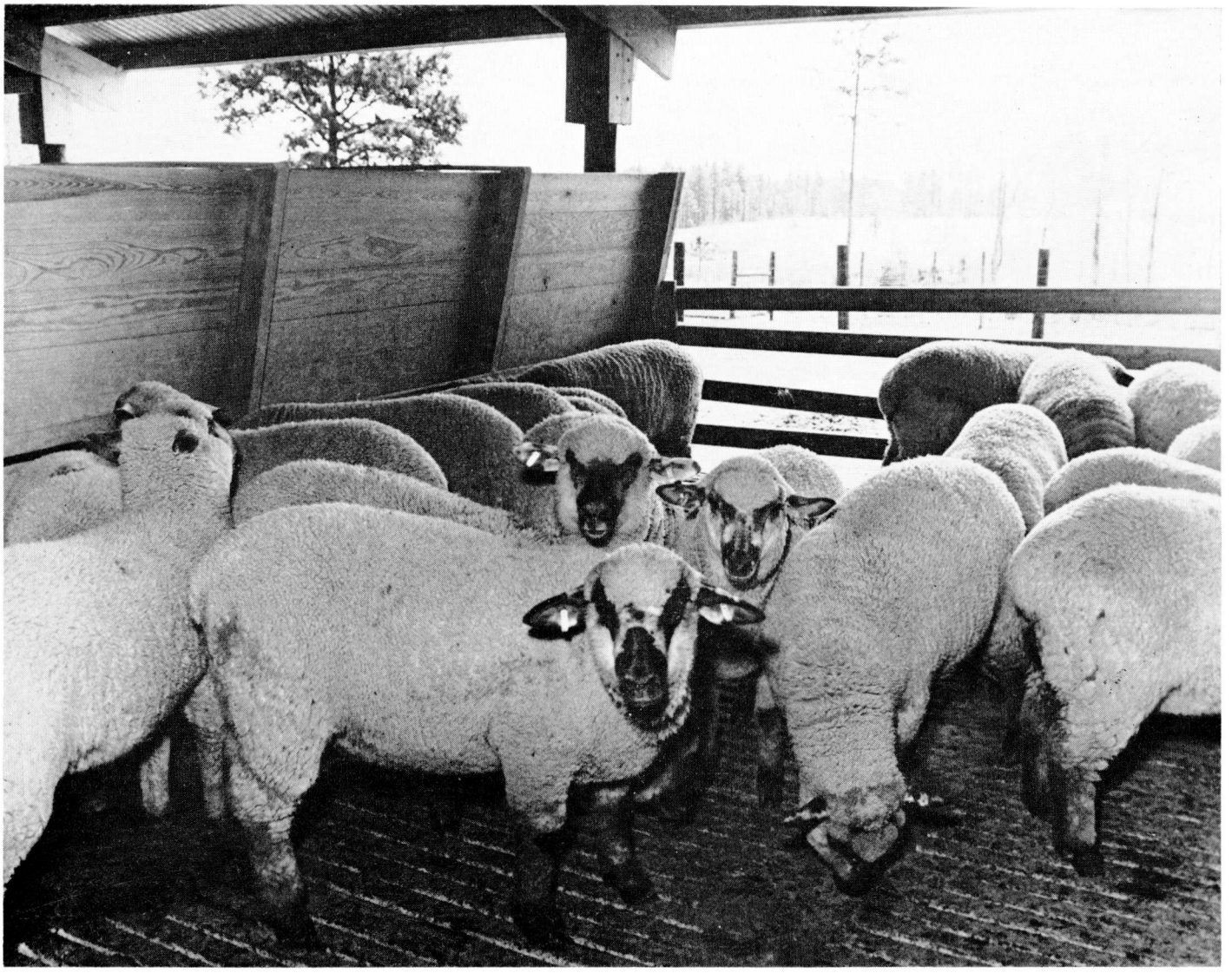
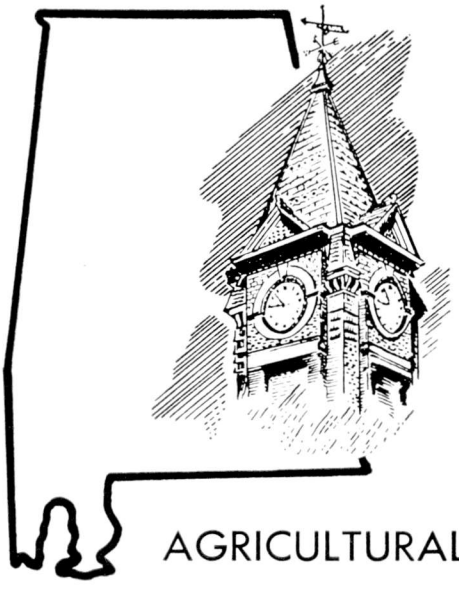
VOLUME 13, NUMBER 2 SUMMER 1966





HIGHLIGHTS of AGRICULTURAL RESEARCH

AGRICULTURAL EXPERIMENT STATION, AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 13, NO. 2 SUMMER 1966

In this issue . . .

On the cover. Late spring-born lambs in Alabama are prepared for the market by the "carryover" method. Researchers at the Auburn Station have investigated the possibilities of finishing such lambs in the drylot. This was done on raised slotted floors. The fact that late-born lambs in the drylot reach market weights in 3 to 4 months instead of the usual 6 to 10 months indicates that immediate drylot feeding is superior to the "carryover" method of managing late lambs. Results of studies using more than 200 lambs are highlighted in the story on page 3.

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Auburn, Alabama

New and Timely PUBLICATIONS

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

Bul. 355. Grain Movements in Alabama.

Bul. 356. Rural Land Ownership and Use in Alabama.

Bul. 365. The Alabama Slaughter Cattle Industry.

Bul. 366. Market Values and Transfers of Milk Quotas in Alabama.

Cir. 138. Soybeans for Oil in Alabama.

Cir. 140. Bahiagrass for Forage in Alabama.

Cir. 148. Farm Handling and Marketing of Pecans in Alabama.

Cir. 151. Sorghum-Sudan Hybrid vs. Johnsongrass Pasture for Dairy Cows.

Cir. 152. Spacing and Rates of Nitrogen for Corn.

Prog. Rept. 79. Controlling Chinch Bugs on St. Augustine Grass Lawns.

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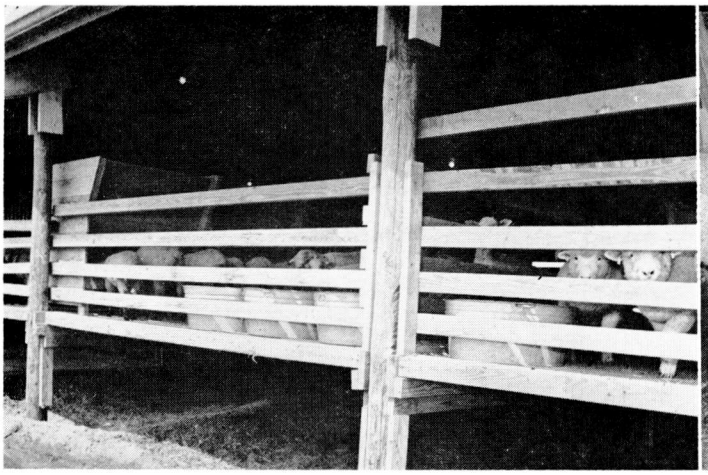
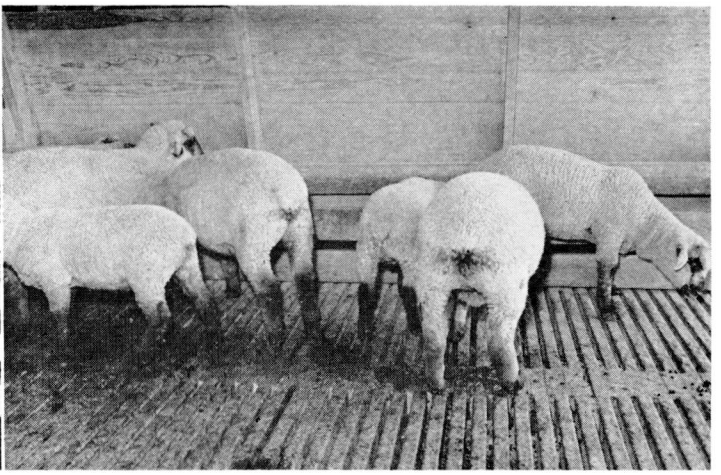
Free copies may be obtained from your County Extension Chairman or by writing the Auburn University Agricultural Experiment Station, Auburn, Alabama.





Slotted floors are raised 3 ft. above ground level to provide air circulation under floors and to facilitate cleaning. The floors are constructed of treated 2x4's placed on edge and spaced ¾ in. apart. Excrement falls through slots making cleaning of floors unnecessary.

FINISHING Spring-Born LAMBS in DRYLOT

E. L. WIGGINS, *Department of Animal Science*

THE CONVENTIONAL method used by Alabama producers in managing lambs born too late in the spring to reach market weights by May or June is known as the "carryover" method.

In this system an attempt is made to keep lambs healthy and thrifty by shearing them when the weather gets hot, controlling parasites as effectively as possible, and providing the best grazing available at that time of the year. Lambs are not really expected to fatten until the weather gets cooler and small grain-clover grazing becomes available in late fall or early winter. However, even with the best management the combination of heat, internal parasites, and poor quality grazing often results in considerable death loss and in unthriftiness and stunting of surviving lambs. Such lambs do not respond immediately to improved environmental and feed conditions and often do not reach slaughter condition until the next spring or early summer. By then many of them are too heavy and too old to bring top prices.

The Auburn University Experiment Station has investigated the possibilities of finishing these lambs in drylot. For 3 years lambs that had not reached market weight at the time of the last spring lamb sale (June) were put in drylot and finished during the summer months.

TABLE 2. COMPARISON OF PERFORMANCE OF LAMBS ON CONVENTIONAL AND ELEVATED, SLOTTED FLOORS

Type of floor	Number of lambs	Initial wt.	Final wt.	ADG	Feed/ cwt. gain
	No.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Conventional	31	51	82	.31	7.6
Slotted	32	52	109	.57	4.9

The 5 lots fed the first 2 years averaged from 59 to 70 lb. in initial weight and gained from .31 to .37 lb. per day in about 100 days, Table 1. Carcass grades on these lambs were in the high-Choice to low-Prime range and lambs sold for top market prices.

Lambs fed the third year had heavier initial weights and consequently gained more slowly, but reached market weight and grade after being fed for less than 90 days. Carcass grades could not be obtained on these lambs but they sold for top market prices.

To investigate the possibilities of securing even better performance of lambs in drylot, elevated, slotted floors were constructed. Lambs fed on these floors gained nearly twice as fast as lambs fed on conventional dirt floors, although the latter lambs performed as well as had similar lambs in earlier years, Table 2. Reasons for superior performance of lambs on slotted floors are not known, but these lambs appeared to be cooler and more comfortable. There was more activity in the pens during the day and less tendency to crowd near electric fans (provided for both groups). Increased air circulation and cooler floor temperature resulting from elevated slotted floors were important factors.

A total of 206 lambs were started on feed in these tests and only one lamb died. In addition, the obvious advantages of having late-born lambs reach market weights and grade and sell for top market prices in 3 to 4 months instead of 6 to 10 months indicates that immediate drylot feeding is superior to the "carryover" method of managing late lambs.

Results obtained at this Station and at Virginia clearly show that lambs will gain both rapidly and efficiently on slotted floors even in summer. Therefore, Alabama sheep producers would do well to consider intensive production programs involving early weaning and finishing on slotted floors, and breeding of ewes to lamb at less than 12-month intervals.

TABLE 1. PERFORMANCE OF LAMBS IN DRYLOT DURING SUMMER MONTHS

Year	Number of lambs	Initial weight	Final weight	ADG	Carcass grade*
	No.	*Lb.*	*Lb.*	*Lb.*	*Av.*
1960	13	60	97	.34	14.6
	13	59	101	.37	14.4
1961	15	68	97	.31	15.0
	14	70	103	.35	14.6
	15	69	100	.32	15.1
1962	24	80	100	.24	----
	24	78	98	.27	----
	24	78	101	.27	----

* 14 = high Choice, 15 = low Prime, 16 = average Prime, etc.

FIG. 1. Healthy (left) and diseased (right) corn plants of the same age.

CORN VIRUSES
in Alabama

R. T. GUDAUSKAS and D. W. GATES

Department of Botany and Plant Pathology

TWO VIRUSES that infect corn have recently attracted national attention by their widespread occurrence and associated heavy crop losses.

The two are the Corn Stunt Virus (CSV) and the Maize Dwarf Mosaic Virus (MDMV), named for the corn stunt and maize dwarf mosaic diseases.

Symptoms are so similar that the two diseases cannot be distinguished in the field. Corn infected by either virus is usually stunted and has a bushy appearance, Figure 1. Yellowish mottling and streaking followed by red to purple discoloring of leaves are also common symptoms. Plants infected during the early growing stage often produce no ears, whereas ears on late infected plants are poorly filled.

Certain Insects Transmit the Viruses

Although symptoms associated with the two viruses are similar, there are differences in properties of the viruses. Thus far CSV is known to be transmitted only by certain leafhoppers, and infects only corn and teosinte, a tropical grass. MDMV is transmitted by aphids and can infect several grasses including johnsongrass. Also, MDMV can be transmitted by rubbing the sap from a diseased plant onto leaves of a healthy plant. This permits rapid screening of disease suspects in the greenhouse.

Stunted Corn in Alabama

Stunted and discolored corn plants have been observed in Alabama for a number of years. In 1963 a disease resembling corn stunt was found in 4 counties, and in 1964 the disorder was reported in 18 counties. Tentative diagnoses of the disease as corn stunt were based solely on symptoms.

In 1965 research was begun by the Agricultural Experiment Station, Auburn University, to determine the extent of corn stunting in Alabama and what if any viruses were involved. Surveys of corn fields were conducted from mid-June to early September. No attempt was made to survey the entire State or to make an exhaustive survey within counties. Fields selected for inspection were those of suspected disease occurrence as reported by farmers and personnel of the Agricultural Experiment Station and the Cooperative Extension Service.

Corn plants showing symptoms suggestive of viral infections were found in 30 of 40 counties checked last year, Figure 2. Corn and johnsongrass from fields in 25 of the 30 counties were tested for presence of MDMV. Leaf tissues of these plants were ground in a mortar and the sap was swabbed with cheesecloth pads onto leaves of seedling corn in the greenhouse.

Samples of diseased corn from 12 fields in 6 counties were tested for CSV in leafhopper transmission tests at Mississippi State University. However, the virus was not found in any of these samples.

Maize Dwarf Mosaic Virus Isolated

A sap transmissible virus was isolated from only those samples collected from three fields in Limestone County. The virus was isolated from johnsongrass as well as corn collected at each of the three fields.

On the basis of host range and other properties determined in the greenhouse and laboratory, the virus found in the Limestone County samples was identified as MDMV. This was the **southernmost discovery of the virus in the United States**. The host range of MDMV is apparently limited to the grasses. Some showing susceptibility to MDMV in greenhouse tests include barnyardgrass, corn, crabgrass, foxtails, goosegrass, johnsongrass, millet, sorghum, sorghum-sudan hybrids, sudangrass, and sugarcane; nonsusceptible include barley, fescues, hardinggrass, koleagrass, oats, rescuegrass, rye, ryegrass, and wheat.

Failure to isolate MDMV from stunted corn in 24 of the 25 counties sampled suggests that CSV was the major cause of diseased corn in 1965. In the light of widespread occurrence of CSV in Mississippi, such an assumption seems reasonable even though the virus was not isolated from Alabama corn. Tests for CSV were limited and this virus is often difficult to isolate.

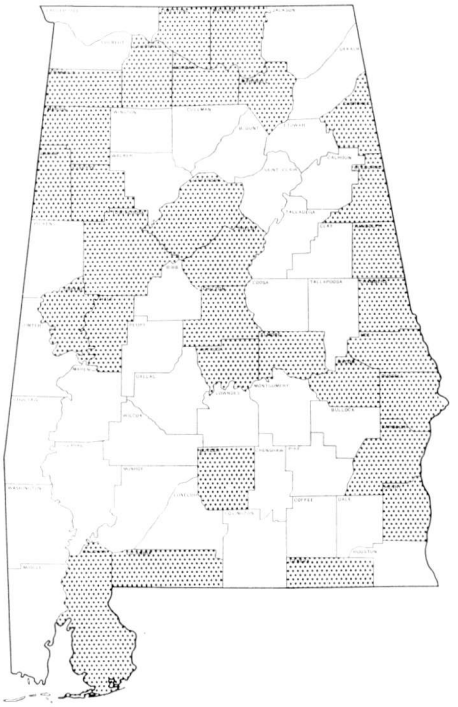


FIG. 2. Shaded counties are those in which stunted, discolored corn was observed last year.

The Case Against LOW GROWING BOLLS*

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

THE MECHANICAL FINGERS or spindles of a cottonpicker will pick most open bolls passing through the machine. However, excessive harvest losses occur where bolls fail to enter the machine because the picker is operated too high above ground and where bolls grow too near the ground.

Since any loss of cotton cuts growers profits, studies to identify these losses and to suggest corrective measures were done at the Agricultural Engineering Research Unit near Auburn.

In previous tests, thin-spaced plants of some varieties produced picker losses of 12%, as compared with 5% for the same varieties spaced close (reported in *Highlights of Agricultural Research*, Vol. 10, No. 4). These losses appeared to be correlated with boll location on the plant because the thin-spaced plants had lower fruiting limbs.

A 1963 test to correlate boll location on the plant with picker efficiency employed a technique of using different colored dyes to identify boll location on the plant. In thin-spaced plants (16 in.), all bolls on limbs originating within 4 in. of the ground were sprayed with red dye. Bolls on limbs 4 in. to 20 in. above the surface were left unsprayed, and those on limbs originating higher than 20 in. were sprayed blue. Average plant height was 36 in.

The cotton was picked with an IHC low-drum picker operating at three drum heights. Different colors of the cotton permitted separation for efficiency calculations on the basis of boll height.

For all drum heights, the lower (red) bolls were harvested less efficiently than the other bolls, Table 1. This difference in efficiency became greater as drum height increased.

TABLE 1. EFFECT OF VERTICAL BOLL LOCATION AND DRUM HEIGHT ADJUSTMENT ON PICKER EFFICIENCY, 1963

Drum height and boll location*	Harvest efficiency	Plant harvest loss	Ground harvest loss
	Pct.	*Pct.*	*Pct.*
Drum 1 in. high			
Red	84.7	8.5	6.8
White	87.2	8.9	3.9
Blue	92.7	3.2	4.1
Drum 2 in. high			
Red	79.9	12.4	7.7
White	86.0	8.8	5.1
Blue	88.5	7.1	4.4
Drum 3 in. high			
Red	75.4	18.9	5.6
White	85.3	10.5	4.2
Blue	94.0	4.4	1.6

* Color denotes originating height of limb having bolls: red, within 4 in. of ground; white, 4-20 in.; blue, above 20 in.

Interaction of picker drum height and plant population on picker performance was determined in another test using plant populations of 10,000, 20,000, 40,000, 60,000, and 80,000 (corresponding to spacings of 16, 8, 4, 2.6, and 2 in.). All plots were drilled thick and hand-thinned to the desired spacing. Each plot had eight, 75-ft. rows.

The picker was operated with the drum set 1, 2, and 3 in. above ground in 1963, 1964, and 1965, and also at 4-in. and 5-in heights in 1964 and 1965. All machine efficiencies were based on a once-over harvest.

Results varied from year to year, but the 3-year average indicated that an increase in drum operating height affected picking efficiency more for thinner than for thicker spacing, Table 2. This was true in 1963 and 1965, but for some unexplained reason in 1964, as drum operating height varied from 1 in. to 4 in.

TABLE 2. PLANT SPACING-PICKER ADJUSTMENT INTERACTION, 1963-65

Plant spacing and drum height	Harvesting efficiency[1]		Av. height, lowest limb having bolls
	1965	3-yr. av.	
	Pct.	*Pct.*	*In.*
16-in. spacing			
1 in.	94.9	93.2	4.3
2 in.	92.7	91.3	
3 in.	91.7	91.0	
4 in.	90.5	----	
5 in.	90.6	----	
5 in.[2]	83.6	----	
8-in. spacing			
1 in.	95.9	93.5	4.7
2 in.	93.2	92.3	
3 in.	94.2	91.7	
4 in.	91.9	----	
5 in.	92.1	----	
5 in.[2]	88.9	----	
4-in. spacing			
1 in.	96.2	93.9	5.6
2 in.	94.9	93.3	
3 in.	95.5	92.6	
4 in.	94.5	----	
5 in.	93.6	----	
5 in.[2]	91.3	----	
2.6-in. spacing			
1 in.	95.4	93.6	7.2
2 in.	94.6	93.6	
3 in.	94.2	92.7	
4 in.	93.8	----	
5 in.	91.8	----	
5 in.[2]	91.2	----	
2-in. spacing			
1 in.	95.8	93.4	7.5
2 in.	95.8	92.8	
3 in.	94.5	92.9	
4 in.	93.3	----	
5 in.	92.5	----	
5 in.[2]	86.9	----	

[1] Total lint yield was 996, 990, 1,010, 948, and 947 lb., respectively, for spacing of 16, 8, 4, 2.6 and 2 in.

[2] Limb lifters were 5 in. above ground; in all others were floating on ground.

These low bolls were left by a mechanical picker, causing lowered picker efficiency.

picking efficiency remained fairly constant and was about the same for all plant spacings.

A good example of the interaction of drum height and plant population is shown in the 1965 data, Table 2. In this test, raising the drum 1 in. decreased picker efficiency 2.2, 2.7, 1.3, 0.8, and 0%, respectively, for populations of 10, 20, 40, 60, and 80 thousand plants per acre. Raising the drum 4 in. and the limb lifters 5 in. decreased picker efficiency 11.3, 7.0, 4.9, 4.2, and 8.9%.

These tests show that operating the picker drum close to the ground gives best efficiency. However, this is possible only if the field is free from rocks and the row profile is properly shaped and uniform in height. All land preparation and cultural practices should lead toward a suitable row profile for the picker.

Further, the studies show the advantage of thick spacings from the standpoint of tolerance in picker drum operating height. A stand of about 40,000 plants per acre has proved desirable for mechanical harvesting. Thin and skippy stands reduce efficiency.

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

Chemicals for Weed Control in Soybeans

G. A. BUCHANAN and RAY DICKENS*
Department of Agronomy and Soils

WEED CONTROL is necessary for top yield and quality of soybeans. Aside from competing for nutrients and moisture, heavy growth of weeds causes harvesting losses. Also, contamination of soybeans with weed seed lowers value of the crop.

Since early summer rains favor rapid germination and growth of weeds, mechanical control is difficult. Thus, many farmers are turning to chemicals. The need is for good, early control until soybeans grow large enough to shade out later weeds.

Currently only amiben and PCP are recommended for soybean weed control in Alabama. Amiben at 2½ to 3 lb. active material per acre has given satisfactory results when moisture was adequate. PCP at 13 to 18 lb. has also been effective. Either material is applied preemergence in 25 to 30 gal. of water per acre.

For best results with preemergence herbicides, soybeans should be planted level. This prevents concentration of the herbicides around seed in case of heavy rains shortly after planting. Level planting also reduces chances of the herbicide being washed from the treated area and thereby decreasing effectiveness of the herbicide. This is more important in sandy than in heavy soils, because of greater possibility of leaching.

Despite generally good results, amiben and PCP are not foolproof. While giving excellent control of most annual grasses, they have not consistently controlled such deep germinating broadleaf weeds as coffeeweed, ironweed, and cocklebur.

Moisture plays an important role in the effectiveness of many herbicides. For example, in 1965 amiben gave 88% control of annual grasses and 73% control of broadleaf weeds at the Gulf Coast Substation and 95% and 51% control, respectively, at the Plant Breeding Unit. Under extremely dry conditions when applied at Auburn, control was 24% of annual grasses and 18% of broadleaves.

Vernolate (Vernam), recommended on trial basis only, has given excellent weed control in soybeans (see table). Although there is the possibility of some early stunting, no yield reductions have been observed in Alabama. Application rate is 2 to 3 lb. active per acre (the higher rate for heavier soils) incorporated as a preplant broadcast application or preemergence band treatment.

There are several methods of preplant incorporation, but disking with a double section disk harrow has given good results. For preemergence treatment, seed should be planted at least 2 in. deep and the herbicide incorporated into the soil over the seed.

Although not presently recommended for soybean weed control, several other herbicides and combinations have shown promise for preemergence use. Trifluralin (Treflan) has given excellent control of annual grasses under all soil moisture conditions, and it has some activity against the more easily killed broadleaf weeds. It is not effective against hard-to-kill broadleaf weeds, such as ironweed, cocklebur, crotalaria, and coffeeweed.

Among the experimental materials, CP-45592 gave excellent results at three locations in 1963. Soybean stands were reduced at one location, but there was no yield reduction at any of the test sites. Results with UC-22463, another experimental herbicide, were good at three of four locations last year.

By using a combination of herbicides, degree of weed control may be increased while reducing the amount of any single herbicide applied to the soil. Amiben (2 lb.) plus CIPC (3 lb.) was the most promising of several combinations tested in 1965. It gave 97% control of annual grasses and 84% control of broadleaf weeds at the Plant Breeding unit and 81 and 68% control, respectively, at Auburn.

* Resigned.

CONTROL OF ANNUAL GRASSES AND BROADLEAF WEEDS IN SOYBEANS WITH HERBICIDES, GULF COAST SUBSTATION, 1963-65

Herbicide and rate per acre	Control of annual grasses			Control of broadleaf weeds		
	1963	1964	1965	1963	1964	1965
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Vernam, 2 lb.	----	----	98	----	----	97
Vernam, 3 lb.	97	100	100	69	80	96
Vernam, 4½ lb.	95	100	----	92	60	----
Amiben, 2 lb.	18	----	56	65	----	87
Amiben, 3 lb.	----	0	88	----	0	73
Amiben, 5 lb.	58	----	----	37	----	----
Amiben, 6 lb.	----	77	----	----	40	----
PCP, 10 lb.	50	----	----	13	----	----
PCP, 13 lb.	----	----	63	----	----	84
PCP, 16 lb.	52	----	----	85	----	----
PCP, 18 lb.	----	0	68	----	40	90
Treflan, ¼ lb.	----	----	97	----	----	56
Treflan, ½ lb.	----	----	93	----	----	83
Treflan, ¾ lb.	----	----	98	----	----	89
Treflan, 1 lb.	90	61	----	69	20	----
Treflan, 2 lb.	90	96	----	54	20	----

Effectiveness of herbicides is illustrated by weed control in photos. Untreated plot (top) is contrasted with results from 4 lb. UC-22463 (center) and a combination of 3 lb. CIPC and 2 lb. amiben (bottom).

Interstate highways and housing projects are occupying much of the previous farm real estate accounting for a part of the increase in value.

The FARM REAL ESTATE MARKET

J. H. YEAGER, *Head, Department of Agricultural Economics and Rural Sociology*

ALMOST TWICE the U.S. average! That was the rate of increase in value of Alabama farm real estate from March 1964 to March 1965.

The Alabama increase was 11% compared with a 6% increase for 48 states. Average value of Alabama farm real estate was $128 per acre in 1965. For the U.S., it was $146 per acre.

Farm real estate values in Alabama have more than doubled since 1955. Values in Alabama, however, are not as high as in many states. In 1965, average per acre value of farm real estate in New Jersey was $640, Illinois $371, Wyoming $27, and California $498, see table. Relatively low per acre values prevailed in such Mountain States as Wyoming.

Changes in farm real estate values over a relatively long period of time present certain facts. Since the 1957-59 period, in 11 states values have increased more than 50%. Florida led with 82%. Seven other Southern States were included in this group plus Delaware, Maryland, and California.

Eight states had increases of 25% or less in farm real estate values since 1957-59. Iowa had only a 17% increase or about 2% per year. Six of the eight states were in the Corn Belt.

Dollar values per acre provide a basis for estimating per farm values. Based on $128 per acre farm real estate value for Alabama in 1965, the estimated real estate value per farm was $21,600. This was about two-fifths of the U.S. average.

Estimates show that voluntary transfers of farm real estate declined from 1964 to 1965. Rate of voluntary transfers in 1965 was 28.4 per 1,000 farms in the U.S. The lowest rates of transfer prevailed in the Southeast and Northern Plains, while highest rates existed in Mountain and Pacific States.

The rate of voluntary transfers has steadily declined for the last decade. This decline has contributed to the upward trend in land prices. A declining sales volume can be attributed to limited number of offerings of land for sale and not to a lack of demand.

Rates of transfer in the U.S. by means of foreclosure, tax sales, estate settlements, and gifts and inheritances were also generally lower in 1965 than in 1964. In Alabama, the 1965 rates of title transfer per 1,000 farms were as follows: voluntary sales and trades 19.9, foreclosures 0.9, tax sales 0.6, and other 10.2. In all cases except for tax sales, Alabama rates of transfer in 1965 were below the average for 48 states. Tax sales were above 1.0 per 1,000 farms in Maine, New York, New Mexico, Arizona, and Washington. Foreclosure transfer rates were highest in the Northeast, Delta, Mountain, and Pacific States.

Fifty per cent of purchases of farm real estate in the U.S. in 1964 were for farm enlargement. Farmers have purchased land in order to increase their volume of business. A large portion of farmers who used credit to purchase land pledged farmlands other than the tract purchased to secure loans.

Also, farmers who purchased land were already owners of larger than typical farms. These borrowers, in most cases, have built up a substantial equity in farm real estate. They have a larger than average income base from which to repay debts.

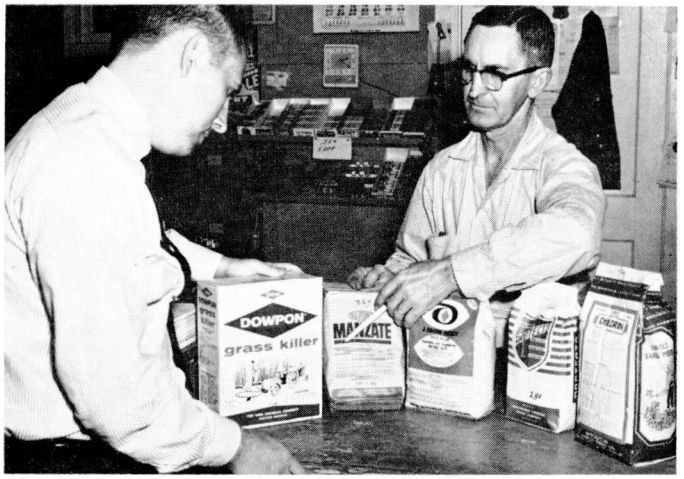
Nearly two-thirds of all buyers of farm real estate in recent years have been farmers. Owner operators of farms account for about one-half the buyers, tenants about 16%, and retired farmers about 3%. In 1964, about one-half the sellers of farmland were active farmers, 14% were retired farmers, and 13% were estates. Remainder were nonfarmers.

The advances in farm real estate values and decline in offerings can at least be partially explained in a number of factors. The Federal Old Age and Survivors Insurance program (social security) no doubt caused some farmers to defer sale of farmland. Price support programs have affected the price of farm real estate. Expanding population and competing nonfarm uses of land explain rather large increases in value in many cases. Many families, both farm and nonfarm, believe investments in farm real estate are a good inflation hedge.

AVERAGE VALUE OF FARM REAL ESTATE PER ACRE, ALABAMA, SELECTED STATES, AND U.S., VARIOUS YEARS, 1950 TO 1965

Year	Alabama	New Jersey	Illinois	Wyoming	California	U.S. (48 states)
	Dol.	*Dol.*	*Dol.*	*Dol.*	*Dol.*	*Dol.*
1950	49	293	174	13	154	65
1955	59	421	234	15	229	85
1960	91	528	316	22	360	116
1961	85	546	306	23	388	118
1962	94	556	315	24	408	124
1963	105	559	331	25	424	130
1964	116	600	348	26	460	137
1965	128	640	371	27	498	146

Source: Farm Real Estate Market Developments, ERS, USDA, various issues.



Where Do Local Dealers Get Pesticide Information?

LAVAUGHN JOHNSON and J. E. DUNKELBERGER
Dept. of Agricultural Economics and Rural Sociology

DEALERS WHO HANDLE pesticides have a difficult job. Each year sees many new pesticides, in a variety of forms, added to the market's already staggering number of brands and formulations estimated to exceed 10,000.

The mere number of pesticide products alone poses a serious problem. Yet, customers look to dealers for information about pesticide uses and proper treatments. Often they are called on to make recommendations for specific common and uncommon pest problems.

It is not necessary that dealers be expert entomologists or professional chemists to serve their customer's needs. But they do need accurate information on the products they sell. Neither is it necessary that dealers memorize a vast amount of information about pesticide products. Of more importance to their customers is their receiving and keeping latest information for reference. By knowing where and how to obtain information about products and their safe uses, the local dealer can provide a public service as well as operate a successful pesticide enterprise.

In a recent Alabama study of the retail pesticide business, dealers in seven selected counties representing different parts of the State were interviewed. One major concern was the retail dealer's sources of pesticide information. Although numerous sources are available, there were questions as to what extent these are used and which sources are used most.

Over half (52%) of the dealers mentioned field representatives of pesticide producers as their primary source of pesticide information. Most dealers indicated they are usually visited by these representatives, and about 90% of those contacted felt they received useful and accurate information.

It might be expected that field representatives would stress competitive prices and profits between brands of pesticide products. Obviously such information was supplied, but half the dealers visited by the representatives indicated they provided primarily technical information on pesticide uses.

Only 24% and 16% of the dealers interviewed considered agricultural experiment station scientists and extension service personnel, respectively, as primary sources of pesticide information. Dealers had been expected to look more to these agencies because their information is free of bias for any product or brand.

Many dealers (especially small ones) viewed pesticides as low profit items stocked primarily as a service to their customers. In most cases, pesticides represented less than 20% of total sales. In this situation, dealers spent little time seeking information on these products. They usually preferred to let the information come to them through someone like the producer's field representative. It is mainly for this reason that only a small proportion of dealers made use of experiment station or extension service information sources.

Pesticide labels on containers were mentioned as another primary source of information by 13% of the dealers. Although labels provide valuable information to both customers and dealers, most dealers overlooked much of this information. When dealers were asked to study the label of an experimental pesticide material, few considered the precautionary directions for safety. Rather, they focused attention on the ingredients and uses.

This finding suggests that many pesticide dealers are not particularly concerned with the toxicity and health aspects of pesticides. Moreover, the label on products offers considerable information that is not being fully used by dealers.

Two-thirds of the local dealers interviewed said they needed more information on pesticides than they were receiving. Opinions varied considerably as to persons or agencies that should supply this information. Almost half thought that pesticide manufacturers were in the most strategic position to fill the need. Dealers who said agricultural experiment stations and extension services should assume major responsibility were in about the same proportion as those naming these agencies as their primary source of pesticide information.

Answers from pesticide dealers suggest that more effective communication of information might be achieved through cooperative undertakings involving producers, agricultural scientists, and extension service workers. Through such an effort, pesticide dealers can be better supplied with the information they need to adequately serve their customers.

SOURCES OF INFORMATION NAMED BY 83 ALABAMA PESTICIDE DEALERS

Information source	Times mentioned	Proportion of dealers mentioning source[1]
	Number	*Per cent*
Manufacturer's representative	43	52
Publications	22	27
Experiment Station personnel	20	24
Extension Service personnel	13	16
Label	11	13
Personal experience	4	5
Conferences and meetings	3	4
Other[2]	7	8

[1] Since some dealers used more than one source, the percentages do not add to 100.
[2] Includes cotton scouts, farmers, USDA personnel, and advertisements.

Annual Clover Stands REDUCED by Pygmy Crickets

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MANY CATTLEMEN may be growing feed for crickets instead of cows. In the case of annual winter clovers, there is evidence that crickets may do more grazing than cattle.

Crickets apparently are involved in the poor reseedings of such annuals as ball and crimson clovers in grass sods, a common difficulty of Alabama farmers. This does not discount the losses caused by low soil fertility, seed destruction by the head weevil, competition from dense grass sods, and dry fall weather.

First pasture damage by pygmy crickets was observed on white clover, as reported in the Summer 1965 issue of *Highlights of Agricultural Research*. More recent experiments show that applying insecticide to control crickets can make a big difference in getting good clover stands and in production of winter forage.

Getting thick stands early is essential if annual winter clovers are to furnish early winter grazing on dormant summer grass sods. Thin stands mean that clover yields will be low and, at best, there will be no grazing until late spring.

How insecticides affect establishment of reseeding annual winter clovers was studied in field experiments at the Tuskegee Experiment Field and Plant Breeding Unit (Tallassee) during fall and winter of 1965-66. Ball and crimson clovers were each planted at low and high seeding rates in early October on Coastal bermudagrass sod scarified with a disk. Arrowleaf clover was included at the Plant Breeding Unit.

Half of each 20- × 40-ft. clover plot was treated with insecticide and the remainder left as a control. Each clover, seeding rate, and insecticidal treatment was repeated four times.

Clover seedlings were up to stands by mid-October. Plots not treated with insecticide soon showed damage by pygmy crickets. Tiny seedlings were eaten soon after emergence, leaving only a short stem. Seedlings in this condition die, since the growing point has been destroyed. Large numbers of dead crickets were found on the plots treated with insecticides, while on untreated areas live crickets were abundant.

Result of controlling pygmy crickets in annual clover fields is shown by ball clover comparison at Tuskegee. Insecticide treated area (right) has better growth than untreated plot.

Stand counts made October 19 showed that both crimson and ball clovers were damaged by crickets, particularly at the low seeding rate. Ball stands were reduced more than crimson, as shown in the table. Reduction of arrowleaf clover stands was similar to that of ball clover in the Tallassee test. Clover stands declined on nontreated plots during fall, as shown by mid-November counts.

Stand loss was greatest at the low seeding rate. This is especially important to note because in reseeding fields clover head weevil may reduce the quantity of seed, thereby reducing potential stand. Several yearly cycles of low seed yields coupled with seedling destruction by crickets could account for declining stands of clover in reseeding pastures.

Loss of clover seedlings is demonstrated by the greatly reduced ground cover in plots not treated with insecticide. Clover seedlings measured on January 7 were considerably larger on insecticide treated plots. Ball clover plants measured only ½ to 3 in. tall on untreated plots, but were 3 to 5 in. high on treated areas. Untreated crimson plants were 1 to 3 in., as compared with 3- to 4-in. height of treated ones.

The real payoff from insecticidal treatment is more early forage, as shown by data in the table. Ball clover at the low seeding rate (3 lb. per acre) produced over 5 times as much forage when treated with insecticide. Even at the high seeding rate, forage yields of ball clover were doubled by using insecticide. The experiment was on a soil that tends to be wet in winter, which retards growth of crimson clover. Even so, it also showed a yield response.

Diazanon seems to be the most effective insecticide that can be used on pastures to be grazed. Adequate control of pygmy crickets can be obtained by treating at planting with ½ lb. per acre diazanon spray or granules. Dairy and beef animals may be grazed immediately after application, but care should be taken not to apply the insecticide directly to the animals.

EFFECT OF INSECTICIDE ON CLOVER STANDS AND YIELDS, TUSKEGEE, WINTER 1965-66

Treatment		Plants per sq. ft. Oct. 19	Ground cover, Jan. 7	Dry forage per acre, 1st harvest
Seeding rate per acre	Insecticide	*No.*	*Pct.*	*Lb.*
Ball clover				
3 pounds	none	15	13	208
3 pounds	treated	42	78	1,100
6 pounds	none	43	60	416
6 pounds	treated	55	90	897
Crimson clover				
15 pounds	none	34	63	140
15 pounds	treated	44	92	336
30 pounds	none	73	90	243
30 pounds	treated	76	96	334

Response of TOMATOES to STAKING

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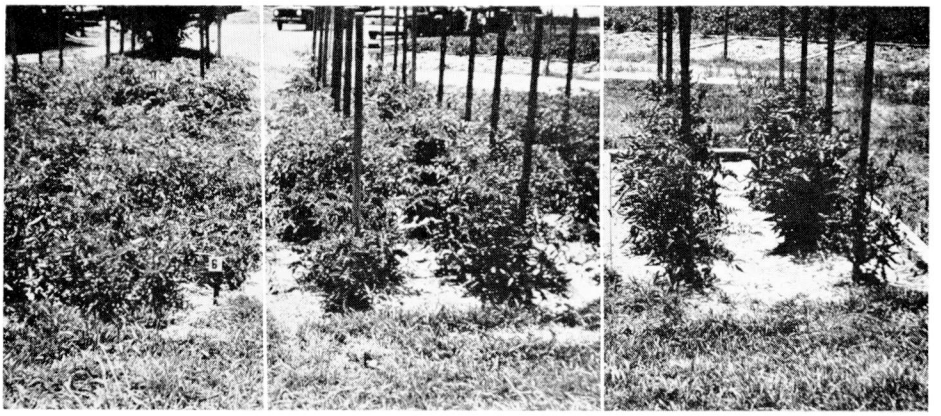
Department of Horticulture



Tomato plots above are left, not pruned or staked; center, staked but not pruned; right, staked and pruned.

DOES PRUNING AND STAKING tomatoes result in higher yields of quality fruit?

This has been a common belief and many growers who grow staked tomatoes also prune them. However, staking, pruning, and tying involves much labor and time and adds much to the cost of growing the crop.

In 1963 an experiment was begun to determine if staking or staking and pruning of tomato plants would significantly increase yields of quality fruit for the fresh market. The experiment was conducted on a Chesterfield sandy loam soil. The surface 8 in. of soil was composited among plots and within each plot in an attempt to prevent soil variations. Treatments were completely randomized and consisted of 4 replications each. Test plots consisted of not staked not pruned, staked not pruned, and staked and pruned to 2 stems per plant. The plants were spaced 18 in. apart in 36-in. rows. Stakes were spaced 36 in. apart and 2 plants tied to each stake.

Each practice was conducted at 2 different fertilizer rates, 1,600 and 2,400 lb. of 8-8-8 per acre. The 1,600 lb. was applied in 2 applications, 800 under at planting and 800 to side 4 weeks after planting. The 2,400 lb. of fertilizer was applied in 3 applications, 800 under plus 800 to side 4 weeks and 800 lb. per acre 8 weeks after planting. Because of low organic content of soil, all treatments received 2 tons of organic material per acre each year. The first 2 years, 1963 and 1964, organic consisted of dry sericea lespedeza and in 1965 animal manure. The first year of the study 1 ton of lime per acre was applied to all plots. In 1964 and 1965 gypsum was applied to all treatments at 1,000 lb. per acre to prevent blossom end rot. The soil was treated with a soil fumigant each year to control nematodes especially that of rootknot.

Yield results for the 3-year period are given in the table. The average marketable yields were 624 bu. per acre from not staked, 755 bu. from staked, and 592 bu. per acre from staked and pruned plants. The respective total yields were 1,010, 1,069, and 895 bu. per acre from use of 1,600 lb. of fertilizer per acre. Therefore, the staked but not pruned plants produced greater marketable yields than plants not staked; the increase was 134 bu. per acre. Pruning of staked plants decreased marketable yields of staked tomatoes 163 bu. per acre. For the early harvest plants not staked produced slightly higher marketable yield than either staked or staked and pruned plants. For both medium and late harvest, the higher yields were from plants staked but not pruned. Marketable yields for the late harvest from the staked plants were near 3 times those of not staked and 1⅓ times those from staked and pruned. The addition of an extra 800 lb. of fertilizer did not result in an increase in marketable or total yields of fruit in either of the practices.

Pruning staked tomatoes increased the yield of cracked fruits over not staked and staked plants. The percentages of cracked fruit were 4.75 from not staked, 6.08 from staked, and 13.63 from staked and pruned plants when 1,600 lb. of 8-8-8 was applied in 2 applications. When the fertilizer was increased from 1,600 to 2,400 lb. per acre, the percentages of cracking were 4.90, 7.06, and 14.77, respectively.

The percentages of culls other than cracks of the total fruit produced were 33.47 from not staked, 23.29 from staked, and 20.22 from the staked and pruned plants when 1,600 lb. of fertilizer was applied per acre; similar percentages were obtained from the higher rate of fertilizer. Most culls represented small fruit; little diseased fruit was present.

The average weight sizes for marketable fruit for the early harvest were .384 for not staked, .404 for staked and .407 lb. for staked and pruned. The respective average weights per fruit from all harvests were .339, .353, and .373 lb., .024 lb. is required for significance.

EFFECTS OF STAKING AND PRUNING ON YIELDS OF TOMATOES (1963-65)

Treatments					Yields per acre							Av. wt./ mkt. fruit		Per cent		
Pruned	Staked	Fertilizer 8-8-8			Marketable, 3-year average				Total, 3-year average			Early har.	All har.	Market-able	Cracks	Culls
		Under	Side	Side	Early	Med.	Late	Total	Cracks	Culls[1]	Total					
			Lb./a		*Bu./a*	*Bu./a*	*Bu./a*	*Bu./a*	*Bu./a*	*Bu./a*	*Bu./a*	*Lb.*	*Lb.*			
0	0	800	800	0	172	399	53	624	48	338	1010	.384	.339	61.78	4.75	33.47
0	0	800	800	800	170	419	66	655	52	355	1062	.403	.354	61.67	4.90	33.43
0	+	800	800	0	148	450	157	755	65	249	1069	.404	.353	70.63	6.08	23.29
0	+	800	800	800	114	445	169	728	75	259	1062	.393	.358	68.55	7.06	24.39
+	+	800	800	0	148	330	114	592	122	181	895	.407	.373	66.15	13.63	20.22
+	+	800	800	800	137	309	129	575	131	181	887	.396	.373	64.82	14.77	20.41
L.S.D.		.05 Level						92	24		98		.024			
		.01 Level						128	33		136		.034			

[1] Culls do not include cracks.

Selling FEEDER CATTLE *to advantage*

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ALABAMA'S BEEF CATTLE ECONOMY can be bolstered by improvement in breeding, feeding, and marketing!

At present it is mainly one of producing feeder cattle with emphasis on production of lightweight calves to be marketed during the fall at the end of the grazing period. Sales of calves under 500 lb. exceed 50% of all cattle sold through auctions. Feeder calf production will continue to be an important part of Alabama's beef cattle economy. Prices for feeder animals, particularly calves, should be studied for possibilities of increasing income through grade and weight improvement and timing of purchases and sales.

Price relationships for feeder cattle and calves of different grades and weights were determined in a 1962 study by Auburn University Agricultural Experiment Station. That year was one of reasonable stability in the cattle price cycle, making possible dependable price comparisons.

Higher Feeder Calf Prices

There were considerable price advantages in producing feeder calves as compared with production of heavier feeder cattle in 1962, Table 1. The widest differential or margin, $2.60 per cwt., occurred in spring. This reflected not only fewer marketings but also increased demands for calves to put on grass pastures.

During the fall period when auction receipts of calves were greatest, the differential shrank to 81¢ per cwt. in favor of calves. This is still an attractive margin considering the number of calves sold in the fall. There are, of course, factors other than price. Relatively inexpensive weight gains are possible from grazing or other homegrown roughages, or both. An added 200 to 300 lb. of such gain can more than offset a lower price. In addition price differences within the year were much less for heavier cattle, making the time of sale (or purchase) less risky. For example, in 1962 the difference between highest and lowest average prices within the year for feeder cattle above 500 lb. was $1.61 per cwt., whereas the price differential between highest and lowest for 400 to 500-lb. calves was $2.54 per cwt. For producers who can provide winter grazing or homegrown roughage, or both, fall purchase of calves for later sale the next spring or summer would provide both weight and price gains.

TABLE 1. COMPARISON OF PRICES PAID FOR FEEDER CATTLE AND CALVES GRADING GOOD AND ABOVE AT AUCTION MARKETS FOR SELECTED WEEKS, BY WEIGHT GROUPS, ALABAMA, 1962

Week	Above 500 lb.	400-500 lb.
	Dollars per cwt.	
Feb. 4-10	22.92	24.81
Apr. 15-21	23.83	26.43
June 10-16	23.82	25.95
Aug. 19-25	23.68	23.89
Oct. 7-13	23.35	24.16
Nov. 25-Dec. 1	24.53	25.56

Grades and Prices

The effect of grade on prices of feeder cattle is shown in Table 2. Prices are given for all cattle and calves, comparing animals grading Good and above with those grading Standard and below. Price differences per cwt. in favor of Good and above ranged from $4.43 in February to $5.71 in October.

TABLE 2. AVERAGE PRICES PAID FOR FEEDER CATTLE AND CALVES SOLD AT AUCTION MARKETS FOR SELECTED WEEKS, BY GRADE, ALABAMA, 1962

Week	Grade	
	Good and above	Standard and below
	Dollars per cwt.	
Feb. 4-10	24.01	19.58
Apr. 15-21	25.99	21.25
June 10-16	25.28	20.04
Aug. 19-25	24.20	18.83
Oct. 7-13	24.17	18.46
Nov. 25-Dec. 1	25.59	20.11

When it is realized that 45% of the Alabama feeder cattle sold through auctions falls in the Standard and below grades, the possibility for increased income through improving grades is apparent. The most important factor influencing grade of feeder cattle is the extent of beef breeding in the animals. Certain management factors, particularly nutrition, influence grade also. Thus, a maximum potential exists for sellers of Standard and below feeder cattle to increase dollar receipts as much as 25% through improved breeding and management. Overall increases in dollar receipts for feeder cattle in Alabama could be increased as much as 10%.

Volume of Auction and Prices

The most important sales outlet for feeder cattle and calves is the auction. It may be possible to increase sales receipts by selection of the auction market. Price differences that existed between large and other auctions in 1962 are shown in Table 3. For all weekly periods studied, prices for comparable grades of feeder animals were higher at auctions of large volumes. Smaller auctions did a better job of pricing Good and above cattle and calves than for lower grades when compared with large auctions. For example, during the October period when sales were seasonally large, the differential for Good and above feeders was negligible between auctions of different volumes. For lower grades of feeders, however, the price difference favoring the large auction was $1.22 per cwt. Standard and below feeder animals brought higher prices generally throughout the year than similar kinds of cattle and calves sold at smaller auctions.

TABLE 3. PRICE DIFFERENTIAL IN FAVOR OF SELLING FEEDER CATTLE AND CALVES THROUGH LARGE AUCTIONS*, BY GRADE, ALABAMA 1962

Week	Price differential at large auctions	
	Good and above	Standard and below
	Dollars per cwt.	
Feb. 4-10	0.44	0.55
Apr. 15-21	.54	1.08
June 10-16	1.32	1.07
Aug. 19-25	.51	.73
Oct. 7-13	.05	1.22
Nov. 25-Dec. 1	.51	.88

* Large auctions were those selling in excess of 25,000 head of cattle and calves during 1962.

Alabama cattlemen should not overlook opportunities for increasing income from feeder cattle by timing sales and purchases, upgrading animals, selling at heavier weights, and selecting markets.

Samples of products were attractively displayed in test stores. Would-be consumer at right examines product.

CONSUMER DEMAND for Pasteurized-Refrigerated Peaches

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HUBERT HARRIS, *Department of Horticulture*

A FREQUENT ERROR made in market development of a new product is to assume that its price to consumers will be determined by costs of production.

Prices are actually determined by the interaction of consumer demands and costs associated with technology of production. Price determination may be looked at in two ways. If consumers are not willing to pay a price that covers costs of new product production, then obviously the product will not continue to be in production. An opposite statement is equally valid; if consumers are willing to pay a price that covers more than costs of new product production, a powerful incentive may exist to expand production.

The discovery of demand appears especially necessary to the rapid development of new technology, which in the process of lowering costs of a particular type of product also produces an essentially new product. The pasteurized-refrigerated peach developed in the Auburn University Agricultural Experiment Station food processing laboratory is possibly such an example. Frozen peaches are a fresh-preserved type of product, but the product has a relatively high cost of production. Pasteurized-refrigerated peaches are also a fresh-preserved type of product, but technology of production, especially stored temperature, indicates that it is less costly to produce than frozen peaches. Pasteurized-refrigerated peaches are also new to the consumer whose demand for the product is unknown. Economic development cannot continue until demand is estimated in some way, either by guess or by a systematic collection of relevant facts.

A test to determine the demand for pasteurized-refrigerated peaches was begun November 9, 1964 by the Station in 4 retail stores located in Montgomery and Auburn, Alabama. Stores ranged in size from 2,000 to 8,000 customers per week and would commonly be designated as supermarkets. Data were collected to reflect some basic influences that determine product demand. These influences are population, spendable income, distribution of income, tastes, price of the product, and prices of other products.

The influences of changes in population, distribution of income, and prices of other products were assumed to be negligible during the test period of about 6 months. The data collected, thus, are defined as reflecting amounts demanded of pasteurized-refrigerated peaches as these amounts are related to the price of the product, tastes, and the level of spendable income. Level of spendable income was measured by average sales per customer as the average sales figure is much more readily available. Sales per customer is also a measure of income level that might be used by supermarkets in their decisions to stock a new product.

Test sales in stores were made according to a systematic design that varied prices among stores serving different income levels. Data in the table were not recorded until the end of an introductory sales period of 2 months when sales per store were judged to have reached a steady level. The introductory period included advertising at the point of sale. The inverse relationship of the law of demand is illustrated by sales results in the table when average amounts consumed per 1,000 customers per week become larger as the price goes down. Comparing total sales value of overall average amounts sold at 23¢ and 35¢ gives an indication of one of the most important aspects of demand. Total sales value per 1,000 customers per week is greater at 23¢ ($1.23, or $.23 × 5.33) than at 35¢ ($.54, or $.35 × 1.55). Total sales value, however, is higher for some products at high prices rather than at lower prices. The relationship between price, quantity sold, and total sales value is important for the following reason. Maximum returns from sales and hence maximum net difference of sales value and production costs can be predicted if the precise relationship between prices and quantity sold is known.

Further analysis of data in the table used for market development work showed that the maximum total net revenue per week (sales value-costs of production) is expected at a selling price of 31¢ per jar. This was based on cost conditions estimated for a commercial packer who, partly as a result of this study, produced the first commercial pack of this product in 1965. Expected sales volume in the absence of advertising would be about 10 jars per week in a store attracting 5,846 customers per week (average number of customers per store in the study). This volume of sales would allow the product to compete for shelf space in many chain supermarkets. Ten units per week would be greater than average sales per week of similar sizes of chilled orange sections, chilled grapefruit sections or 12 oz. packages of frozen peaches that were observed in the study. The predicted price and sales relationship appears to be substantially correct based on sales in 1966 of the commercial pack now being test-marketed.

SALES OF PASTEURIZED-REFRIGERATED PEACHES IN 3 RETAIL FOOD STORES, AT 3 PRICES, MONTGOMERY, AND AUBURN, JANUARY-APRIL, 1964

Item	Prices per 16 oz. jar 5-wk. period		
	.23	.29	.35
	Av. amt. per 1,000 customers/wk.		
Store 1	9.01	4.21	1.88
Store 2	4.57	2.73	1.66
Store 3	2.40	3.74	1.10
Overall av.	5.33	3.76	1.55

CAN COASTAL MANAGEMENT AFFECT MILK PRODUCTION?

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GETTING COWS to maintain milk production on perennial pastures like Coastal bermudagrass is an annual problem for dairymen. Cows that experience a "summer slump" in milk production enter the base-building period milking at a low level and produce less per lactation than when normal production persistency is maintained. Also, most cows calving in summer produce less milk than those calving at other seasons.

The summer slump is seemingly associated with rapid changes in nutritive quality of pasture forage. Rapidly growing, immature forage is generally high in nutritive quality. However, forage quality may drop rapidly as plants mature or are grazed down, or as growth is slowed by shortages of water or soil nutrients. In addition, crops differ in nutritive value and in their acceptability by cows.

Problems with Coastal bermuda pastures were identified in Auburn research that was done to evaluate effect of several management practices on performance of grazing cows. Even when intensively managed – irrigated and clipped regularly – Coastal pastures failed to maintain expected milk production persistency. Nevertheless, rotational grazing and proper mowing are practices that increase forage consumption and reduce amount of forage refused by cows.

The Coastal test pastures got a high rate of fertilizer to ensure that shortages of phosphorus and potassium could not affect results. Lime was applied according to soil test.

All groups of experimental animals had access to pasture from 6:30 a.m. to 9:30 a.m. and from 5 p.m. to 4 a.m. All were milked twice daily. The ratio of 15-16% concentrate to FCM (4% fat-corrected milk) was 1:4 in trials 1, 2, 3, and 4; 1:3½ in trial 5; and 1:3 in trial 6. In addition to experimental cows, other animals were pastured to utilize surplus forages, but these were adjusted so that forage was always adequate for test cows.

In all trials, the standard decline in milk production of 6% per 4-week period was used for comparison. In terms of lactation persistency, "normal" production in successive 4-week periods would be 94% of that of the previous 4 weeks.

Results of six trials are summarized in the table. In trials 1 and 2, 40 lb. of nitrogen per acre was applied at 6- and 4-week intervals, respectively. Trial 2 forage was irrigated during dry weather. Under continuous grazing in these two tests, milk production was unsatisfactory, forage intake and digestibility were low, and forage was poorly utilized. Cows did not graze in areas contaminated by urine and droppings.

In trials 3-6 all forage treatments were grazed 1 week of a 3-week rotational cycle. All areas grazed were mowed at heights indicated in the table and fertilized with 50 lb. of nitrogen per acre at 3-week intervals. All forages in trials 3, 4, and 5 were irrigated in an attempt to provide highly nutritious and palatable forage that would support satisfactory milk production. No attempt was made to evaluate advantages of irrigation.

Except for trial 4, lactation response from Coastal was inferior to that from millet. The alternate day-night grazing of millet and Coastal mowed at 8 in. proved beneficial in trial 3. This was not true where Coastal was mowed at 4 in. in trial 4 (irrigated) or trial 6 (non-irrigated). The higher intake and digestibility values in trial 4 were obtained with heifers, whereas all others were determined with milking cows.

The unmowed Coastal in trial 5 gave a higher lactation persistency than the mowed forage, but forage refusal was greater and utilization was decreased.

In trial 6 the CG group of cows was fed 50% more grain than C group cows. This did not improve milk production, but appeared to decrease intake and digestibility of the forage.

Chemical data show that as the season advances, Coastal forage declines in crude protein, proportion of leaves to stems, and digestibility faster than does millet. Dairymen who depend heavily on Coastal pastures for high producing cows must adjust their feeding to avoid summer slump.

EFFECT OF MANAGEMENT PRACTICES ON PERFORMANCE OF DAIRY COWS GRAZING COASTAL AND MILLET

Trial[1]	Treatment[2]	Mowing height	Daily FCM production			Lactation persistency	Crude protein content	Dry matter intake per cwt.	Dry matter digestibility
			Start	End	Mean				
		In.	*Lb.*	*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Lb.*	*Pct.*
1	C(131)	unmowed	35.0	20.0	27.1	88	11.5	not measured	
2	C(168)	unmowed	34.4	16.1	20.5	86	11.4	2.10	53
3	C(84)	8	38.6	24.6	29.4	88	13.6	not measured	
	M(84)	12	36.9	33.5	36.7	97	16.9	not measured	
	CM(84)		37.5	32.0	34.7	95	—	not measured	
4	C(91)	4	41.8	32.2	36.3	94	13.4	2.40	61
	M(91)	12	41.5	31.0	38.3	94	14.3	2.42	68
	CM(91)		40.6	30.7	37.7	94	—	2.37	64
5	C(70)	unmowed	42.2	33.4	35.2	91	11.3	2.12	53
	C(70)	4	48.1	34.1	37.1	87	13.6	2.24	55
	C(70)	8	44.0	26.4	32.6	81	11.6	2.13	53
	M(70)	12	44.0	41.0	41.2	93	17.4	2.34	57
6	CG(84)	4	47.8	32.7	36.5	87	13.8	1.70	52
	C(84)	4	48.3	32.6	36.9	87	13.8	2.10	54
	M(84)	12	47.4	38.4	43.0	93	17.9	2.36	58
	CM(84)		48.4	33.9	37.4	88	—	2.11	55

[1] Trials 1 and 2 were under continuous grazing; others were rotationally grazed.

[2] C = Coastal; M = Millet; CM = Coastal (grazed p.m.) + millet (grazed a.m.); CG = Coastal + high grain. Numbers in parentheses are trial length in days.

How quail are hatched and housed for Auburn research is illustrated here. Eggs in one type incubator are shown at left, with partially hatched tray of eggs in another type incubator at center. At right is bank of cages being used to house bobwhite quail. Although hatching procedures for quail are similar to those for chickens, equipment is specially designed to accommodate the small eggs. Coturnix quail hatch in 16-17 days, whereas bobwhite eggs require 23-24 days.

IMPROVED QUAIL STOCKS DEVELOPED AT AUBURN

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W. D. IVEY, *Department of Zoology-Entomology*

QUAIL, LIKE OTHER animals, can be improved by selection. Although few people have tried improving quail this way, some striking results have been obtained recently at Auburn, both with bobwhite (*Colinus virginianus*) and coturnix quail (*Coturnix coturnix japonica*).

The need for improving quail has become evident in recent years as importance of the bird has increased. Not only is there demand for quail for stocking hunting preserves and for food, but more and more research laboratories are using coturnix as research animals. Coturnix meat and eggs may also offer possibilities for use in specialty foods, as shown by Auburn food processing investigations.

Studies with bobwhite quail to date have concentrated on improving egg production. By selection and light stimulation, bobwhite quail that laid only 60 eggs a year with natural light have reached yearly production of more than 300 eggs.

The greatest improvement in egg production resulted from light stimulation. However, selection through three generations resulted in substantial improvements in egg production over nonselected strains. Thus far, fertility and hatchability have not increased correspondingly, and only some 20% of the extra eggs resulted in more bobwhite quail.

Genetic selection studies with coturnix quail began at Auburn in a modest way in 1961. With development of facilities to house 20,000 quail, the population was increased to include coturnix from many sources, and also bobwhite quail.

Several selection programs are underway with coturnix using many birds from several stocks. Criteria being studied are: (1) 70- to 220-day egg production; (2) egg size; (3) egg mass from 70- to 220-day production, a combination of data from the previous two; (4) age to reach maturity, with birds being selected for early and late maturity; (5) shell strength; (6) 100-day body weight; (7) reproductive efficiency, both fertility and hatchability; (8) livability, including studying of coturnix quail over 4 years old to determine longevity; (9) shell color and pattern; and (10) incubation time required to hatch.

New lines have been developed for 70- to 220-day egg production (line 651) and for 100-day body weight (line 661). Line 641 was established by pooling several coturnix stocks from different sources. This line was developed for research workers who required stock that was less inbred than much of that currently available in the United States.

To illustrate results to date with coturnix, body weight has been increased from 140 to 156 g. for females and from 110 to 128 g. for males in three generations. Egg production has, during seven generations, been raised in one stock from 52.8 to 76.5% (laying 3 out of 4 days rather than every other day).

For the Auburn work, some 2,500 quail are hatched each week. At 21 days old the birds are allotted for experimental use in either genetic, nutritional, management, anatomical, physiological, pathological, or parasitological studies (several researchers at the University get birds from the same origin). Alternatively, birds may be shipped when about 5 weeks old to provide foundation breeding stock for other research institutions. Quail have gone by air express from Auburn to all parts of North America, and to Hawaii, South America, and Egypt.

Hatching eggs from replacement parent stock are normally collected only from coturnix between 70 and 220 days old since fertility and hatchability are low before and after this period. Bobwhite parent stock, on the other hand, have been kept as long as 3 years because the demand for experimental bobwhites far exceeds the Auburn supply. Many studies using bobwhite quail involve only males since there are insufficient numbers of females.

Most genetic selection studies are carried out with individually caged quail. This is essential for work involving age of maturity, egg production, and egg quality. Wing-banded birds in colonies were used in early studies on selection for body weight, livability, and some other criteria. This procedure is still used but, in measurements like body weight, birds often respond differently when caged in colonies, in individual cages in view of other birds, or in complete isolation.

Packaged Fruit Products By PASTEURIZATION-REFRIGERATION

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Department of Horticulture

IMPROVEMENT in quality, variety, and convenience of packaged food is a major objective of research in the food processing laboratory, Department of Horticulture, Auburn University Agricultural Experiment Station.

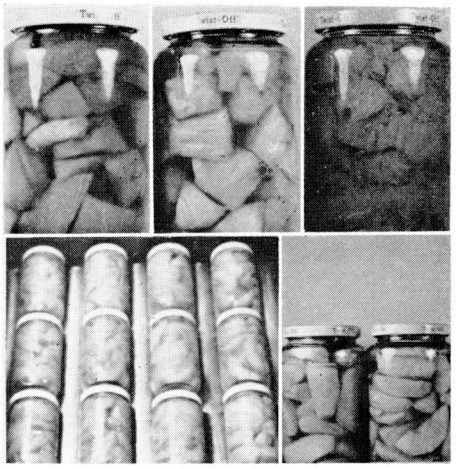
Studies are designed not only to develop new or improved products on a laboratory basis but also to determine commercial possibilities of products that offer promise and to develop special equipment and processes when needed for commercial application.

Current research on improved peach products is a good example of this work. This research has resulted in a new product made by a special pasteurization-refrigeration process that preserves high qualities of fresh ripe peaches for a long period in packaged ready-to-serve form. The process involves packaging of sliced ripe peaches in glass jars with syrup, addition of vitamin C and citric acid to the pack, vacuum sealing, controlled pasteurization, chilling, and refrigerated (32-34°F.) storage.

The pasteurization treatment is the key to high quality and long shelf life of the product. A special machine has been designed and a prototype model constructed to rotate the containers of peaches during pasteurization and cooling. This provides the necessary control of heating throughout the container and greatly reduces the time required for heating, cooling, and chilling. Technology has also been developed for equipment and process requirements in a commercial processing line for packaging this product. A test pack of 13,000 cases has been made in a commercial plant.

Latest studies in this area have been concerned with the preservation of four additional fruits by the peach pasteurization-refrigeration process. The process was effective in preserving fresh qualities of ripe apples, pineapple, grapefruits, and acidified cantaloupes.

Fresh ripe fruits were washed, peeled, sliced, dipped in a 0.05% sodium metabisulfate bath for 3 minutes, blanched in steam for 30 seconds, packed tightly in 22.5-oz. jars containing 3.5 oz. of boiled 72° Brix syrup, sealed at 120°F. by steam vacuum method, pasteurized for 3 minutes with jars rolling in steam in the special pasteurizer, cooled, and refrigerated. The center-of-jar temperature reached was approximately 160°F. at the end of the pasteurization period. Average vacuum readings after refrigerated storage was 21 in. of mercury. In the case of apples 30 mg. of ascorbic acid per 100 g. of product were added, whereas in the case of cantaloupes the pH of the product was adjusted to 3.8-4.0 range with acid additives. Both citric and acetic acids were tested for this. Strict plant sanitation was practiced during the entire operation. Physical characteristics of the products are presented in Table 1.



Samples of pasteurized-refrigerated products at top, left to right, cantaloupe, pineapple, and grapefruit. At bottom, left, peaches are in special machine designed to rotate containers during pasteurization and cooling and at right are apple samples.

TABLE 1. SOLUBLE SOLIDS AND pH DATA ON PASTEURIZED-REFRIGERATED FRUITS

Fruit	Fresh		Processed[1]	
	pH	Soluble solids	pH	Soluble solids
Peaches	3.5	10.2	3.5	21
Apple	3.6	12.0	3.6	23
Pineapple	3.2	12.0	3.3	24
Grapefruit	3.1	—	3.3	21
Cantaloupe	6.4	11.5	3.8[2]	22

[1] Standard process as used on pasteurized-refrigerated peaches except as noted.
[2] Acidified with citric acid.

TABLE 2. BACTERIOLOGICAL DATA ON PASTEURIZED-REFRIGERATED CANTALOUPES[1]

Processing stage	Bacteriological media[2]	
	Orange serum agar	Dextrose tryptone agar
Before SO_2 dip	400	1,000
After SO_2 dip	200	600
Processed acidified:		
with acetic	0	0
with citric	0	0

[1] Results expressed as No. bacteria per gram of product.
[2] No growth (any treatment) on potato dextrose agar.

Bacteriological data on the cantaloupe product are presented in Table 2. The sulfur dioxide bath resulted in a considerable decrease in the number of microorganisms in the fresh fruit and contributed to the retention of color.

The apple product was improved by a vacuum treatment of slices before packaging to remove respiratory gases and increase uptake of syrup. Slices were submerged in syrup, held for 15 minutes under 29 in. of vacuum and the vacuum released. This improved the appearance of the product and eliminated a low syrup level in jars after processing. An excellent product was made from the Golden Delicious variety. Packing apple slices in pineapple juice, the soluble solids of which were built up to 72° Brix with cane sugar, resulted in an acceptable flavor variation. Taste panel scores on apples and other products are presented in Table 3.

The grapefruit product rated high in flavor and color but did not retain wholeness of segments during processing. Packing the skinned grapefruit sections with coconut shreds showed promise for variety in flavor and appearance.

Excellent retention of fresh qualities was obtained in pineapple chunks from fully ripe fruit.

To preserve the cantaloupe slices, it was necessary to add acid to lower the pH. Samples acidified with acetic acid to 4.0 and with citric acid to 3.8 were well preserved by the pasteurization-refrigeration process. The acetic acid product rated higher in flavor. This product was rated as good in flavor by all 5 judges that sampled the product.

TABLE 3. TASTE PANEL SCORES FOR SIX PASTEURIZED-REFRIGERATED FRUIT PRODUCTS

Product	Average scores[1]
Peaches	8.8
Apples	8.2
Vacuumized apple	8.8
Cantaloupes in acetic	8.0
Cantaloupes in citric	7.6
Grapefruits	8.8
Pineapples	8.8

[1] The scores arrived at by 5 judges were based on excellent, (10-9); good, (8-7); fair, (6-5); and poor, (below 5).

VARIETAL RESISTANCE or INSECTICIDES *for pickleworm control on cantaloupes?*

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THE PICKLEWORM, *Diaphania nitidalis* (Stoll), in Alabama is usually the most destructive insect of cantaloupes and other cucurbits. This worm reduces vigor of plants and destroys market value of crop by boring into the vines and fruits.

Cantaloupes planted in early spring often escape serious injury by pickleworms, especially when transplants are used to hasten maturity. However, melons maturing late in summer and fall are often severely damaged by this insect when no control measures are applied.

Since several cantaloupe varieties are available that possess certain disease resistance, it was of interest to determine if any varieties had a degree of inherent resistance to the pickleworm.

Six small-plot field experiments were conducted during 1965 at four Substations of Auburn University Agricultural Experiment Station System; 23 canteloupe varieties were evaluated for pickleworm resistance.

Plantings were made from May to July. All varieties were field-seeded, thinned to two plants per hill, and treated for disease control. One variety was treated with a recommended insecticide to serve as a control. Ten hills spaced about 40 in. apart in 88-in. rows made up a single plot. All varieties were repeated at random 4 to 5 times. Generally, melons were harvested at half-slip and examined for pickleworm damage.

Results for 11 of the common evaluated varieties are summarized in Table 1. At the Tennessee Valley Substation, Belle Mina, and the North Alabama Horticulture Substation, Cullman, all varieties were severely damaged by pickleworms in the absence of insecticidal control; percentage of damaged melons ranged from 50 to 88%. There were some differences in varietal susceptibility, but none of the varieties showed an acceptable degree of resistance. Damage by pickleworms was less severe at the Chilton Area Horticulture Substation, Clanton, and the Wiregrass Substation, Headland, but all varieties were damaged to some degree. The average percentage of damaged melons listed in Table 1 cannot be interpreted as a valid measure of varietal susceptibility since all varieties shown were not evaluated in all experiments. Other varieties found to be susceptible to pickleworms in one or more experiments included: A-63-10, A-63-11-4, A-63-59, Banana, Delicious 51, Hales Best 45 SJ, Honey Dew, Honey Rock, PI-140471, Rocky Ford, and Schoons Hardshell.

As shown in Table 2, heavy and damaging infestations of pickleworms can be effectively controlled with recommended insecticides. At present, there are no cantaloupe varieties that appear to have adequate pickleworm resistance to be of value as a control measure.

Melons should be planted as early as possible to escape ravages of this pest. When worms appear in the blooms, one of the following insecticides applied at weekly intervals until melons mature will effectively control pickleworms: carbaryl, lindane, or parathion. **Parathion should not be used in the home garden.**

TABLE 2. PICKLEWORM CONTROL ON CANTALOUPES, CULLMAN, ALABAMA

Treatment	Lb. active per acre	Percent demaged melons		
		1964	1965	Av.
Carbaryl + Maneb	1.0 + 1.6	0	8.7	4.4
Lindane + Maneb	0.25 + 1.6	7.6	8.4	8.0
Untreated Check	0	77.6	100.0	88.8

TABLE 1. VARIETAL RESISTANCE OF CANTALOUPES TO PICKLEWORM DAMAGE, 1965

Variety	Per cent damaged by pickleworms				
	Belle Mina	Clanton	Cullman	Headland	Av.
A-63-11	---	17.7	68.2	3.1	29.7
Smiths Perfect	49.6	5.5	62.7	12.0	32.5
Edisto 47	66.4	13.0	52.6	20.4	38.1
Edisto	77.6	14.3	51.2	10.0	38.3
Florida #1	---	19.1	62.2	---	40.7
Florisun	---	14.1	68.3	---	41.2
Golden Perfection	81.5	---	---	6.5	44.0
Hales Best Jumbo	86.2	12.7	50.4	40.0	47.3
Perfected Perfecta	82.3	---	---	20.4	51.4
Seminole	83.2	25.6	88.1	28.8	56.4
Texas Resistant	86.9	---	---	39.1	63.0
Treated	25.0	3.4	7.6	---	12.0

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* Author acknowledges assistance of J. K. Boseck, C. A. Brogden, C. C. Carlton, M. H. Hollingsworth, superintendents of cooperating Substations, and of J. D. Norton, Horticulture Dept., who supplied numbered breeding lines in these experiments.