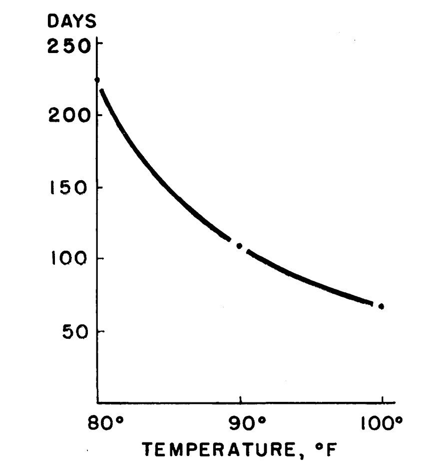


FIG. 1. Cumulative effect of heat stress on egg production is illustrated by graph showing days required for production to decline to 50% after the onset of lay.

Birds in the 50° – 85° regimen were exposed to 3,350 hours of temperatures above 70°F. not experienced by birds kept at 50° – 70°. Those in the 50° – 100° group encountered an additional 748 hours at temperatures hotter than 85°. The additional heat that resulted when temperatures were allowed to fluctuate (more natural conditions) depressed egg production, as shown by data in the table. There was a similar but more pronounced trend for egg size. The greatest depressive effects in egg production, however, were recorded for the birds exposed to temperatures in excess of 85°F.

In an attempt to determine effects of cooling periods interspersed during hot weather, another study was recently carried out for a 6-month period. Groups of laying birds kept at 80°F. were subjected twice weekly to either 90° or 100°F. temperatures for 2-hour periods followed by 2-hour exposures to either 50° or 65°. For comparison, one group was exposed only to 90°F. and another group only to 100°F., without any cooling below 80°. Effects on egg production are illustrated by Figure 2.

EGG PRODUCTION OF S.C.W.L. PULLETS UNDER DIFFERENT TEMPERATURE REGIMENS

Temperature regimens	Egg production by months			
	1-3	4-7	8-11	Over-all
	Pct.	*Pct.*	*Pct.*	*Pct.*
50°-70°	79.1	67.5	42.0	62.2
50°-85°	78.0	58.8	47.4	61.4
50°-100°	73.1	56.9	34.9	55.0

Birds exposed to 90°F. for 2-hour periods benefitted by subsequent cooling, with 50° being better than 65°. A similar trend was observed for the birds exposed to 100°F., but egg production at this high temperature was depressed for every treatment. Four hours of exposure each week to 100°F. rather than 90° depressed egg production by an extra 5%, and a similar difference was encountered by all treatments involving 100°F.

Cooling an extra 15° was more beneficial for the birds exposed to 100°F. This indicates that stress from extreme heat is more effectively overcome by greater cooling. Further experiments are seeking to discover the degree of cooling required for maximum benefits for laying poultry.

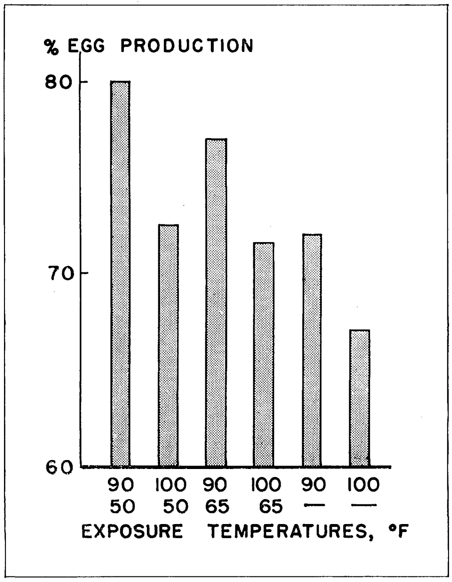


FIG. 2 Periodic cooling during hot weather increases egg production, as shown here. Given is per cent lay of pullets maintained at 80°F. except for 2-hour periods of exposure to heat and cold twice weekly.

How much do URBAN FAMILIES pay for FOOD?

RUTH A. HAMMETT, *Department of Agricultural Economics*

MOST HOMEMAKERS want to feed their families well at the lowest cost. From practical experience they are aware of the relationship of food bills to family size, income, and kinds of persons fed. However, few homemakers know how to measure their ability as a food purchaser against the performance of other homemakers, or how much a nutritionally adequate diet should cost. Recent food buying decision-making studies may provide useful information for homemakers who want answers to these questions.

During the past 30 years, home economists in the USDA have developed five weekly food plans based on the National Research Council's Recommended Dietary Allowances. These family food plans are widely used by welfare agencies, in home management classes, and for estimating the potential demand for agricultural products. Costs of food in the plans, by sex and age groups, are periodically adjusted to current prices. The low-cost plans include one adapted to Southeastern food habits and an economy plan.

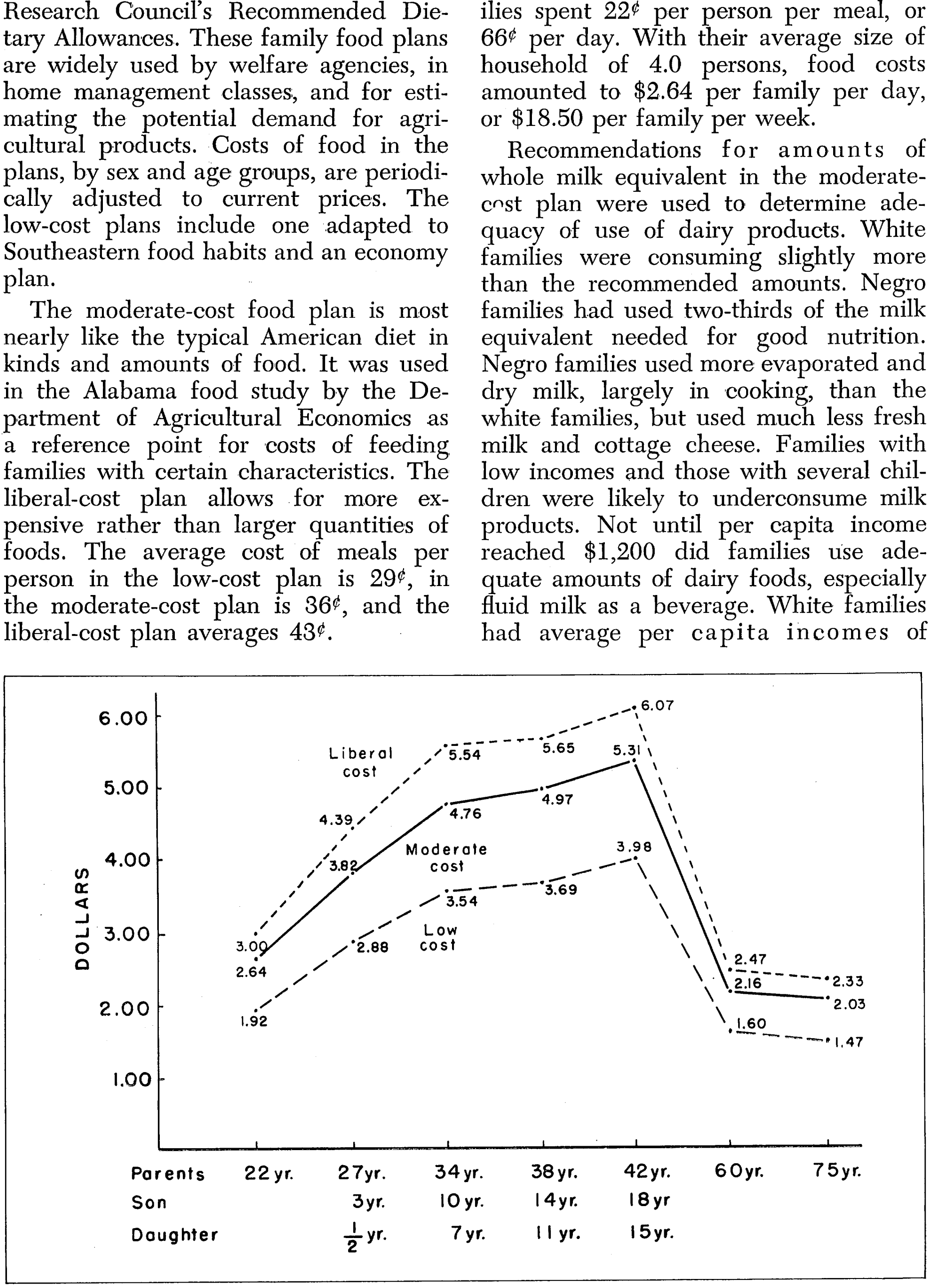
The moderate-cost food plan is most nearly like the typical American diet in kinds and amounts of food. It was used in the Alabama food study by the Department of Agricultural Economics as a reference point for costs of feeding families with certain characteristics. The liberal-cost plan allows for more expensive rather than larger quantities of foods. The average cost of meals per person in the low-cost plan is 29¢, in the moderate-cost plan is 36¢, and the liberal-cost plan averages 43¢.

White families in the Alabama study spent an average of 34¢ per person per meal, or $1.02 per person per day. With an average size household of 3.3 persons, these families spent $3.37 per day, or about $24 a week for food. Negro families spent 22¢ per person per meal, or 66¢ per day. With their average size of household of 4.0 persons, food costs amounted to $2.64 per family per day, or $18.50 per family per week.

Recommendations for amounts of whole milk equivalent in the moderate-cost plan were used to determine adequacy of use of dairy products. White families were consuming slightly more than the recommended amounts. Negro families had used two-thirds of the milk equivalent needed for good nutrition. Negro families used more evaporated and dry milk, largely in cooking, than the white families, but used much less fresh milk and cottage cheese. Families with low incomes and those with several children were likely to underconsume milk products. Not until per capita income reached $1,200 did families use adequate amounts of dairy foods, especially fluid milk as a beverage. White families had average per capita incomes of $1,200, but Negro incomes were half this amount.

To aid homemakers in determining costs of providing nourishing foods for their families, the moderate-cost plan was adapted to a per-person-per-meal basis, see table. Multiply the appropriate single meal cost for each family member by the total meals eaten at home over a 7-day period. The total for all family members represents the cost of providing healthful food for your family at current prices.

Homemakers know that as the family increases in size and the children go into adolescence, the food bill becomes larger. In the figure, a typical family is taken through the years from marriage to old age to illustrate an application of data in the table to food costs and stage in the family cycle. The daily food costs at three levels were calculated from individual meal costs by age and sex, multiplied by 3 (meals per day). Spending this amount does not guarantee a properly nourished family, but it does provide guide lines for the homemaker in planning her food budget.



Typical daily meal cost during the family cycle at three cost levels.

PER CAPITA MEAL COSTS BY SEX-AGE GROUPS, BASED ON MODERATE COST PLAN ADJUSTED TO SEPTEMBER 1964 FOOD PRICES[1]

Age group	Male	Female
	Cents	*Cents*
Under 1 year	.186	.186
1-2 years	.233	.233
3-5 years	.281	.281
6-8 years	.338	.338
9-11 years	.390	.386
12-14 years	.462	.424
15-19 years	.529	.433
20-34 years	.457	.400
35-54 years	.424	.385
55-74 years	.390	.333
75 years and over	.376	.300
Pregnant women	......	.467
Nursing women	......	.533

[1] *Family Economics Review,* Consumer and Food Economics Research Division, Agricultural Research Service, United States Department of Agriculture. Washington, D. C. December 1964. pp. 27-28.

Adapted from quantities of food needed for good nutrition at the moderate cost level at current prices. See *Family Food Plans and Food Costs,* Home Economics Research Report No. 20, 1962. Also see "The Farm Index," Economic Research Service. USDA August 1964.

Sources of Trash in Cotton Harvesting*

T. E. CORLEY, *Department of Agricultural Engineering (Coop. USDA, ARS, AERD)*

BACKACHE is fast being eliminated from cotton picking in Alabama, as harvesting with mechanical cottonpickers becomes standard practice.

Despite their many advantages, mechanical pickers also have disadvantages. Quality of cotton fiber is often lowered by trash contamination during mechanical harvesting and the subsequent cleaning of seed cotton and lint at the gin to remove the trash. This lowered quality weakens cotton's competitive position with synthetic fibers.

Sources of contamination were studied during 1962-64 by Auburn University Agricultural Experiment Station in cooperation with AERD, ARS, USDA. The method of trash identification was based on a process of elimination – by removing known sources of trash from the plants before harvesting and then determining the amount and character of each in the harvested cotton.

Three trash sources were removed by hand before harvesting: leaves, boll bracts, and ground trash. Each year the study was conducted in well defoliated cotton that had a small amount of new growth. Treatments consisted of an untreated defoliated check; removing each trash source separately; and removing all three sources.

All three sources were removed from two sets of plots for picking with a "clean" and a "dirty" picker. (A "dirty" picker was one whose picker drum had not been cleaned after picking several hours in an adjacent field; the "clean" picker had been thoroughly cleaned before picking each plot.)

Leaves, bracts, and ground trash – the sources removed – are not the only sources of trash. This is evidenced by trash found in the cotton having all three sources removed before harvesting. Analysis of the trash showed that the bur was an important source. The burs and limbs were weighed separately to determine what amounts they contributed to the total trash.

Remaining trash from the cotton treatment where all three trash sources were removed before harvesting contained some cotton fibers lost during the fractionation processes and some fine particles of foreign matter. It is believed that this foreign matter consisted of soil particles deposited on the cotton by rain and wind before harvesting and flakes of burs. Too, the test technique was not perfect since it was difficult to remove all of the trash before harvesting. This unidentified trash amounted to 14% of the total during the 3 test years.

After determining trash content for each treatment, it was possible to calculate the amount of trash from each source. The total trash was based on actual weights of trash removed from the harvested cotton and averaged only 4.2%. Based on calculated values, it was divided into these sources: bur, 50%; leaf, 20%; bract, 12%; limb, 3%; ground, 1%; and unidentified, 14%.

The bur content varied from 30% in 1962, when cotton was harvested soon after bolls opened, to 64% in 1964, when harvesting was delayed several weeks after bolls were open and 12 in. of rain fell on the open cotton. Burs are fairly easy to remove in the gin and do not contribute much to contamination of lint.

Fine trash is difficult to remove in ginning, especially if the particles are imbedded in the fibers. Content of fine trash in the test cotton averaged 1.3% (about ⅓ of total trash) and consisted of 38% leaf, 40% bract, and 22% unidentified trash.

There was no difference in trash content between cotton harvested with a "dirty" and "clean" picker.

Results of the Auburn studies can be summarized in these five major findings:

(1) Ground trash was not a source of contamination.

(2) Trash in the drum of a "dirty" picker did not contaminate the cotton. Thus, less frequent cleaning of drum than is now recommended appears possible.

(3) Boll bracts constituted a large portion of the fine trash. This points up the desirability of a bractless cotton for mechanical harvesting.

(4) Leaf trash was a major source of contamination, even in well defoliated cotton. Defoliated leaves that lodged on the plant and open cotton accounted for most of this trash.

(5) Burs made up an average of 50% of total trash. The percentage varied greatly from year to year, depending on deterioration of burs before harvesting.

This test area was used in the study of sources of trash in harvested cotton. Left: leaves, boll bracts, and ground trash were removed by hand before harvesting; right, untreated check.

* Based on a contributing study to the Regional Cotton Mechanization Project S-2.

GOOD FEED CONVERSION:

Decreasing light schedule results in fast broiler gains

D. F. KING, *Dept. of Poultry Science*

CORRECT LIGHTING for broilers is less costly to provide and is easier to control than correct temperatures or ventilation!

Yet it is often given little consideration, even though results show that under normal conditions correct lighting will yield greater gains than the most favorable temperature or ventilation.

Longtime Experiments

Research at Auburn University Agricultural Experiment Station with broiler light has been extensive and for a long period of time. Results from the first tests show that broilers grow faster during the first 4 weeks of age on 24 hours of light per day than they do on 6 hours of light per day. From 4 to 8 weeks of age, however, broilers grow better on 6 hours of light per day than under continuous light. These tests would indicate that the amount of light should be reduced with increasing age. Results of other tests show that broilers receiving 24 hours light per day for 2 weeks, 18 hours 2 to 4 weeks, 12 hours 4 to 6 weeks, and 6 hours 6 to 8 weeks were not as large as those getting 6 hours throughout the growing period. The shock of reducing the hours of light every 2 weeks apparently suppressed growth.

Further tests have revealed that the stress of reducing light hours can be overcome by reducing the light intensity with increasing age. Table 1 shows that broilers getting 24 hours of light per day with decreasing intensity were larger at 8 weeks than those getting 6 hours, 24 hours, or 12 hours light of constant intensity throughout the growing period.

Research results on correct light intensity for broilers of various ages are given in Table 2. In these tests, broilers started on 2 foot candles of light and reduced gradually to ½ foot candle at the end of the growing period weighed more than broilers grown on other decreasing light schedules.

Light Schedule to Use

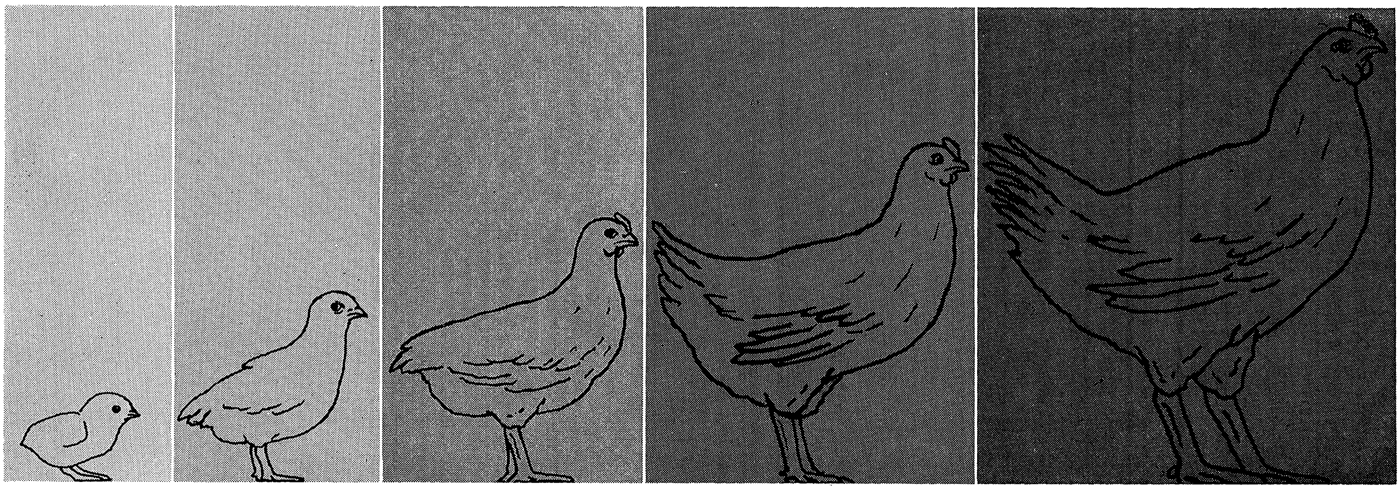
Poultrymen can use this decreasing light schedule in their windowless houses by starting the broilers on 40-watt bulbs. At 1 week of age, half of the bulbs (every other one) should be replaced with 25-watt bulbs. At 2 weeks use all 25-watt bulbs, at 3 weeks half 25- and half 15-watt bulbs, at 4 weeks all 15-watt bulbs, at 5 weeks half 15- and half 7½-watt bulbs, at 6 weeks all 7½-watt bulbs and at 7 weeks remove half of the 7½-watt bulbs. This light schedule will result in good growth, excellent feed conversion, low mortality from picking and cannibalism, less bruises, good feathering and extra fat, high quality, docile broilers.

TABLE 1. BROILER WEIGHT AS EFFECTED BY DECREASING LIGHT INTENSITY

Light schedule	Weight in grams
Decreasing intensity	1187
6-hour light day	1106
12-hour light day	1051
24-hour light day	1099

TABLE 2. BROILER WEIGHT IN RELATION TO DECREASING LIGHT OF DIFFERENT INTENSITIES

Light schedule, foot candles	Weight in pounds		
	Males	Females	Average
1.5-0.0	2.98	2.46	2.72
2.0-0.5	3.17	2.55	2.86
2.5-1.0	3.05	2.65	2.85
3.0-1.5	2.87	2.54	2.71
3.5-2.0	2.90	2.43	2.66
2.0	3.00	2.50	2.75



Decreasing light intensity results in good growth, excellent feed conversion, and high quality broilers.

Most Farms too Small to Net $5,000 Income *in Limestone Valley Areas*

P. L. STRICKLAND, JR., *USDA and*
E. J. PARTENHEIMER, *Dept. of Agricultural Economics*

MOST ALABAMA FARMERS operate farms too small to yield incomes comparable to those of their nonfarming neighbors!

In the Limestone Valley Areas, nonfarm incomes of $5,000 are not uncommon. An analysis was made by USDA and Auburn University Agricultural Experiment Station economists to determine the least amount of open land needed to yield a $5,000 return to the operator for his labor and management. Results indicate that in 1959, 81% of the farms in the Limestone Valley Areas were too small to yield such an income.

Method of Study

Analyses (linear programming) were made to determine the minimum open land and other resources, and the best (optimum) combination of enterprises that would yield the $5,000 return. To further analyze how future changes might affect the optimum, estimates were made for selected cotton allotment levels, cotton prices, and values of open land.

It was assumed the operator was available for full-time work on the farm. Seasonal labor could be hired to do crew jobs and odd jobs at 60¢ per hour. The operator owned one new and one used tractor and a full set of land preparing, planting, and cultivating equipment. He also owned a one-row corn picker. All cotton produced was custom machine picked. Interest and depreciation on the owned machinery were charged as farm expenses.

Enterprise cost and returns budgets were estimated, using the best management practices currently used by top farmers in the Areas. The crop enterprises that could be used and their yields per acre were: cotton, 700 lb. of lint; corn, 65 bu.; oats, 70 bu.; wheat, 40 bu.; soybeans, 22 bu.; alfalfa hay, 4.5 tons; lespedeza hay, 2 tons. Livestock enterprises were: hogs, two 8-pig litters per sow, per year; beef cows, 90% calf crop; and steers. Achieving the assumed cotton yield will require less improvement in management for the average farmer than that required to achieve the other yields.

The prices expected for these commodities were: corn, $1.05 per bu.; oats, $0.80 per bu.; soybeans, $2.20 per bu.; alfalfa hay, $34 per ton; lespedeza hay, $28 per ton; fat hogs, $16 per cwt.; and fat calves, $22 per cwt. A cotton price of 31.2¢ per lb. of lint was used to approximate current market conditions. The current agricultural value of an acre of open land was estimated at $200.

Results of Study

The minimum acres of open land required to yield a $5,000 operator labor and management return range from 97 to 117 acres. (See Table.) Further analysis indicates that the corresponding requirements to yield a $7,000 return are 130 acres and 155 acres.

With 31.2¢ cotton, the optimum enterprise organizations included cotton to the allotment limit, oats, corn, hogs, and beef cows. As the cotton allotment increased, corn acreage and sow numbers decreased. Oats acreage remained the same. With a 26¢ cotton price and $16 per cwt. hogs, it was more profitable to produce corn and hogs than to produce cotton. (See Table.)

The big increase in acreage requirement for a $5,000 return occurs when the land value changed. However, changing the land price did not affect the relative size of the enterprise. For farmers who already own their land, land values could have little effect on farm income. For those who need to purchase additional land, the effect of the increasing land values could seriously hinder their ability to pay for land and make a fair income for family living.

The small number of beef cows in these plans utilized the available unplowable open land that was not used by any other enterprise. This small number of cows could be disregarded as an enterprise with little effect on the net income. For farmers who have a higher proportion of unplowable open land, beef cows could be used to utilize this pasture.

Summary

Although the estimated farm sizes to obtain the $5,000 income are small enough to be family farms, they are much larger than the present average farm in the Areas. According to data in the 1959 census, four out of five farms in the Areas had fewer than 97 acres of open land. In 1959, 91.5% of the farms in the Areas had fewer than 155 acres of open land. These acreages are the minimum required assuming highly skilled management levels. Therefore, most farmers in the Areas now have too few resources to consistently yield an average of $5,000 to operator labor and management.

The family farm in Alabama agriculture is not doomed. However, if the operators are to receive incomes equal to their nonfarm neighbors, the size of farm must continue to increase and the number of farms will continue to decline for some time.

MINIMUM REQUIREMENTS FOR $5,000 NET RETURN TO OPERATOR LABOR AND MANAGEMENT: SPECIFIED COTTON ALLOTMENTS (PER CENT OF 1963 ALLOTMENT), COTTON PRICES, AND OPEN LAND VALUE PER ACRE, LIMESTONE VALLEY AREAS, ALABAMA

Item	Situation				
	100% allot. 31.2¢ cotton $200 land	115% allot. 31.2¢ cotton $200 land	85% allot. 31.2¢ cotton $200 land	100% allot. 26¢ cotton $200 land	100% allot. 31.2¢ cotton $400 land
Open land, *acres*	98.2	97.1	99.2	105.7	116.9
Cotton, *acres*	17.7	20.1	15.2	0	21.0
Corn, *acres*	46.0	43.1	48.9	66.9	54.8
Oats, *acres*	16.2	16.3	16.2	15.8	19.3
Pasture, *acres*	18.3	17.6	18.9	23.0	21.8
Beef cows, *No.*	4.2	4.1	4.2	4.5	5.0
Sows, *No.*	17.5	16.4	18.7	25.5	20.9
Av. invest. (exclud. land), *dol.*	11,820.00	11,563.00	12,082.00	13,682.00	12,791.00
Av. ann. operating capital, *dol.*	2,519.00	2,456.00	2,583.00	2,974.00	3,000.00
Seasonal labor required, *hr.*	197	197	197	195	234

High CONCENTRATE Levels + COASTAL Inadequate for DAIRY COWS

G. H. ROLLINS
L. D. GUTHRIE
Dept. of Dairy Science

POOR FEEDING AND MANAGEMENT can result in low production in dairy cows regardless of inherited capability.

This condition is suspected when cows begin their lactation at a high level but fail to maintain lactation persistency at or near the accepted rate of decline of 6-8% per month.

In studies at the Dairy Research Unit, Auburn University Agricultural Experiment Station, lactation persistency of cows confined to Coastal pastures declined at a rate of 12% per month. This suggested that the nutritive requirements of cows grazing Coastal were not being met when they were fed concentrates daily at the rate of 1 lb. to each 3-4 lb. of 4% fat-corrected-milk (FCM).

Therefore, a study was made to test the effect of feeding a high level of concentrates to cows grazing Coastal.

Twenty-four cows ranging in production from 36 to 62 lb. per day of 4% FCM were used as test animals. Following a 2-week standardization period during which all cows received the same treatment, they were assigned to 4 experimental treatments as follows: (A) Coastal pasture fulltime + 1 lb. concentrates per 3 lb. FCM, (B) Coastal pasture fulltime + all the concentrates each cow would eat during the two 30-minute feedings daily, (C) Coastal pasture at night-millet pasture during the day + concentrates as in A, and (D) millet pasture fulltime +concentrates as in A.

Cows grazing Coastal and millet (Gahi-1 variety) were rotated to a new area at weekly intervals. Following each week of grazing, the grazed area was mowed with a rotary mower (Coastal to a 4-in. height, millet to a 12-in. height) and fertilized with 50 lb. N per acre. Pastures were not irrigated.

Daily production of FCM for treatments A, B, and C was similar, Table 1. Cows receiving treatment D produced significantly more milk. Lactation curves for treatments A and B were similar, see graph, and rate of decline was greater than normal. Thus, the almost 50% more concentrates consumed by cows receiving treatment B did not enhance lactation or gain in weight, Table 2.

TABLE 1. MEAN DAILY MILK PRODUCTION OF COWS GRAZING COASTAL AND MILLET

Treat.	Av. daily prod., 4% FCM[1]		Adj.[3] mean
	Stand. per	Expt. per[2]	
	Lb.	*Lb.*	*Lb.*
A	48.3	37.1	36.4
B	47.8	36.4	36.5
C	48.4	37.4	37.4
D	47.4	42.5	43.0

[1] Each value represents mean for 6 cows.
[2] Experimental period was 12 weeks.
[3] Covariance analysis was used to adjust for differences in level of production during standardization period.

TABLE 2. COMPARISON OF MILK PRODUCTION, CONCENTRATE CONSUMPTION, AND BODY WEIGHT CHANGE FOR COWS GRAZING COASTAL AND MILLET

Treat.	FCM[1] total	Con. consumed		Total[1] wt. change
		Total[1]	Per lb. FCM	
	Lb.	*Lb.*	*Lb.*	*Lb.*
A	18,725	8,165	0.44	−38
B	18,335	12,070	0.66	− 4
C	19,041	7,995	0.42	+ 9
D	21,394	7,951	0.36	−18

[1] Group totals. Six cows per group.

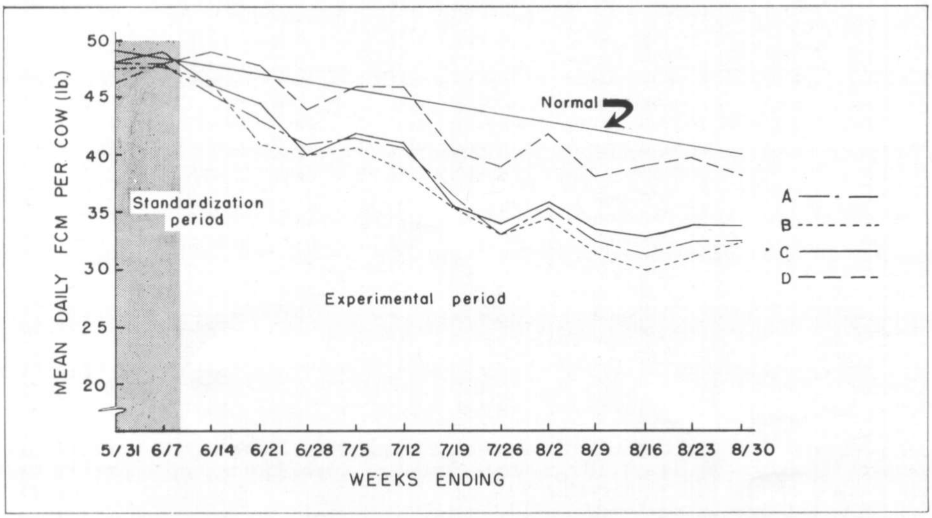
Protein content of millet forage was higher than that of Coastal, Table 3. Digestibility of forage dry matter of treatment D was higher than that for treatments A and B, but was not significantly higher than that for treatment C. Differences in intake and digestibility of Coastal by cows on treatments A and B suggests that the extra concentrates depressed both intake and digestibility.

Calculation of the nutrient intake from concentrates and forage showed that cows on treatments B, C, and D consumed enough crude protein and total digestible nutrients (TDN) to maintain production comparable to that during the standardization period. Cows on treatment A apparently consumed slightly less than the required TDN. Thus, feeding high levels of concentrates to cows grazing Coastal does not ensure satisfactory production.

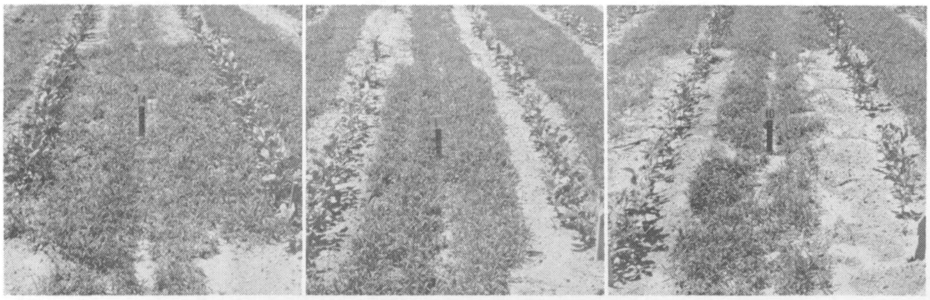
TABLE 3. COMPARISON OF CRUDE PROTEIN IN FORAGE AND FORAGE DRY MATTER INTAKE AND DIGESTIBILITY BY COWS GRAZING COASTAL AND MILLET

Treat.	Crude prot.	Forage dry matter	
		In./100 lb. body wt.	Dig.
	Pct.	*Lb.*	*Pct.*
A	13.8	2.10	54.4
B	13.8	1.70	52.5
C	—[1]	2.26	55.5
D	17.9	2.36	58.2

[1] Cows grazed both forages.



Mean daily FCM per cow by weeks for groups of cows grazing Coastal and millet forages.



Plot at left received no herbicide, center plot was treated with 4 lb. of CIPC and plot at right received 8 lb. of Dacthal per acre applied in a 14-in. band over the planted row.

CHEMICAL WEED CONTROL in SOUTHERN PEAS

W. A. JOHNSON and H. J. AMLING
Department of Horticulture

SOUTHERN PEAS grow vigorously and need protection from weeds for only a short period. Protection for 3 to 4 weeks is all that is needed.

Because of its importance as a processing crop, Southern pea acreage is increasing in Alabama and the need for a suitable herbicide for weed control is becoming more important.

Experimental Work

Studies were begun in 1960 at the Auburn University Agricultural Experiment Station to evaluate promising herbicides for weed control on light sandy soils. Results for 1963 and 1964 as to herbicides used, yields, weed control, and crop injury ratings are given in the table.

Herbicides were applied with a knapsack sprayer. Applications were made on a 14-in. band over the planted row the same day the crop was planted in 1963. In 1964 the time of applications after planting was varied for some herbicides. Applications were made within 1 day after planting and at the time germinating seed were in the cracking stage. Records were obtained on weed control at approximately 3 weeks after planting each year. A rating of 0 represents no control and 10 complete weed control. The mature-green pods were harvested and weights per plot recorded to measure the effects of herbicides on production.

Results

Crabgrass was the predominant weed. Since the crop was grown in an area each of the years where the weed had seeded the previous year, crabgrass populations were high. In both years the unhoed check treatments produced lowest yields. In 1963 the difference between the unhoed and hoed check was 2,287 lb. of green peas in the hull and in 1964, 970 lb. per acre. All herbicide treatments both years produced greater yields than the unhoed check except in treatments where injury was severe. Most treatments produced about the same yields as those from the hoed check. Weed control was good to excellent in all treatments. In weed control studies with other crops, these same herbicides gave very good to excellent control of goosegrass, Florida pusley, and pigweed usually the most important weeds other than crabgrass affecting Southern peas in Alabama.

Recommended Herbicides

Of the herbicides used in this study, CIPC and Dacthal have been cleared for use for weed control in Southern peas. It is likely that several other herbicides used in this study will be cleared for Southern peas. Dacthal has given slightly better results than CIPC. Dacthal at 8 lb. per acre is usually sufficient for good results. When goosegrass and broadleaf weeds, such as Florida pusley and pigweed, are present 10 to 12 lb. should be used. For best results apply Dacthal within 2 days after planting. CIPC gave good control of weeds without significantly reducing yields.

Tillam used both pre-plant incorporated and post-plant not incorporated did not affect yields and weed control was excellent. When used pre-plant the young seedlings were retarded in growth for approximately 2 weeks after which growth resumed. This retardation did not affect production. Amiben caused a slight injury at time seedlings were up to stand, but yields were not affected. Zytron gave excellent results but present cost would limit its use. Diphenamid gave good weed control, but plants were injured when it was applied immediately following planting and irrigation applied or rain followed. When application was delayed until germinating seed were in the cracking stage, there was practically no injury and yield was not affected. Premerge at 4 and 8 lb. per acre applied at time of cracking stage did not affect yields and gave good control of weeds.

INFLUENCE OF HERBICIDES ON WEED CONTROL AND YIELDS OF SOUTHERN PEAS

Herbicide			Yields per acre		Weed control rating[2]		Injury rating[3]	
Kind	Rate per acre	Method[1] of application	1963	1964	1963	1964	1963	1964
			Lb.	*Lb.*				
CIPC	4	Post-plant	4,162	5,470	8.4	9.7	0.0	0.0
Dacthal	8	Post-plant (1)		5,385		7.6		0.0
Dacthal	8	Post-plant	4,856	5,623	9.9	9.9	0.0	0.0
Dacthal	12	Post-plant	5,093		9.9		0.0	
Dacthal	24	Post-plant	5,524		10.0		0.0	
Tillam	3	Pre-plant	3,450		7.9		0.0	
Tillam	4	Pre-plant	4,440	5,514	8.6	9.6	0.0	0.8
Tillam	4	Post-plant		5,514		9.9		0.0
Amiben	4	Post-plant	4,901	5,173	10.0	9.6	1.8	1.3
Zytron	12	Post-plant (1)		5,672		10.0		0.0
Diphenamid	4	Post-plant (1)		5,697		9.7		0.5
Diphenamid	4	Post-plant	2,178	4,737	10.0	10.0	7.5	4.5
Diphenamid	6	Post-plant	1,965		10.0		8.3	
Premerge	4	Post-plant (1)		5,563		9.7		0.0
Premerge	8	Post-plant (1)		5,881		9.9		0.9
Check-not-hoed			2,401	4,811	0.0	0.0	0.0	0.0
Check-hoed			4,688	5,781			0.0	0.0

[1] Post-plant: herbicide applied same day following planting. Post-plant (1): herbicide applied at cracking stage, 3 days after planting. Pre-plant: herbicides applied before planting and worked into soil with a rotary tiller.
[2] Rating of 0 represents no control and 10 complete control.
[3] Injury rating of 0 represents no injury and 10 complete kill.

How and Where

ALABAMA BROILERS ARE SOLD

MACK N. LEATH, *Dept. of Agricultural Economics*

PRODUCTION OF POULTRY and poultry products is a leading industry in Alabama. And broiler production is an important segment of this industry.

The last 10 years has been a period of rapid expansion in the State's broiler industry. In 1953 Alabama ranked tenth among broiler growing states, producing 28.4 million birds (2.97% of U. S. total). By 1963 the State had moved to third in the nation. Production that year amounted to 228 million birds, represent 10.84% of total production in the United States. Broilers produced in 1964 approached 250 million, with total pounds of broiler meat exceeding the combined total of beef, pork, and mutton produced in the State.

Since Alabama's population growth has not kept pace with broiler production, larger and larger proportions of broilers move to out-of-state markets in deficit broiler regions. Broilers processed in Alabama plants in 1962-63 were shipped to receiving points in at least 19 states, according to results of an Auburn University Agricultural Experiment Station study of 12 State processors. Of the total processed, 87% was shipped to out-of-state markets and only 13% went to local markets.

How Broilers Are Sold

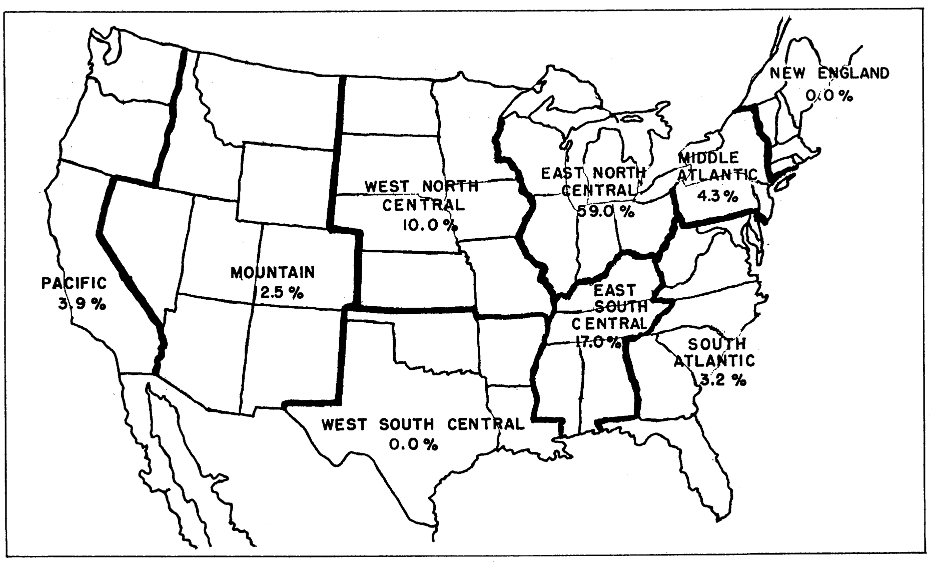
Wholesalers and food brokers were the most important outlets for Alabama broilers, accounting for 71.6% of total sales. Chain food stores warehouses were the outlets for 19.9%, followed by company distribution houses with 8.0%. All other outlets combined accounted for 0.5% of sales.

The proportion moving directly to chain food stores increased slightly during the 3-year period in which information was obtained. Obviously, chain food stores are the dominant retail outlet for broilers. Probably larger proportions of output from processing plants will go directly to chain warehouses in the future as adjustments are made in marketing channels.

Most Alabama-produced broilers were sold in fresh, ice-packed form – 91% whole and 2% cut up. These birds carried no brand name. The remaining 7% was sold as frozen birds and almost all (6.5%) had the brand name of an Alabama processor on the wrapping material. Only three processors were freezing a significant proportion of output.

Where Broilers Are Sold

The proportion of Alabama broilers marketed in each geographic area for 1962-63 is shown by the map.



Proportion of Alabama broilers marketed in each region in 1962-63 is shown by the map.

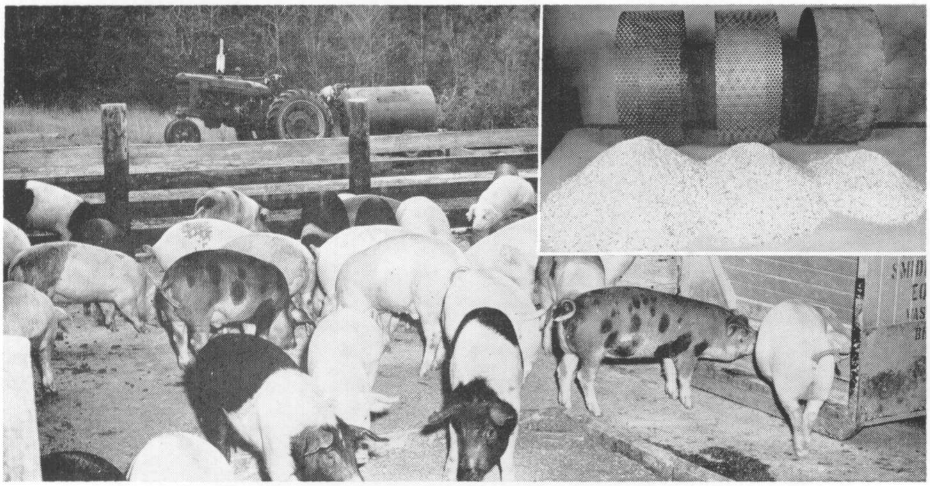
Locational advantage of a supply source was highly important in determining the relative profitability of various markets. The most profitable out-of-state markets for Alabama processors were located in the Great Lakes Area. Importance of these markets is exemplified by the metropolitan area receiving the largest proportion of Alabama broilers. Given below are the standard out-of-state metropolitan areas receiving at least 2% of Alabama broilers:

Metropolitan area	*Proportion received*
Chicago	25.2%
Detroit	12.8%
St. Louis	4.7%
Cleveland	4.0%
St. Paul	3.4%
Los Angeles	2.7%
Milwaukee	2.5%
Louisville	2.5%
Miami	2.4%
Grand Rapids	2.3%
New York	2.0%

Seven of the 11 out-of-state metropolitan areas receiving 2% or more of Alabama broilers were in North Central States. If locational advantages of various sources of supply are considered, receiving points located in these states should remain relatively attractive among out-of-state broiler markets during future years.

All processors with freezing facilities reported selling some frozen birds in foreign markets. However, less than 1% of total sales were to foreign markets.

Competition among supply sources was keen in these out-of-state markets and is not expected to diminish in the future. Therefore, operational and organizational adjustments will continue to be necessary for all segments of the industry. Prompt action in making proper adjustments can be a major factor in helping Alabama's broiler industry maintain a favorable competitive position.



Relative grinding rates of feed mill with different mesh screens is illustrated by amounts of feed placed in front of each screen in the inset photograph. Screen sizes tested, left to right, are 5/16 in., 7/32 in., and ⅛ in. Efficiency of feed ground to different fineness was learned in feeding comparisons made in hog barn shown.

Fineness of Feed Affects Efficiency of Hog Production

V. L. BROWN, *Superintendent*
Lower Coastal Plain Substation

GRINDING CORN for hogs is a product of modern agricultural technology. Acceptance of confinement feeding, with its high investment in facilities, made rate of gain increasingly important. Grinding of feed was found to give maximum hog gain.

Although rate of gain is increased, economics of feed grinding depend on added cost of feed processing. Development of small, low volume feed processing equipment created interest in on-the-farm feed formulation, but raised questions about time and power requirements.

Providing answers to such questions was the object of a test at the Lower Coastal Plain Substation. A complete mixed ration (shelled corn and 40% supplement) was ground to varying degrees of fineness, using a small, electrically powered mill. Rate and economy of gain and time and cost requirements were recorded for the different grinding treatments.

Three screen sizes were selected. Fine, ⅛ in.; medium, 7/32 in.; and coarse, 5/16 in. Particle sizes were identified by separating with sieves of three meshes to reveal any variations that might occur. Given here are percentages of feed passing through the different sieves (mesh numbers are per inch of screen):

Sieve	*Fine*	*Medium*	*Coarse*
10 mesh	86.5%	68.0%	55.5%
20 mesh	49.7%	41.4%	34.0%
30 mesh	21.0%	16.4%	14.2%

The electric motor pulling the mill was equipped with a panel meter to indicate the motor load. The flow of corn and supplement into the mill was adjusted to place the same power load on the motor with all screen sizes. Hourly capacity of the mill and cost of grinding (electricity rate for 3-month period averaged 2¢ per kilowatt hour) were determined, as reported here:

Screen	*Capacity/hour*	*Cost per ton*
Fine	660 lb.	9.09¢
Medium	1,356 lb.	4.44¢
Coarse	1,656 lb.	3.63¢

Rate and efficiency of gain was learned in feeding tests with 144 Hampshire-Landrace pigs. They were allotted to three groups on the basis of sex, weight, and litter for feeding the fine, medium, and coarse ground rations. Results are reported in the table.

As shown by these results, pigs fed the medium ground feed gained at the highest rate. Average gain was the same for those on fine and coarse ground rations. Feed efficiency was directly related to fineness of grinding. Feed required per hundredweight gain went down as the feed was more finely ground.

EFFECT OF FINENESS OF GRINDING FEED ON PERFORMANCE OF GROWING-FINISHING PIGS

Item	Result, by test ration		
	Finely ground	Medium ground	Coarsely ground
Pigs, No.	48	48	48
Average initial weight, lb.	62.46	61.96	61.43
Average final weight, lb.	188.48	195.43	189.20
Average gain, lb.	126.02	133.47	127.77
Average days on test, No.	81.33	81.24	82.98
Average daily gain, lb.	1.55	1.64	1.54
Feed consumed per pig, lb.	423.0	465.3	464.3
Feed per cwt. gain, lb.	335.7	348.6	363.4

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