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Agricultural Experiment Station
AUBURN UNIVERSITY

HIGHLIGHTS *of* Agricultural Research

A Quarterly Report of Research Serving All of Alabama

VOLUME 9, No. 2 SUMMER, 1962

In this issue . . .

On the cover. This new laboratory in Funchess Hall permits expanded research on food processing methods for home and industry. In addition to studies that led to development of the improved process for pickling peaches, many other food processing projects are underway. New sweetpotato products, superior processes for jams and jellies, methods of handling peaches for shipment, processing and storing methods for pecans, a flame process for shelling chestnuts, and evaluation of varieties and breed lines for processing qualities are contributions of the processing laboratory, see page 7.

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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. 332. Management of Irrigated Cotton.

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

Bul. 340. Vegetable Procurement by Wholesalers in Alabama.

Bul. 341. Folded Garment Storage for Southern Farm Homes.

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

Cir. 137. Producing Fence Posts from Thinnings.

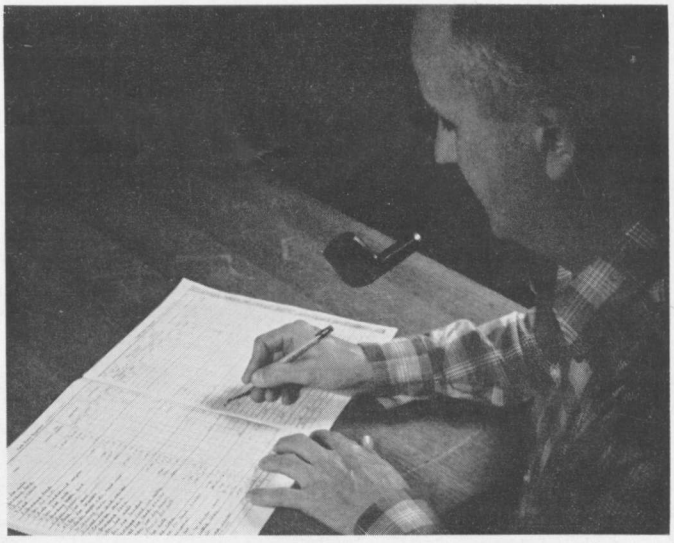
Cir. 138. Soybeans for Oil in Alabama.

Leaf. 63. Cooler Homes from Attic Ventilation.

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

Prog. Rept. 82. Performance of Silage Varieties.

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



Measuring FARM EARNINGS

J. H. YEAGER, *Agricultural Economist*

MY GROSS INCOME was more but my net income was less. No doubt you have heard this statement from a farmer or business man who had measured his earnings for the past year.

Farm earnings vary. The spread between high and low income farms is greater than in previous years. Costs are increasing faster than receipts on many farms.

To determine whether progress is being made, earnings must be measured. The earnings position of a given farm relative to other farms usually discloses interesting comparisons. Such comparisons show strong and weak points in farm organization and operation. An analysis of earnings often points the way to improvements.

The 1960 records of 532 farmers cooperating in the Farm and Home Development and Unit Test Demonstration programs of the Auburn University Extension Service were analyzed in 1961. These records included: (1) investment in land, buildings, machinery, livestock, feed and supplies; (2) cash receipts and expenses; (3) major crops and yields; (4) livestock and production rates; and (5) an estimate of man-days work on the farm.

Records were grouped and analyzed according to farming areas, amount of operator's labor income, and acres of open land. Also farms were studied according to major sources of income. This report concerns only dairy farmers in the group.

Figures in the table are for 94 dairy farms included in the record analysis project. Except for four counties, these dairy farms were in the northern half of Alabama.

Net income may be net cash income, the difference in cash receipts and expenses, or net farm income. Receipts include dollars from the sales of things produced on the farm and frequently from the sale of a capital item, such as a dairy cow.

The same is true of expenses. When a tractor is bought, the cost is recorded as an expense. All the cost, however, should not be charged against the farm in 1 year. Thus, inventory records are necessary to show what is happening not only to the investment in machinery but also to other items. Through the use of inventories, adjustments are made to offset purchases and sales of capital items. This gives a more nearly correct picture of farm finances. Also, placing a value on unpaid family labor other than for the operator permits a better comparison between farms with different amounts of family labor.

ANALYSIS OF 94 ALABAMA DAIRY FARMS, 1960

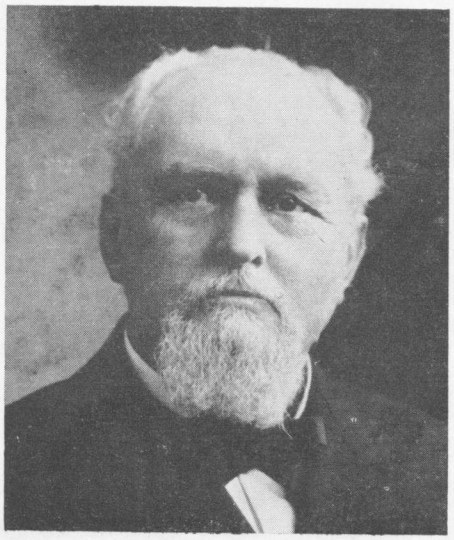
Item	47 least profitable farms	47 highest profitable farms	94 farms
Capital investment			
Land, timber, and ponds	$15,420	$20,710	$18,065
Buildings[1] and fences	6,580	7,520	7,050
Machinery	8,390	11,510	9,951
Livestock	10,710	18,820	14,765
Feed, seed, and supplies	1,640	2,390	2,016
TOTAL	$42,740	$60,950	$51,847
Income			
Cash receipts	$15,384	$26,455	$20,922
Cash expenses	14,859	22,867	18,859
Net cash income	525	3,588	2,063
Net change in inventory	3,533	5,093	4,313
Value of unpaid family labor	511	369	440
Net farm income	3,547	8,312	5,936
Interest on av. investment[2]	2,137	3,048	2,592
Operator's labor income	1,410	5,264	3,344
Value of farm privileges	665	702	684
Operator's labor earnings	$ 2,075	$ 5,966	$ 4,028
Acres operated	298	387	342
Number of dairy cows	39	59	49
Cwt. milk sold per cow	59	82	71
No. man equivalents	2.5	2.8	2.6
Days work per man equivalent	280	352	316

[1] Excludes value of home.
[2] 5% of investment.

If an interest charge is made on the farmer's investment and subtracted from net farm income, the remainder is operator's labor income. This is what the farm operator would have received for his labor if he had paid interest at 5% on the farm investment. Labor income for the most profitable dairy farms was almost 4 times that of the least profitable ones.

Still another factor can be used to account for differences among farms. On some farms the value of family used products, such as milk, meat, and vegetables, amounts to much while on others it is little. Operator's labor earnings is labor income plus the value of family used products. Since this measure includes farm products consumed, it can be used for comparing earnings of farmers with non-farmers.

There are many measures of farm earnings. Each is a useful figure when understood and used wisely. Measures of earnings tell the degree of success in farming.



J. S. NEWMAN—
Station's first director

LILLIAN FOSCUE, *Graduate Assistant*

FARMERS generally cannot afford either the time or money to conduct experiments with such accuracy and persistency as to render the results valuable. Hence, the necessity for an agricultural experiment station where such investigations are conducted for the general good under auspices of the State.

James Stanley Newman, first director of the Auburn Experiment Station, wrote those words in the first bulletin issued in the fall of 1883. The Alabama Legislature appropriated funds in February of 1883 for an Experiment Station at the Agricultural and Mechanical College at Auburn.

Station Buys Farm

A worn-out, gullied farm of 226 acres was bought near the College. Washed, red land, long abandoned from profitable cultivation was a challenge to learn what could be done for marginal farming. Careful experiments were to test agricultural theory.

Much of the first year was spent clearing the land and preparing it for cultivation, but within 2 years experiments included production studies with cotton, corn, peas, sugar cane, sorghum, millet, clover, lucerne, various grasses, vegetables, and melons, in addition to Jersey cattle, American Merino sheep, Essex and Berkshire hogs, and carp ponds.

The man who directed the miraculous change to green fields and crops was Director Newman, teacher and author as well as agriculturist and Confederate hero. Born in Orange County, Virginia, Newman made his home in Georgia after the war. He founded a boarding school for boys, but he maintained his farming interests.

A large fruit grower, Newman helped organize the Georgia State Horticultural Society. Eight years with the Georgia State Department of Agriculture preceded Newman's appointment as director of Auburn's Experiment Station. He was vice-director of Georgia Experiment Station, director of Farmers Institutes, and author of manuals on sheep, cattle, hogs, and poultry.

AUBURN UNIVERSITY CENTENNIAL FEATURE

Researcher, Author, Leader

Newman assumed a position of leadership in agriculture in Alabama. He served as president of the Alabama State Agricultural Society, reorganized in 1884. The first Alabama State Agricultural Society flourished prior to the Civil War. Newman was president of the Alabama State Alliance when he left Auburn at the end of 1891 to fill the chair of agriculture and direct the Experiment Station at Clemson College.

Newman had grown up on a diversified farm, and though he had devoted his attention to orchards on his Georgia farm, he was interested in all types of agriculture. Whether it was ponds for food fish or a new type of grass, Newman was alert for any enterprise that would combine with the traditional cotton culture of the South for more successful farming. He personally conducted experiments with many varieties of apples, pears, peaches, plums, figs, grapes, strawberries, and raspberries to determine their comparative productiveness and adaptation to the soils of Alabama.

In 1889 Newman started a series of cooperative fertilizer tests with some of the leading farmers of the State. Later new varieties of seed were tested in the different soils of Alabama in the same way – the Experiment Station furnishing the seed or fertilizer to be tested, the farmer keeping records of results.

Results of experiments made on the Experiment Station farm at Auburn were of such value to nearby farmers on similar soil that farmers on other types of soil were anxious to participate in an experimental program. The heavy prairie soil of the Canebrake, or Black Belt, particularly posed many problems to row crop cultivation. A branch experiment station was established by the Alabama Legislature in 1886 near Uniontown. Newman served also as director of the branch experiment station. First work there concerned oats, red clover, cotton, and corn.

The system of outlying research units, created by the State Legislature in 1927 with substations and experiment fields on the major soil types in Alabama, finally replaced the cooperative local experiments started by Newman.

Throughout his life, Newman continued to write. He contributed five books to the agricultural literature of that early period. He wrote bulletins on a wide range of agricultural topics. He was a frequent lecturer at Farmers Institute meetings in Alabama, taking results of agricultural experiments personally to farmers. After leaving Auburn he directed Farmers Institutes in South Carolina.

An outstanding scholar himself at the University of Virginia, Newman brought a new approach to teaching agriculture. With a farm laboratory, agriculture became an applied science. Results learned through experimentation were transferred to the classroom.

Newman was the first director of the Auburn Experiment Station when it was only a State institution. He continued on as director when the station was reorganized under terms of the Hatch Act of 1887, marking the beginning of Federal-State cooperation in nationwide agricultural research. He pioneered in establishing plans and techniques for experimentation that have been the foundation of present agricultural research.

Soil fertility and PEANUT YIELDS

D. G. STURKIE and L. E. ENSMINGER
Dept. of Agronomy and Soils

PEANUT GROWERS have a double-barreled objective – making high yields and maintaining or increasing soil fertility. Since peanuts are considered to be "hard on the soil," reaching both objectives appears difficult.

An experiment was begun at Auburn in 1950 to determine if soil productivity could be maintained under a cropping system of continuous peanuts. Concrete-walled bins 14 × 31 ft. were filled to a depth of 6 in. with a uniformly mixed Norfolk sandy loam soil. The 15 treatments used were repeated three times. Dixie Runner peanuts were grown the first 6 years (1950-55) followed by a Virginia bunch type (Ga. 119-20) during 1956-61.

Treatment Effect

Yields and percentages of sound mature kernels produced with the different treatments are given in the table. Treatments did not affect yield for the first 3 years. However, omission of phosphorus and potassium (treatment 1) and/or lime (treatment 2) caused yields to decline rapidly after the third year. The original soil had a pH of 5.8 and tests showed medium levels of calcium, phosphorus, and potassium. After a few years, pH had dropped to 4.7 and calcium and potassium levels were low where no lime or fertilizer had been applied. Application of phosphorus and potassium with lime was necessary for continued high production.

Other practices, such as topdressing with gypsum or basic slag and addition of corn stalks, increased yields slightly. Increases from certain practices, based on yields for the last 6 years, are given below:

Practice	*Increase*
PK (treatment 1 vs. 2)	656
Lime (2 vs. 3)	1,377
Gypsum (3 vs. 5)	56
Basic slag (3 vs. 4)	119
Corn stalks (6 vs. 13)	225
Winter legumes (6 vs. 15)	35

Practices that contributed to higher yields were addition of P, K, and lime, topdressing with an available source of calcium, and addition of organic matter.

The soil test data show that fertility of the soil was maintained or improved over the 12 years with these practices. As shown by production figures, there was no decline in yield during the 12-year period. Yields in 1961 were as large as any made during the test period.

As would be expected, soil became more acid from treatments 1 and 2 that did not include liming. Where lime was added (treatments 3-15), acidity remained constant or was reduced.

Percentage of sound mature kernels was increased by treatments that improved yields. Practices that resulted in large yields also produced high quality nuts.

Results of the tests showed there was no value to applying nitrogen or using minor elements. Growing legumes ahead of peanuts was of little or no value.

No Response to Application Methods

Method of applying fertilizer did not affect yield or quality. Three methods of application were tested and all were equally effective. However, all methods used kept seed out of direct contact with the fertilizer, which is necessary to prevent stand damage.

Recommended insect and disease control practices were closely followed, which undoubtedly contributed to high yields. Perfect stands of plants were obtained in closely spaced rows – about 34 in. apart.

Results of the Auburn study show that satisfactory yields of peanuts can be produced over a period of 12 years and at the same time maintain fertility of the soil. The results do not mean that higher yields could not have been produced with crop rotation. Effect of rotation was not studied in the experiment reported.

KEY TO TREATMENTS

Fertilizer used: (1) no fertilization: (2) PK; (3) PKL; (4) PKL-BS; (5) PKL-G; (6) PKL-G; (7) PKL-G; (8) PL-G, K during 1950-55, no K in 1956-61; (9) PKL-G, plus 64 lb. N; (10) PKL-G, plus 2,000 lb. 0-16-8 (0-14-14 in 1956 and 1959) every 3 years; (11) PKL-GME, plus 2,000 lb. 0-16-8 every 3 years; (12) PKL-G, plus 3 tons corn stalks every second year; (13) PKL-G, plus 6 tons corn stalks every second year; (14) PKL-G, plus 6¼ tons green legumes annually; and (15) PKL-G, plus 12½ tons green legumes annually.

Rates per acre: P, 62 lb. P_2O_5 from superphosphate; K, 120 lb. K_2O from muriate of potash; G, 400 lb. gypsum in 1950-56 and 500 lb. in 1957-61 dusted on when plants began blooming; BS, 400 lb. basic slag in 1950-56 and 500 lb. in 1957-61 dusted on when plants began blooming; ME, minor elements—5 lb. Colemanite, 5 lb. manganese sulfate, 7½ lb. zinc sulfate, 2½ lb. copper sulfate, and ½ lb. sodium molybdate; green legumes, vetch or crimson clover; and corn stalks, dry stalks chopped into short lengths and put on soil in fall and turned the following spring.

Methods of application: In treatments 2-5, all P_2O_5 and 32 lb. K_2O applied in drill 2 weeks before planting and 88 lb. K_2O sidedressed after plants were up; for treatment 7, all fertilizer was applied in the drill 2 weeks before planting; and in others (6 and 8-15) all fertilizer was broadcast before land was turned.

YIELD OF PEANUTS AND PERCENTAGE OF SOUND MATURE KERNELS FROM DIFFERENT FERTILIZER AND OTHER PRACTICES, 1950-61

Treatment number	Per acre yield, average			Per cent sound mature kernels, av.		
	1950-52	1953-55	1956-61	1950-52	1953-55	1956-61
	Lb.	*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Pct.*
1	2,375	1,018	238	63.3	59.1	39.9
2	2,194	1,336	894	63.1	51.7	45.0
3	2,179	1,740	2,281	64.2	62.1	62.8
4	2,299	1,929	2,400	64.2	66.4	65.0
5	2,255	1,806	2,337	64.5	63.9	65.0
6	2,271	1,970	2,432	64.9	65.6	64.2
7	2,434	1,741	2,392	64.8	63.4	64.8
8	2,250	1,873	2,486	64.4	65.8	64.4
9	2,351	1,842	2,375	64.8	64.3	64.3
10	2,239	1,765	2,484	63.4	61.6	65.4
11	2,211	1,739	2,446	64.4	59.7	67.2
12	2,591	1,867	2,608	64.9	62.9	67.0
13	2,500	2,157	2,657	64.5	65.2	66.8
14	2,487	1,987	2,477	64.6	66.7	66.3
15	2,657	1,776	2,467	64.5	64.5	66.5

Stored ROUGHAGES vs. GRAZING

E. L. MAYTON
J. H. BLACKSTONE
GEORGE HAWKINS
J. A. SANDY
JOE LOTT*

STORED ROUGHAGES and grazing for dairy cows differ little – *cost-wise* or *production-wise!*

Price relationships between grain and roughages usually favor roughage feeding. Since cows have the capacity to consume large amounts of high quality roughage, this points out the need to find the lowest cost method of supplying it.

Feeding Experiment

The dairy herd at the Piedmont Substation of the Auburn Agricultural Experiment Station was divided into two experimental, roughage feeding groups during the last 3 years. One group of cows was fed stored roughages of corn silage and alfalfa hay. The other group was on high quality grazing plus hay and silage as needed. Since grain feeding was used at the same rate with both systems, the most economic level was not determined for either. Quality grazing was provided during as long a period of the year as weather permitted. Small grains and/or ryegrass and clover, Starr millet (3 plantings), and permanent pasture on a limited basis were used for grazing by experimental cows, dry cows, and replacement heifers. Cows in one system were assigned to the alternate system at the beginning of each new lactation in order to minimize individual cow differences.

Production and Costs

Total feed cost per cwt. of milk produced by the two systems was as follows:

Year	*Stored roughage*	*Grazing*
1959	$2.09	$1.89
1960	2.42	2.03
1961	2.64	2.29
3-yr. av.	2.41	2.09

Feed cost per cwt. of milk increased each year from 1959 to 1961 for both groups of cows. This was because of some increased feed consumption from one year to the next, and to increased costs of purchased items used in the production of feed and forages. The average amount of feed used per cwt. of milk during the 3-year period was as follows:

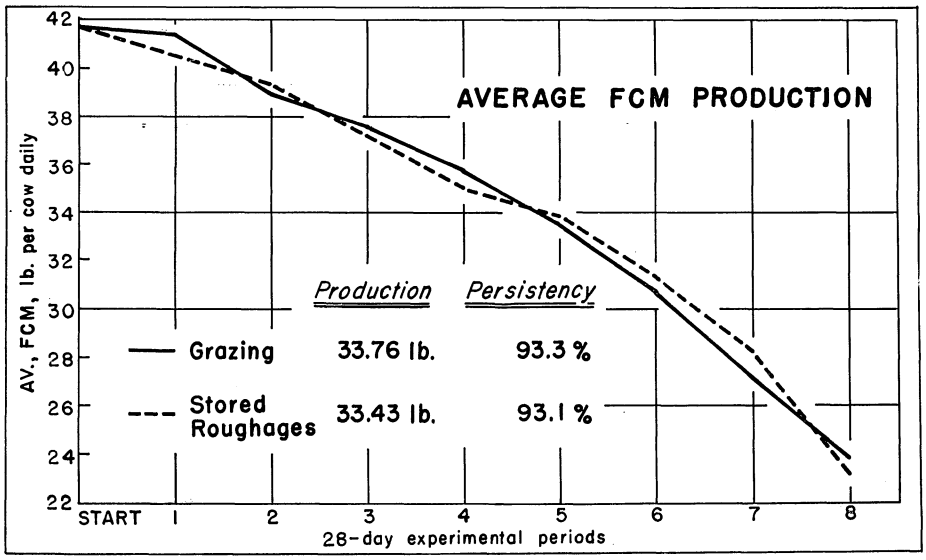
Kind of feed	*Stored roughage*	*Grazing*
Corn silage, lb.	195	47
Alfalfa hay, lb.	35	11
Grain mixture, lb.	25	24
All grazing, days	0.46	2.51

A total of 35 cow years was studied for the 3-year period in each system. Cows on the stored roughages consumed an average of 68 lb. of silage and 11 lb. of hay per day while in milk. They were crossbred Holsteins, averaging 1,170 lb. in body weight. Cows on the stored roughages (drylot) produced an average of 10,368 lb. of 4% fat corrected milk (FCM) on a calendar year basis, as compared with the 11,179-lb. average of the grazing group. Higher production by the grazing group was the result of starting at a higher level. On a lactation basis, average daily milk production and percentage persistency each 28 days was almost identical for paired cows in each system (see chart). Adjusting costs to equal production levels would give a 3-year average feed cost per cwt. of milk produced of $2.23 for the stored roughage group and $2.09 for the grazing group. The small difference in average feed cost between groups, considered as a 3-year average or by year to year differences, leads to the conclusion that either of these systems could be developed into a satisfactory program for this herd.

On land used in this study, yields during the last 4 years averaged: corn, 42 bu.; alfalfa hay, 1.8 tons; and corn silage, 9.6 tons.

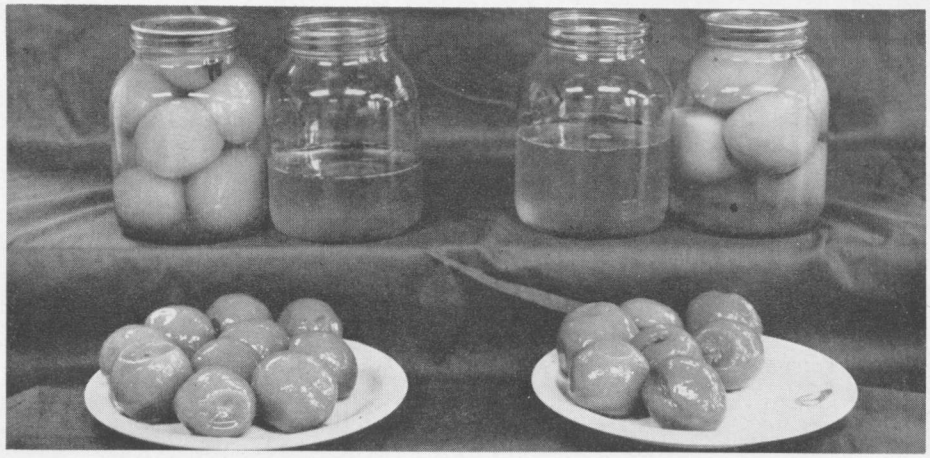
Conclusions

Individual dairymen in Alabama need to consider three possible forage systems – (1) a stored roughage system of all corn silage or silage and hay; (2) a grazing system supplemented when needed with silage, or hay or both; or (3) selected best combinations of the two. No one system would be best for all dairymen. There is no exception to the rule, however, that high producing cows will consume large quantities of high quality roughage on a year-round basis. For cows in milk and weighing 1,200 lb., this means about 100 lb. of corn silage per day (harvested weight equivalent) for an all-silage ration; 70 lb. of silage and 11 lb. of alfalfa hay for a combination; or about 125 to 175 lb. of good quality green grazing per cow per day. High producing cows in this experimental herd could not consume enough roughage to meet their nutritive requirements. Therefore, grain feeding was necessary.



Average daily milk production is for the 224 days beginning 61 days after calving. Persistency is the production for each 28-day period expressed as per cent of production during previous 28-day period. Persistency values are averages for the eight periods.

* Substation Superintendent, Agricultural Economist, Dairy Husbandman, Assistant Substation Superintendent, and former Assistant Superintendent, respectively.



Improved process (left) results in more fruit, less syrup per container as compared with that of cold pack method (right).

Improved Process for PICKLING PEACHES

HUBERT HARRIS, *Associate Horticulturist*

Now comes an improved, rapid process for pickling peaches that yields a top quality product for commercial or home use.

The usual methods of overnight holding periods are considered impractical for commercial production. Instead rapid cold pack methods are used generally, but these result in excess syrup in proportion to fruit, and often in poor flavor and texture.

Auburn Research

The improved method is a development by Auburn Agricultural Experiment Station's horticulture crop processing laboratory. The process produces pickled peaches of high flavor, good texture and color, and a higher ratio of fruit to syrup than those processed by customary methods.

Highly desirable for both home and commercial use, the improved process uses a short preheating treatment of the fruit in the pickling syrup. Preheated fruits can be packed closer, thus increasing the fruit-to-syrup ratio, Table 1. Correct preheating did not soften the fruit enough to cause tearing or mashing during packing, as is generally the case with holding methods.

Table 1. Fruit-Syrup Ratios*

Method	Pack: (24-ounce jar)		Cut-out syrup volume
	Fruits	Syrup	
	No.	*Oz.*	*Oz.*
Cold pack	7	10	12
Preheat	10	8	8

* 1¾ to 2-in. diameter Dixired peaches, 61.5% syrup.

Final cooking of the fruit was done in the container after spices and syrup were added and the container exhausted and sealed. Cooking periods required for proper texture varied with other treatments, as given in Table 2.

Flavor qualities were affected greatly by the syrup formula used. Best results with the preheating method were obtained by using a syrup with 1 part acid to 40 parts sugar, and 61.5% soluble solids.

The kind and quantity of spices used also affected flavor. Excellent flavor was obtained from spicing treatment in the improved process, Table 2.

Much of the undersize fruit from peach packing sheds is suitable for pickling, especially during early and mid-season when varieties are mainly of the semi-cling type. Even though such fruit may be low in solids and flavor, high quality pickled peaches can be made by correct use of vinegar, sugar, spices, and this improved process.

Table 2. Required Cooking Period[1]

Method	Cooking period[2]
	Minutes
Cold packed fruit	
7 min. steam exhaust	30
Vacuum seal	35
10 min. preheat	
4 min. steam exhaust	20
Vacuum seal	25
15 min. preheat	
4 min. steam exhaust	12
Vacuum seal	17

[1] Dixired, firm ripe fruit, 1¾ to 2 in. packed in 28-oz. jars.

[2] Cooking period may vary some with variety, fruit size, maturity, size of container.

Improved Process

1. Use firm, ripe fruit of a variety suitable for pickling – 1¾ to 2 in. in diameter preferred.

2. Prepare syrup by dissolving 13 lb., 3 oz. sugar in 1 gal. of 40-grain vinegar.

3. Peal peaches with a knife or dip for 1 min. in boiling 1% lye solution; wash and trim.

4. Preheat fruit 10-min. in vinegar-sugar syrup at simmering temperature (205°F.).

5. Add spices to containers; use ¼ teaspoonful of mixed pickling spices, 2 cloves, and 1 small piece of stick cinnamon per 28-oz. jar. This may be varied to suit taste.

6. Add prepared fruit, cover with hot syrup, steam exhaust 4 min., seal, cook 28-oz. jar 20 min. at 212°F, cool in air. If vacuum seal is used cook 25 min.

7. Product may be used after aging 1 week; however, to develop maximum quality 6 weeks are required.

Other Research

From the horticulture crop processing laboratory have come improved purees for pies, baby foods, and instant products produced from low market grade sweetpotatoes, a new freeze process to retain aromatic fruit flavor in jams and jellies, improved system for hydro-cooling peaches for shipment to distant markets, flame process for shelling chestnuts; methods for processing and storing pecans, and evaluation of new varieties and breed lines for processing qualities.

The plot at left was treated with 4 lb. Eptam applied as a 14-in. band following a fresh cultivation soon after transplanting.

HERBICIDES for SWEETPOTATOES

W. A. JOHNSON and HARRY AMLING
Department of Horticulture

THE ACREAGE of sweetpotatoes in Alabama has declined over the past few years mainly as a result of high labor requirements involved in production.

The cost of weeding an acre of sweetpotatoes during a wet, growing season ranges from $20 to $25. Therefore, an effective herbicide may reduce cost and enable more acres to be grown with less labor. The cost of herbicides registered for use on sweetpotatoes ranges from $8 to $10 per acre.

Weed Control Studies

Weed control studies in sweetpotatoes have been conducted for the past 2 years on light sandy soils at the Auburn University Agricultural Experiment Station with Eptam, Dacthal, and CIPC. Studies were made on early and late plantings each year. The checks in each test consisted of hoed and unhoed plots. Herbicides were applied broadcast with a knapsack sprayer immediately after setting plants. During the test none of the treated plots was hoed regardless of amount of grass or weeds present.

Yields and weed control results from the three materials used are given in the table. Weeds present were predominantly crabgrass and Florida pusley. The unhoed checks produced the lowest yields in each of the studies. In 1960 with the early planting, Eptam at 4 lb. worked into soil (incorporated) produced 86% of that produced by the hoed treatment, granular Eptam incorporated 103%, Dacthal at 8 lb. 82%, CIPC at 4 lb. 53%, and the unhoed checks 47%. In the early 1961 planting the percentage comparisons with the hoed plots were 92% for Eptam at 4 lb. incorporated, 81% not incorporated and 88% at 7½ lb. not incorporated, 76% for granular Eptam at 4 lb. not incorporated, 95% for Dacthal, 88% for CIPC, and 39% for the unhoed check. A one-year study at the North Alabama Horticulture Substation showed that Eptam at 4 lb. produced more than the 7½ lb. rate. In 1960 on the late planting, Eptam at 4 lb. incorporated produced more than the hoed check, while Dacthal and CIPC nearly equalled the hoed check in yield. In 1961 all herbicide treatments in late planting produced higher yields than the hoed check.

The degree of control is shown in the table by ratings for crabgrass and Florida pusley. A rating of 0 represents no weeds and 10 severe weed population. Dacthal at 8 lb., Eptam at 4 lb. incorporated (except for pusley in late set crop) and at 7½ lb. not incorporated gave good to excellent control of crabgrass and Florida pusley. CIPC gave excellent control of crabgrass in 2 tests and fair control in 2. Pusley control was excellent in 3 tests and fair in 1.

Use Factors

Factors in successful use of a herbicide on sweetpotatoes are types of soil, temperature, moisture conditions, methods and time of application, distribution of herbicide, condition of planting bed, condition of plants when treatment is applied, and cultivation after treatment.

Research Results

Results from 2 years' testing indicate that farmer trials of these herbicides, especially Eptam and Dacthal should be initiated. These materials are registered for use on sweetpotatoes. In central and southern Alabama, apply Eptam at a rate of 7½ lb. (broadcast basis) on a 14- to 16-in. band (not incorporated). In northern Alabama apply 4 lb. per acre (broadcast basis) on a 14- to 16-in. band (not incorporated). Apply herbicides 1 or 2 days after setting plants. Be sure no depressions are left around plants nor soil left in a cloddy condition.

In one test, Eptam at 4 lb. per acre was applied in a 14-in. band in 2 plots of 8 varieties of sweetpotatoes with a tractor weed sprayer, leaving 2 plots unsprayed. The untreated plots were hoed. Total yield for the treated plots was 569 bu. with 390 bu. being No. 1 potatoes. Total yield on the hoed plot was 569 bu. with 340 bu. No. 1.

INFLUENCE OF HERBICIDES ON TOTAL YIELD AND WEED CONTROL

Treatments	Lb. actual/a broadcast	Yields per acre and weed index									
		1960						1961			
		Early			Late			Early			Late	
		Bu.	Index[1] (a)	(b)	Bu.	Index (a)	(b)	Bu.	Index (a)	(b)	Bu.	Index (a) (b)
Unhoed check	—	228	7.3	10.0	185	7.0	8.3	170	7.8	4.3	105	6.0 4.0
CIPC 4E	4	254	3.0	3.0	252	1.0	1.8	378	1.0	0.0	129	3.0 1.0
Eptam 6E	4 Inc.[2]	415	1.3	2.8	311	2.5	5.8	399	0.4	0.8	—	
Eptam 6E	4	—						350	3.1	1.3	117	2.0 1.0
Eptam 6E	7½	—						381	0.9	1.1	181	1.0 2.0
Eptam 5G	4 Inc.[2]	496	0.0	1.8				—			—	
Eptam 5G	4	—						328	1.5	2.0	—	
Dacthal W-75	8	396	2.0	0.5	246	0.3	0.5	410	1.5	0.0	112	1.0 0.0
Hoed check	—	480			268			432			106[3]	
Date plants set		May 9			June 3			May 10			June 2	

[1] Index (a) for crabgrass and (b) for Florida pusley. 0 = no weeds 10 = severe weed population.

[2] Eptam being very volatile was lightly incorporated into the soil in 1960 and with the lower rate in 1961 to compare with a higher rate not incorporated.

[3] Hoed late.

Best Environment for BROILER PRODUCTION?

J. R. HOWES, *Assistant Poultry Husbandman*
WALTER GRUB, *Associate Agricultural Engineer*

Low feed costs have been cited as the main reason for the broiler industry moving south. However, the southern broiler industry was growing rapidly before cheap water transportation of mid-western corn was realized.

The original cause for the industry to migrate south was better climate that permitted birds to be grown in cheaper houses with less heat. Less labor was required and labor was cheaper.

Condemnation

With the advent of broiler inspection in 1960, the problem of condemnation arose. Management and environment contributed much to this new problem. As an outcome, the concept of controlled environments for raising broilers became realistic. Research was begun in 1961 at the Auburn University Agricultural Experiment Station to provide information about the best environment for raising broilers. One year's results have not answered the question, but they do indicate the complexity of the problem.

Studies Conducted

In three studies to date, sexed Arbor Acres strain broiler chicks have been grown on wood shavings litter at a density of approximately one bird per sq. ft. of floor space. All birds received 14 hours of light, about 0.5 cu. ft. of air per minute per bird, and were subjected to approximately 60% relative humidity. Various constant temperatures have been tried and controlled fluctuating temperature systems are now being investigated. In all three completed experiments, a group of chicks from the same hatch were exposed to the outdoors. Except for the 14 hours of light, which was controlled, these birds were under fluctuating conditions. In this way it was possible to compare broilers raised under controlled and Station farm conditions.

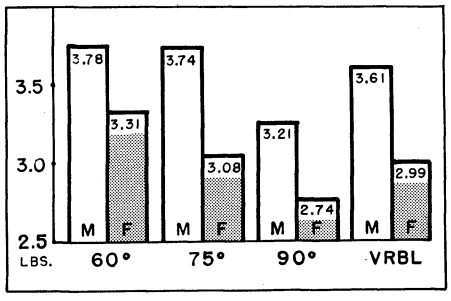


FIG. 1. The above chart gives average 8-week body weights of male and female broilers grown at 60, 75, and 90° F. and for similar birds grown under variable farm conditions at the Auburn Station.

Growth rate, feed efficiency, and dust production were measured in the experiments. The feed was removed 12 hours before slaughter, and the experimental birds were followed through processing to obtain condemnation and carcass data. Sample carcasses from each treatment were subjected to a taste panel to evaluate flavor, juiciness, and tenderness. Physical separation studies of bone, edible meat, skin, and fat, were also made on sample birds from all environments.

Results of Tests

To date these studies have revealed that birds grew better at lower temperatures (50-60° F), but gave the best feed efficiency and produced less dust at high temperatures (85-95° F.) The birds grown under farm conditions were intermediate in most respects. Thus from the standpoint of the producer, the best environment would depend on the costs for feed and controlling the environment as related to market price for finished broilers. Broilers produced at the higher temperatures gave the highest dressing percentages, least feathers and blood, and least digestive tracts. Thus the processor would definitely prefer birds produced at high temperatures. Birds produced under variable farm conditions were the most inferior from the processing standpoint.

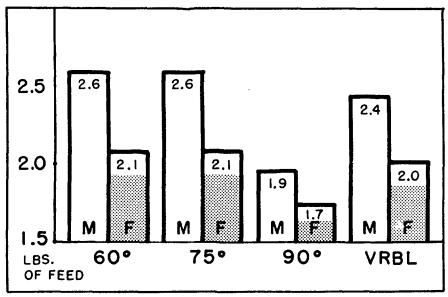


FIG. 2. The chart indicates feed efficiency for male broilers; M in this chart indicates lb. of feed per lb. of dressed weight; and F indicates lb. of feed per lb. of live weight.

From the consumer's point of view, birds produced in any controlled environment were superior to those grown under variable conditions. The birds grown outside consistently gave inferior edible meat to bone ratios. A pound of broiler from a controlled environment contained more meat than its farm raised equivalent. Furthermore, the flavor, juiciness, and tenderness scores favored birds grown under controlled conditions, especially those from the high temperature rooms (85-95° F).

What then is the best environment for raising broilers? Tentatively, it would appear that consumers and processors would prefer birds from high temperature systems. If this can be provided economically, the producer would probably favor this, too, since eventually the customer is always right.

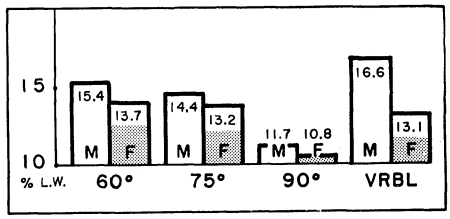
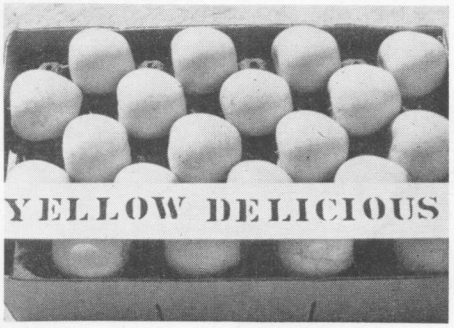


FIG. 3. This chart shows average blood and feather weights expressed as percentages of live weights of broilers on test.



Commercial Apple Production—Promising Alabama Enterprise

H. J. AMLING and J. L. TURNER, *Department of Horticulture*
E. E. KERN, *Department of Agricultural Economics*

THE APPALACHIAN mountains in northern Alabama provide that half of the State with a natural advantage for commercial apple production. Not only is the climate suitable, but apples can be harvested for market before those from any other apple-growing area in the Nation. During the area's harvest time, prices are higher than at any other time of the year.

Because of Alabama's natural advantages, an intensive apple research program is underway by the Auburn Agricultural Experiment Station. Factors that must be considered for profitable apple production in Alabama are receiving major emphasis in the study.

Varieties Important

Since Alabama is on the southern fringe of the area adapted to apples, only certain varieties perform adequately and meet commercial standards. For maximum profit, Alabama apples should be placed on the market before the second week in September. These requirements limit the choice of varieties to Lodi, Wellington, July Delicious, Golden Delicious, and Red Sports of Red Delicious. As the research progresses, more varieties will be added to the recommended list.

Red Delicious variety commands the highest price of all the varieties recommended. Thus, the largest acreage should be planted to Red Sports of this variety.

Dwarfing Rootstocks

To meet current trends toward more fully mechanized agriculture, smaller apple trees are needed to reduce maintenance and harvest costs. Furthermore, having to maintain an orchard for 6 to 8 years before a crop can be made is a drawback that prevents planting of large acreages.

Growing dwarf apple trees can overcome most of the disadvantages. By using certain dwarfing rootstocks, tree size can be restricted and crops harvested 2 to 4 years after planting. For example, a tree of the variety Lodi with a Malling IX rootstock planted in the spring of 1960 at the North Alabama Horticulture Substation yielded ½ bu. of 3-in. or larger fruit in 1961. A larger yield is expected in 1962.

Yields per tree for a variety on standard stock are much higher than on dwarfing rootstock. However, yields per acre are generally higher when dwarfing rootstocks are used. Yields in other parts of the nation have, in certain instances, exceeded 500 bu. per acre when dwarfing rootstocks were used.

Production Practices

Good results with apples on dwarfing rootstocks require certain prescribed practices. *All of the following practices must be used together for success*:

(1) Remove all blossoms during the first growing season. Failure to do this will result in unsatisfactory tree growth.

(2) Make sure that the recommended varieties are on Malling IX rootstock if dwarf trees are wanted. Malling VII or Malling Merton 106 rootstocks are used if semi-dwarf trees are wanted. Less is known about Malling Merton 106, but it is woolly aphid resistant, which is an advantage over the others. No other dwarfing apple rootstocks are suggested for use in Alabama at present.

(3) Control of woolly aphid is necessary since Malling IX and VII are susceptible. This can be done by uniform applications of 3 lb. of heptachlor per acre to the orchard.

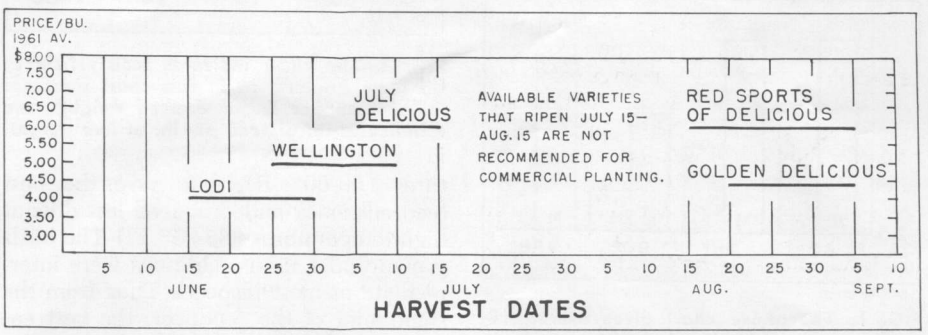
(4) Each tree must be mulched with a 4 to 6-in. layer of suitable material, such as pine needles. This reduces soil temperature and maintains a higher level of moisture in the root zone. Poor performance can be expected if trees are not mulched.

(5) Dwarf and semi-dwarf trees must be supported to prevent their being blown over. A two-wire trellis such as used with grapes is best for dwarf trees. Semi-dwarf trees should be staked.

(6) Diseases and insects must be controlled.

Only the best, well drained land should be selected for a commercial apple orchard. Elevated sites are preferred. Cross pollination is necessary for production and must be provided.

Packaging and grading of apples must satisfy chain stores, because the greatest volume will pass through this market.



Apples recommended for Alabama sell for high prices, as shown here. Little market information is available on Wellington and July Delicious because of limited supplies, but these varieties produce good fruit that can be expected to command premium prices.

Opportunities for VEGETABLE PROCESSING in Alabama

EDWARD E. KERN, JR., *Assoc. Agricultural Economist*

PROCESSING OF FRUITS and vegetables in the Nation is increasing.

Canned, frozen, and dried products accounted for 49% of the consumption of fruits and vegetables in 1958. This compares with 38% consumed in 1947. Also 25% of the potatoes marketed for food in 1960 was sold in processed form, as compared to only 14% 4 years earlier. The outlook is for this trend to continue even faster than population growth as rural to urban migration continues, as farm processing diminishes, and as demands for convenience foods increase. The people in the Southeast and in Alabama are interested in whether this area can participate in the growth and development of the processing industry.

Local Processing

Until now vegetable processing in this area has been relatively minor. More than four-fifths of the total quantity produced has been for fresh market. To a large extent, processing has been a means of handling excess production to bolster fresh market prices. In 1961, however, 6,000 acres of vegetables were grown for processing in Alabama. This was a sharp increase over the previous year.

Establishment of processing firms in an area depends on availability of markets, raw supplies, and labor; transportation facilities; attitude of its citizens toward development; and general living conditions for management and workers. Conditions are favorable in Alabama and in the Southeast. Growing southern markets, availability of labor, excellent transportation facilities, desire of citizens to develop industrial potential, and pleasant living conditions are realities. Also, in Alabama, there are experienced vegetable producers in at least four well-defined areas of the State. In addition, climate and soil conditions are conducive to the production of a wide variety of vegetables suitable for processing. An important factor is the State's progressive program of research and education with regard to production and processing of vegetables. However, relatively low yields and variability in production and marketing practices among many vegetable producers are factors needing continuous attention. The competitive nature of the commercial market necessitates adoption of efficient and business-like procedures in both production and marketing.

Studies Made

Studies made of vegetable processing firms in the Southeast, including Alabama, indicate the unstable nature of firms established in the past. Many small firms came into existence between 1930 and 1950 with expectations of achieving success in restricted supply and market situations. The 61 firms, controlling 70 plants, studied in 1960 indicate that those remaining in business have found it necessary to adjust operations considerably during the years. Thus, substitution, addition or dropping of products processed was characteristic of firms studied. Nineteen per cent of the operating plants processed fruit in the beginning but later added vegetable lines. Initially, plants primarily processed fruit, tomatoes, okra, and sweetpotatoes. In 1960, the majority was processing only one or two vegetable items. Some also processed fruit, berries, pre-processed vegetables, and specialty products. Low volume was reported to be characteristic of many existing firms. Variation in volume among firms studied was from less than 5,000 lb. of raw vegetables annually to about 45 million lb. Sixty-eight per cent of the total pounds of raw products processed was canned and 32% frozen. Average volume processed per canning plant was 5.6 million lb. as compared to 12.5 million lb. for freezing plants.

Firms in the study have experienced a significant change in procurement patterns during the past 15 years. Firms now draw on more distant areas for supplies of raw product than previously. In Alabama, almost the entire volume was obtained within 100 miles of the plant in 1945, whereas in 1960 about a fourth of the volume originated 200 or more miles from the plant. Better facilities for maintaining quality of raw products now make it possible for producers more distant from plants to sell to these plants.

Procurement Practices

Procurement practices for specific products varied considerably by type of product. Whereas pimento peppers were contracted for in advance almost exclusively, other commodities were obtained under various types of arrangements. Procurement methods for all vegetables totaling about 476 million lb. were as follows:

Method	*Per cent*
Contract	36
No contract but direct from farmers	35
Brokers	20
Farmers or auction markets	1
Other	8
Total	100

As interest in development of vegetable processing in the area continues, there are both strong and weak factors to be encountered. Production areas have been moving further west where large-scale operations have served to attract major food organizations. However, by applying known production and processing techniques, producers and processors in this area can aid in overcoming the problems associated with low yields and volume and seasonality of operations. Growing southern markets, and potential resources available for development present a challenge in the State. County agents recently contacted throughout Alabama reported the potential fruit and vegetable acreages in their respective areas to be several times that actually produced in 1961. Opportunities exist for participating in processing development in this area. However, guidelines for development aimed at bringing land and other resources into fuller use are needed. These would aid in careful planning while avoiding pitfalls encountered in the past.

Editor's note: This report was based, in part, on vegetable marketing research in progress in the Southeast under Research Project SM-8. F. M. Williams and M. B. Allen, Georgia Agricultural Experiment Station have been actively engaged in research on this project.

CHRYSANTHEMUMS for fall planting

TOK FURUTA, W. C. MARTIN, and H. P. ORR,
Department of Horticulture

Chrysanthemums shown here are used as a base planting for a public building.

THE CHRYSANTHEMUM, aristocrat of the fall garden, is an old flower with numerous uses. A versatile plant in the landscape, the Chrysanthemum may be grown in a variety of ways and transplanted at anytime during its growth.

Experiments over a period of years at the Auburn University Agricultural Experiment Station have shown that garden Chrysanthemums can be transplanted when the plants are in flower. Plants grown in containers are preferred to those grown in beds for fall transplanting. One plant should be grown per container the size of a No. 10 food can (3 qt. soil capacity).

Chrysanthemum plants in containers fit well into modern marketing practices and can be offered to the public through a variety of outlets. They provide immediate color in the home landscape, and furnish plants for future flowers. There are distinct opportunities in growing Chrysanthemums for sale in containers.

Source of Plants

Many large firms specialize in propagation and sale of rooted cuttings of Chrysanthemums. The use of these cuttings offer many distinct advantages: (1) The plants are insect and disease free upon arrival, (2) the plants are available when desired, (3) the grower can obtain the desired varieties, (4) the grower can obtain the desired number of plants, and (5) the cost per plant or rooted cutting quite often is less.

Chrysanthemums root easily from stem tip cuttings. Usually a 3-in. cutting is made. Rooting of the cuttings under mist in peat pots filled with soil is recommended.

Cultural Requirements

Strict attention to the cultural requirements of Chrysanthemums is needed to ensure production of quality plants. If possible, light shade (no more than 25% reduction of sunlight) should be provided. Plants can be grown in full summer sunlight without difficulty.

Placing plants in containers in June or early July is preferred to earlier planting. One small plant is placed in each container in June. After July 1, more than one plant per container may be necessary to produce the desired size flowering plant.

Several soil mixtures have been used successfully and the choice depends largely on the grower. Experimentally, many light weight mediums such as sand and peat or perlite and peat have been used to grow excellent plants. Constant fertilization and frequent applications of minor elements are required in these light weight mediums.

High amounts of organic matter should be used in all soil mixtures for Chrysanthemums. From 25 to 50% by volume is desirable. Many types of organic matter such as leaf mold, peat moss, manure, and old sawdust have been used. It must not be completely decomposed for best results.

Chrysanthemums are heavy feeders, that is, a lot of fertilizer is needed for best growth. Generally 20% superphosphate and lime are mixed into the soil before potting. One pound of superphosphate is added to each wheelbarrow full (2½ bu.) of soil mixture. Lime is added to satisfy lime requirements of the soil.

High calcium levels must be maintained and nitrate form of nitrogen applied. The first application of fertilizer should be made after plants are well established.

Management Practices

Regular pinching of shoots must be practiced to develop a compact, well branched plant. The original plant should be pinched 4 to 6 in. above ground level. Each succeeding shoot should be pinched after it is 4 to 6 in. long. Pinching should continue until August 1. Generally Chrysanthemums will initiate flowers between August 15 and September 1. Pinching after August 1 will delay flowering.

Thorough control of insects and diseases is needed. Prevention is the best practice. Since several diseases of Chrysanthemums cannot be controlled after the plant is infected, prevention is absolutely necessary. These diseases include Verticillum wilt, Fusarium wilt and virus diseases. A preventive program begins with sterilization of the soil before planting, and the use of disease- and insect-free plants. Weekly applications of an all-purpose insecticide-fungicide spray should be made. In addition, plants should be regularly inspected for troubles and remedies applied.

FERTILIZER FOR CHRYSANTHEMUMS

Material	*Form*	*Rate*
Complete fertilizer such as an 8-8-8	Dry	1 tsp. per container (6 in. pot or larger) at 2 week intervals. Use less fertilizer for smaller containers.
Sodium Nitrate 15% or Calcium Nitrate 15%	Liquid	Dissolve 1 oz. in 2 gal. of water and give each container 1 pt. of this solution each week.
Potassium Chloride 50%	Liquid	As above for 15%.
Complete water soluble such as a 20-20-20	Liquid	As above for 15% or dissolve 1 oz. to 15 gal. of water and apply solution each time plants are watered.

Logic of Incorporating Family Farms

E. D. CHASTAIN and W. FRED WOODS
Department of Agricultural Economics

Is it logical to incorporate a family farm? Non-farm businesses have successfully used the corporate structure for many decades. Until recent years, its use in farming was considered to be restricted to large-scale, highly-capitalized farms.

Interest in corporate farming has grown in recent years. Many believe it has wide use for family farms. The dean of agriculture at the University of California says "Family corporations will be operating the family farm by 1975."[1]

What is a Corporation?

The corporation is an artificial being created under State law. Its legal existence is as a fictitious person entirely separate and distinct from those who compose it.

To evaluate the corporate business organization, it must be compared with the two alternative organizations – single proprietorship and partnership. The single proprietorship, a business operated on a one-owner basis, is the simplest organization and most widely used in farming. A partnership has two or more owners who contribute their resources and share in profits and losses.

To increase appreciation of the corporate structure, Auburn University Agricultural Experiment Station analyzed the business arrangement on several Alabama farms. This study provides information about some basic characteristics of the corporate structure as they apply to farm conditions. Such information is needed for judging merits and limitations of the corporate structure for an individual farm and must be considered for sound decision making.

[1] Daniel G. Aldrich, Jr., as quoted in *Better Farming Methods,* Jan. 1961.

Corporate Characteristics

Management. Corporate decisions are generally made in a way much different from the single proprietorship or partnership. This is not necessarily true with a family farm, because the same people are usually at all levels in the corporation – manager, stockholder, and director.

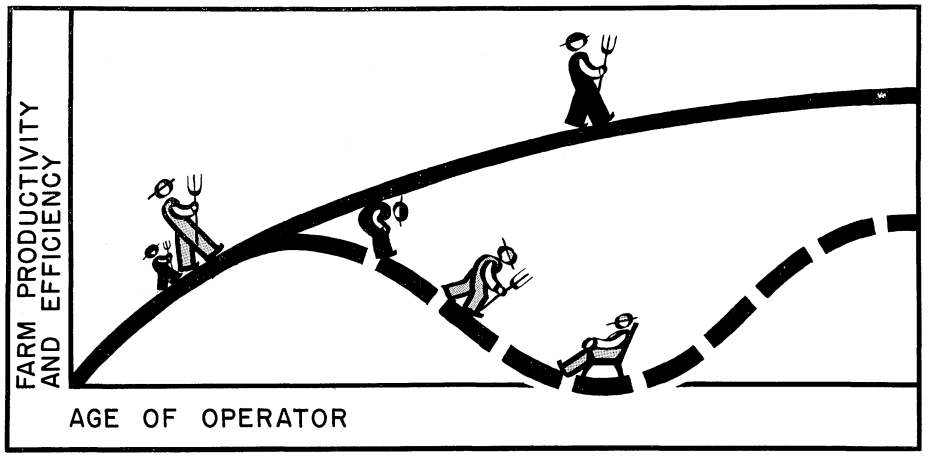
Legal Requirements. The partnership and single proprietorship can exist without a formal legal document. This is not true with a corporation. However, the legal requirements of incorporating are easily handled by a competent attorney. Costs of incorporating a business vary, but $200 to $400 for an Alabama family farm is estimated.

Raising Capital. Incorporation of the family farm can be expected to have little value in attracting outside investors. However, members of the immediate family who have left the farm may be more willing to invest in an incorporated farm. As far as lending policies of various loan associations are concerned, reputations of the owners would be the primary consideration, rather than the act of incorporating.

Maintenance of Productivity. The past patterns of farms being allowed to run down with each generation need to be remedied, as shown by the chart. This objective can be accomplished under all three forms of business arrangement. The partnership and single proprietorship may be more cumbersome in accomplishing this objective than under the corporate organization. Once a corporation is properly organized, ease of transferring corporate shares makes the problem much simpler to solve.

Liability. Liability is a major factor with the partnership and single proprietorship. The corporate organization provides liability protection that is not provided by the other two arrangements.

Taxation. Income tax differences under corporate organizations have created much interest. However, taxes for the incorporated family farm may not differ basically from those paid under partnership or single proprietorship. Under certain conditions, which family farms usually meet, the corporation may elect to be taxed as a partnership. A partnership files a tax return but pays no taxes. Taxes are paid by members of the partnership on individual earnings from the partnership. As a second alternative, income of the family corporation can be paid as reasonable salaries to the parties involved, rather than as dividends. The double taxation feature normally associated with corporations is eliminated by accounting.



Farm productivity and efficiency may be increased through succeeding generations by corporate farm organization, as shown by the solid line. This prevents traditional productivity loss under single proprietorship as the operator becomes older (shown by dotted line).

Helpful in Problem Solution

Although the corporate form of business organization is not a cure-all, it appears more adapted to handling many farm problems than the partnership or single proprietorship. It offers a definite possibility for meeting many of the financial and organizational problems of farmers.

Corporate farming does not signify the end of the traditional family farm. Rather, it may be a major avenue for maintaining and increasing efficiency of the family unit.

TABLE 1. LOCATION OF MIGRANTS FROM RURAL FAMILIES IN FOUR ALABAMA COUNTIES, 1961

Location	County migrated from				
	Clarke	Monroe	Montgomery	Tallapoosa	Total
	Per cent	*Per cent*	*Per cent*	*Per cent*	*Per cent*
Within county	20	22	20	14	19
Elsewhere in county	20	18	37	26	23
In adjacent county	3	7	5	13	7
Elsewhere in Alabama	32	23	12	8	21
Adjacent states	8	23	9	18	14
Elsewhere in United States	14	6	16	18	14
Military service	3	1	1	3	2

MIGRATION of RURAL RESIDENTS

JOHN M. HUIE, *Assistant in Agricultural Economics*

TWO-THIRDS OF the counties in Alabama lost population between 1950 and 1960. But rural population dropped in 91% of the counties.

Although many factors contributed to this population loss, by far the most important was the large numbers that moved away. A net out-migration of people can be particularly harmful to an area if too high a percentage of those leaving are young, highly-trained individuals. This group would represent a greater loss of potential income and leadership to an area than would any other group.

In the Alabama phase of a southeastern regional study now underway, a record of out-migration of family members was obtained. More than half of the families interviewed reported at least one person had left the original family unit. Fourteen per cent reported only one migrant, while in 18% of the families there had been five or more.

Location of Migrants

In analyzing the degree of out-migration from Alabama counties in the study, present location of each migrant was determined, Table 1. Forty-two per cent remained in their home county, 28% lived elsewhere in the State, and 28% (excluding military service) had moved outside the State.

Only Montgomery County had retained more than half (57%) of migrants from rural families. No doubt this reflects the influence of the metropolitan and industrial area associated with the city of Montgomery.

Characteristics of Migrants

Although the degree of migration is important, characteristics of those leaving is of equal or greater importance.

Migrants of the four counties were equally divided between sexes. However, a greater proportion of those leaving the State were men (54%). Fewer than half who remained in the county were men.

Marital status of the migrants also had some influence on migration. The findings reveal that 92% who remained in the county were married. This compares with 87% who lived elsewhere in the State and 78% of those who had left the State.

There was little age difference between the groups. The median age of those who remained in their home county was 33, 2 years old than that of the other two groups.

Education Important

Education is one of the most important characteristics of migrants that affects an area's economy. Of those remaining in the county, 35% had an eighth grade education or less. Twenty-four per cent of those living elsewhere in the State and 20% who had left the State received less than 9 years of schooling. Less than a third of those who completed high school or more remained in their home county; 34% of this group left the State.

Only 5% of those living in their home counties received any education beyond high school. Some training beyond high school was reported for 15% of those elsewhere in the State and 12% who left the State. Of those who received a college education (16 years or more of schooling), only 15% remained in their home county, 23% lived elsewhere in the State, and half moved out of the State.

Employment Opportunities Needed

These findings are indicative of conditions in many low-income areas. Employment opportunities that are available are primarily jobs that require little formal education. In previous studies it was found that forestry and related work, manual labor, and factory work ranked high as employment possibilities for Alabama laborers in low-income counties.[1] Most of these were relatively low-income jobs. Persons who have spent time, effort, and money for an education will not remain in an area when better opportunities are available elsewhere.

Out-migration of the better trained people represents one of the basic problems that low-income counties and states must overcome to increase income levels of the area. One of the best ways to achieve this objective is to develop employment possibilities within an area that will attract and hold highly trained individuals at income levels comparable with those in other areas.

[1] Surveys of physical and human resources in Autauga, Bibb, Coosa, and Elmore counties.

TABLE 2. EDUCATION OF RURAL MIGRANTS FROM FOUR ALABAMA COUNTIES, BY PLACE OF RESIDENCE 1961

Years of education	Location of migrants		
	In county	Elsewhere in State	Out of State
	Pct.	*Pct.*	*Pct.*
None	0	1	0
1-3	1	0	1
4	2	2	4
5-7	21	12	6
8	11	9	9
9-11	28	19	22
12	32	42	46
13-15	3	11	3
16 or more	2	4	9

Systemic Insecticides for scale insects

W. G. EDEN, *Entomologist*
R. L. SELF, *Plant Pathologist*

ORNAMENTAL PLANTS are under constant attack by a variety of insect pests. The worst offenders of the Alabama state flower – the camellia – are scale insects.

The tea scale, *Fiorina theae* Green, is probably the most important of several species that attack camellia and other ornamental plants. Tea scale can be recognized by white, cottony material secreted by scales on the underside of leaves. The upper sides of leaves have a yellow mottled appearance. The insects suck sap from the leaves, thereby reducing vitality of plants. Severe infestations will ultimately cause defoliation.

Systemics Provide Control

Systemic insecticides provide excellent control of sap-sucking insects. This type of insecticide is absorbed by the plant, becomes a part of the sap, and kills the feeding insects. Tests at the Auburn University Agricultural Experiment Station have shown the effectiveness of certain systemic insecticides against a variety of insects on ornamental plants (Highlights, Vol. 2 (1), 1955).

Subsequent research has substantiated that systemic insecticides are excellent for control of scales and other insect pests and that additional insecticides and methods of application may be used. Results are presented in the table. From these data it is evident that single applications of phorate at 20 lb. per acre (200 lb. of 10% granules) and dimethoate at 0.5 lb. (1 pt. of 4-lb. per gal. emulsifiable concentrate) per 100 gal. of water resulted in control of tea scale on potted sasanquas for the entire season.

Recommended Systemics

The following systemic insecticides are recommended for control of indicated insects on ornamental plants based on research in Alabama and other states:

1. *Demeton* (Systox) is available only as a 2-lb.-per-gal. emulsifiable concentrate. Spray plants with 1½ fl. oz. of the concentrate to 5 gal. of water. Demeton controls scale, spider mites, thrips, leafhoppers, whitefly, aphids, mealybugs, and certain leaf miners.

2. *Dimethoate* (Cygon) is available only as a 4-lb.-per-gal. emulsifiable concentrate. Spray plants with 1 fl. oz. of the concentrate in 5 gal. of water. As a soil drench, use 1 fl. oz. of the concentrate per gallon of water per plant for plants up to 6 ft. tall; increase proportionately for larger plants. Dimethoate controls the same pests as listed for demeton.

3. *Phorate* (Thimet) is available primarily as 10% granules. It is therefore used only as a soil treatment. For single stem plants, such as camellia, use 4 oz. of 10% granules for each inch of trunk diameter. Spread granules uniformly from the trunk to the drip line on all sides, work into the soil, and water thoroughly. On bushy shrubs, such as azalea, use 1 oz. of 10% granules per 5 sq. ft. of area covered by the plant. Phorate controls spider mites, thrips, aphids, whiteflies, leafhoppers, mealybugs, and certain leaf miners. It also controls scale insects on potted plants. Further research is necessary before phorate can be recommended for scale insect control on plants growing freely in the soil.

4. *Di-Syston* is available only as 2, 5, and 10% granules. Therefore, it is used only as a soil treatment. Use 5% Di-Syston at twice the rate and in the same manner as recommended for 10% phorate. Except for scale insects, Di-Syston is recommended for control of same insect pests as phorate.

TEA SCALE POPULATIONS ON SMALL SASANQUA FOLLOWING VARIOUS INSECTICIDAL TREATMENTS, SPRING HILL, 1961

Treatment[1]	No. scales per cm by dates[2]				
	4/20	5/26	6/22	8/3	9/1
Untreated check	1.0	18.9	15.8	17.9	69.3
Phorate, 5 lb. per acre	0.5	27.8	3.9	16.1	28.4
Phorate, 10 lb. per acre	0.9	21.9	0.9	2.8	3.9
Phorate, 20 lb. per acre	0.4	5.3	0.0	0.0	0.0
Phorate, 40 lb. per acre	12.5	1.7	0.3	0.3	0.0
Dimethoate, 0.25 lb./100 gal.	9.8	0.8	0.0	1.9	3.1
Dimethoate, 0.5 lb./100 gal.	28.1	2.1	0.1	1.1	0.1
Dimethoate, 1.0 lb./100 gal.	40.9	1.0	0.0	0.0	0.5
Dimethoate, 2.0 lb./100 gal.	21.3	1.2	0.3	0.0	0.0
AC 43073, 0.5 lb./100 gal.	34.1	1.5	2.5	9.6	8.5
Zectran, 1.0 lb./100 gal.	16.5	8.8	3.4	5.9	18.6
SD 3562, 0.5 lb./100 gal.	1.1	10.3	9.2	4.5	13.6
NIA 5767, 1.0 lb./100 gal.	26.0	34.8	15.4	13.6	34.8

[1] Phorate was applied to the soil as 10% granules; Dimethoate, AC 43073, Zectran, and SD 3562 were applied as emulsifiable concentrate sprays; NIA 5767 was applied as wettable powder spray.

[2] Counts made on April 20 were before treatments were applied.

When and How to Apply

Systemic insecticides may be applied at any time during the year. However, for greatest effectiveness they should be applied when the plant is making a new flush of growth in the spring. At that time the plant sap is flowing at a maximum and uptake of the systemic is rapid. Soil treatments are as effective as foliage sprays, but require a longer time to become effective.

All of the systemic insecticides given are highly toxic. Use utmost precautions when applying these materials.

New controls for APPLE DISEASES

URBAN L. DIENER, *Assoc. Plant Pathologist*

A NEW FUNGICIDE now makes it possible for Alabama apple growers to obtain a higher degree of control of summer diseases than heretofore.

The new compound, *Phaltan*, has only been cleared recently by the U.S. Pure Food and Drug Administration for use on apples with a residue tolerance of 50 parts per million. Chemically, it is closely related to captan, the recommended fruit fungicide for a number of years. It is nearly as safe as captan.

In experiments by Auburn Agricultural Experiment Station and by the Georgia and North Carolina Stations, the new fungicide has given superior control of sooty blotch, flyspeck, bitter rot, black rot, and Botryosphaeria rot of apples. Phaltan can be applied from calyx and first cover at even as much as 14-day intervals until harvest. It has longer effectiveness than captan, which allows a greater interval between applications and a reduction in total number of sprays in a season. Phaltan is applied at a rate of 2 lb. of 50W per 100 gal. of spray.

Although not as new as Phaltan, Cyprex (dodine) has come into wide use on apples and pecans in the last few years. It has a residue tolerance of 7 parts per million. It is outstanding in controlling apple scab. However, it is not effective against most other apple diseases. It is known for its ability to check apple scab even after the disease has become established. Cyprex is applied at a ½-lb. rate as a protective measure and at ¾ to 1 lb. per 100 gal. to eradicate or check spread of the apple scab fungus from leaf to leaf and from leaf to fruit.

The table summarizes the results of 2 years' experiments at the Auburn Station's North Alabama Horticulture Substation, Cullman. Note the high degree of control of apple scab on fruit sprayed with Cyprex-Phaltan treatment, because of the Cyprex, as compared with the unsprayed fruit. This combination, because of the Phaltan, gave outstanding control of sooty blotch, flyspeck, and bitter rot — the most important summer diseases of apples here.

The higher level of control obtained under the more severe disease conditions in 1961 is credited to better timing of applications during the season and better coverage from use of an airblast type sprayer. In 1960 it required 3 men 8 hours to spray the experimental orchards using the old conventional equipment. Last year it took 1 man 4 hours using the new sprayer.

With the combination treatment of Cyprex and Phaltan, Cyprex was applied from pre-pink through the first cover, while Phaltan sprays were begun with the calyx or first cover. In severe scab years, Cyprex (¼- to ½-lb. rate) can be continued for several additional cover sprays, even though Phaltan is fairly effective against scab. Phaltan is applied after bloom because it may injure tender new growth. Occasionally, it causes minor damage from the calyx application.

Captan has been the standard all-purpose fruit fungicide for several years. It provides good control of scab and the summer fruit rots and spots when applied on a weekly basis. However, under severe disease conditions, Cyprex has been observed to be superior in scab control and Phaltan superior for control of summer diseases, especially when applied at 10- to 14-day intervals.

FUNGICIDAL CONTROL OF DISEASES OF RED DELICIOUS APPLES IN ALABAMA AS MEASURED IN PER CENT OF DISEASED FRUIT

Disease	Fungicidal treatment		
	Check[1]	Captan	Cyprex-Phaltan
	Pct. diseased fruit		
Flyspeck and sooty blotch			
1960	80.7	51.3	13.3
1961	96.5	0.8	3.1
Apple scab			
1960	9.7	0.4	0.4
1961	97.6	17.8	7.7
Bitter rot			
1960	5.5	6.4	3.8
1961	[2]	1.5	0.3

[1] Unsprayed.

[2] Low incidence of bitter rot with no diseased fruit on check trees.