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In this issue . . .

On the cover. Since establishment of this lawn, the homeowner has kept a watchful eye on appearance of wild garlic. He treats them individually using a kerosene-creosote mixture, which is one of two treatments recommended by Auburn University Agricultural Experiment Station when there are only a few scattered clumps. As pointed out in the article on page 3, wild garlic bulbs may not germinate for several seasons. Winter is the time to kill this yard pest. Based on research by its author, the article reports on how the wild garlic develops and spreads, what chemicals (herbicides) are most effective, and when and how often to treat. Successful control hinges on preventing formation of the bulbs and bulblets.

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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. 305. Boron Requirements of Crops in Alabama.

Bul. 312. Sulfur in Relation to Soil Fertility.

Bul. 313. Growth of Pine Plantations in Alabama's Coastal Plain.

Bul. 324. Potassium Requirements of Crops on Alabama Soils.

Bul. 345. Father-Son Farming.

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

Bul. 351. Hog and Pork Movements in Alabama.

Cir. 137. Producing Fence Posts from Thinnings.

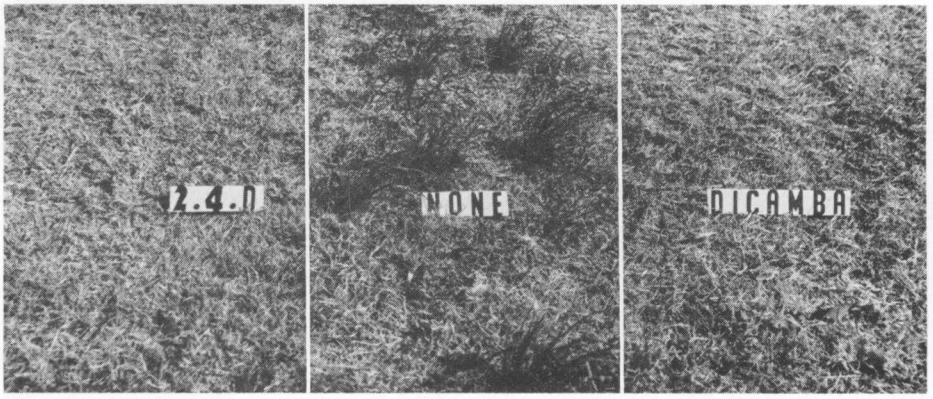
Cir. 142. Procedures for Calculating Producer Quotas and Prices for Grade A Milk in Alabama.

Cir. 149. Crop Varieties for Alabama.

Leaf. 52. Building A Pole Barn.

Leaf. 71. Yuchi—New Arrowleaf Clover.

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



At left and right wild garlic was controlled by broadcast applications of herbicide in December 1962, and March and December 1963. Center, no treatment. Photos made January 6, 1964.

How to CONTROL WILD GARLIC

D. G. STURKIE
Department of Agronomy and Soils

MANY AN OWNER is beset by wild garlic (Allium vineale) and wild onion (Allium canadense) in his lawn, pastures, and small grains.

Wild garlic occurs in Alabama more often than wild onion, and it is more difficult to control. Prevention of bulb and bulblet formation is the key to successful control, according to results of research by Auburn University Agricultural Experiment Station.

Nature of Plant

Wild garlic in lawns usually occurs in clumps, whereas in cultivated areas it is scattered. Plants vary from a few inches to 3½ ft. tall. Leaves are slender, nearly round, hollow, and coated with waxy material that makes wetting difficult. Early season leaves arise at the base and subsequent leaves occur along the lower stem. An undisturbed plant produces a tall stem that is capped by a cluster of aerial bulblets incorrectly called seeds. True seeds are rarely produced.

The plant produces a large central bulb with delicate white skin, and a cluster of 2-6 small bulbs with hard brown shells. These occur 2-6 in. in the soil. Bulbs and bulblets are the means of reproduction. Plants die after producing bulbs in winter and spring and bulblets in May. Large bulb and bulblets usually germinate in the fall, whereas the hard-shelled bulbs germinate as a rule at different times during the fall and early spring. Since some do not germinate for several years, treatment is required several seasons for complete eradication.

How to Control

Control measures are based on preventing formation of new bulbs and bulblets. Formation of aerial bulblets is easily prevented by mowing lawn frequently. However, this does not prevent development of underground bulbs. In lawns or uncultivated areas, some chemical means must be used to prevent bulb formation. If done for several years, all bulbs will be eliminated.

At Auburn most bulbs in tests were eliminated the first year. All but a few of the remaining bulbs were killed the second year. If plants are numerous, broadcast spray applications will probably be needed for at least 2 years. Scattered plants that come up later can be treated individually. It is important to be watchful for such plants every year and to treat them as they appear.

Herbicides for Garlic Control

Materials and rates per application that proved effective (90% or more control) in 1962-64 are:

Common name	*Pounds active per acre**
Dacamine D	2
Dicamba	2
2,4-D (amine)	2
MH	3
Silvex	4
Paraquat	1
Trysben	2

* See instructions on containers for mixing amounts to treat small areas.

These chemicals are dissolved in water at recommended rates of active compounds. It will require about 50 gal. water per acre to wet plants 3-6 in. tall. This is a rate of about 1 pt. per 100 sq. ft. A good wetting agent or detergent at rate of 1 tbsp. per gal. water is added as a spreader. Garlic is sprayed when dry and when there is little chance of rain for at least 6 hours. The plants are thoroughly wetted; they should not be mowed for at least 2 days to allow absorption of the chemical. The herbicide is applied when the temperature is above 50° F.

How Often to Treat

First application is made in December and the next in late March. It is important to make the applications after as many bulbs have germinated as possible but before new bulbs are formed. Plants are not mowed for several days before spraying to allow them to become large enough to wet easily. The first plants to come up in fall begin to form bulbs in December. Later plants begin to develop bulbs in April. One application will not eliminate the pest since generations overlap. At least two applications properly timed are necessary.

Caution: MH and paraquat should not be used where winter grass is grown, but the other chemicals will not seriously damage such turf. MH and paraquat may temporarily discolor summer lawn grass when applied in late March. All the materials by contact will kill or damage flowers, shrubbery, and shade tree foliage. Garlic treated with MH shows little visible effect since MH is a growth regulator that prevents new bulb formation rather than killing plants. The other chemicals cause death to the plants within a day or a few weeks.

The easiest way to treat a few clumps of plants is to apply one of two mixtures, using a long spout engineer's oil can. Either of the following is effective: 9 parts kerosene or diesel oil and 1 part creosote; or 1 oz. paraquat formulation per gal. water plus 1 tbsp. of detergent.

These beef cattle at the Piedmont Substation will be on urea-supplement this winter.

UREA—a protein substitute for FEEDING COWS

W. B. ANTHONY, R. R. NIX, and J. G. STARLING
Department of Animal Science and Wiregrass Substation

UREA, A NITROGEN-CONTAINING PRODUCT, can be fed to ruminating animals (cows, sheep) as a substitute for protein.

In recent years there has been a large increase in manufacturing capacity for urea and it is readily available for livestock feeding. Relative prices of various protein supplements favor urea as a supplement for cattle and sheep.

Precautionary Measures

Only ruminants make satisfactory use of urea. The rumen microorganisms of these animals can use urea as readily or more readily than they can utilize high quality, vegetable proteins. A precaution is necessary when urea is fed. Urea is rapidly hydrolyzed by the enzyme urease to form ammonia. This happens in the rumen. The ammonia should be used as soon as it is produced. But ammonia produced in excess of that which can be used is absorbed into the liver where it is reconstituted to urea and excreted in the urine. If it enters the blood in large amounts it becomes toxic.

Therefore, when urea is fed the amount consumed must be regulated to prevent excess ammonia production. A "rule of thumb" frequently applied is that urea should not be used to supply more than 35% of the total ration protein. This rule serves as a guide for regulating urea intake. A protein supplement may properly contain urea at a level much higher than 35% of its protein. However, when this supplement is mixed with the remainder of the ration, the portion of the total ration protein furnished by urea should be approximately 35% or less.

When urea-containing supplements are mixed with major components of the ration, little danger of toxicity exists. Likewise, these supplements can be used when silage is fed. In this case urea supplement should be spread over the silage. Supplements containing a large amount of urea are more difficult to feed to brood cows as a supplement to a grass hay ration. If the supplement is palatable, some cows are likely to overeat and be killed by excess urea.

Research Conducted

Results of research at the Auburn University Agricultural Experiment Station show that urea looks promising as a feed ingredient when used to produce high analysis protein supplements. A 65% crude protein, urea-containing supplement has been developed and tested at the Station. The formula of this supplement is given below.

The urea supplement used in the tests included the following ingredients:

Ingredient	*Per cent*
Urea	17.50
Cottonseed meal	57.50
Salt[1]	12.50
Defluorinated phosphate	12.50

[1] Corn to replace salt improves the physical property of the mixture. Add vitamin A if needed.

The supplement has been fed to beef brood cows and to fattening cattle. It furnishes protein and mineral and is usually fed at the rate of 1 lb. per animal daily. Beef cows have been wintered very satisfactorily on 1 lb. per head daily of this supplement and either sorghum silage or Coastal bermudagrass hay. It is not a palatable supplement and hay-fed cows lick the supplement and require several hours to consume the ration. Although no toxicity has been experienced, it is recommended that cows be conditioned to the supplement by feeding small amounts for the first 10 days. Do not stop feeding for a few days and then return to full ration. Cows build up a tolerance to urea, but they quickly lose this tolerance on removal of urea from the diet.

Urea As a Substitute

The urea-containing supplement has been used as a substitute for CSM in mixtures for fattening cattle at the Auburn Station. In tests with yearling cattle, the supplement proved fully equal to CSM. For calves the supplement may not quite equal CSM in terms of animal gain, but the urea supplement usually will cost less. Performance data on steers fed at Auburn and at the Wiregrass Substation are given in the table. In these tests the basal mixture contained 10% CSM. The urea group was fed the same basal, but with CSM removed. The urea-containing supplement was fed at the rate of 1 lb. per head daily. At the conclusion of the feeding tests, cattle in both lots graded high Good or low Choice with no significant difference in carcass grade or yield. In one test there was an indication that the urea-fed cattle had slightly larger rib eyes. Digestibility trials were carried out with cattle fed the CSM-containing and the urea-containing feeds. Dry matter and cellulose digestibilities were improved by urea.

Urea is a valuable supplement for ruminants. To obtain most satisfaction from the use of urea, the diet should furnish ample mineral, a little readily available carbohydrate, and sufficient non-protein feed to provide adequate energy. Also, urea should not be added to a feed mixture already adequate in protein. Many other feed items are frequently offered for improving urea utilization, but these usually have little or no beneficial effect.

AVERAGE DAILY GAIN OF STEERS FED CSM- OR UREA-CONTAINING FEED[1]

Location	Kind of animal	CSM	Urea
		Lb.	*Lb.*
AMS[2]	Yearling	2.71	3.03
AMS	Calves	2.41	2.28
WGS[2]	Yearling	2.26	2.03

[1] The supplement formula is given in informal table.
[2] AMS, Auburn Main Station; WGS, Wiregrass Substation.

BORON FOR COTTON PROFITABLE IN ALABAMA

JOHN I. WEAR
Department of Agronomy and Soils

A LITTLE BORON goes a long way. In fact, adding ½ lb. per acre to deficient soils provides all that is needed for cotton.

Value of boron for cotton on sandy soils was revealed by results of Auburn University Agricultural Experiment Station tests. These results are responsible for the current recommendation that boron be applied to all coarse-textured soils for cotton.

Profitable Yield Increases

During 3 years at the Sand Mountain Substation, yields of seed cotton were increased about 150 lb. per acre by addition of boron. These tests were on both acid and limed soils. Other trials at 21 Alabama locations showed an average increase of about 50 lb. of seed cotton per acre. Some of these tests were on farmers' fields and others on units of the Experiment Station System.

Not all test locations showed an increase in yield of cotton. But the average increase at all locations was worth about $6 per acre from the 25¢ investment in boron. Yield improvement like that measured at the Sand Mountain Substation would be worth considerably more.

The range between boron deficiency and toxicity in the soil is narrow. Therefore, precautions are necessary to avoid adding more than the recommended amount of boron. Larger amounts may be toxic to the cotton plant, resulting in leaf burning and reduced yields. Precautions must also be taken to place borated fertilizer no closer than 2 in. to the side and 2 in. below the seed. Cotton seedlings are especially sensitive to boron.

Lime, Moisture Affect Deficiency

Lime status and moisture conditions of the soil are important factors in boron requirements of cotton. Lime increases the need for boron. Thus acid soils need both lime and boron. However, there is less chance of getting boron toxicity on limed than on unlimed soils.

Soil moisture conditions help determine whether soils suffer boron deficiency. For higher cotton yields, the plant needs a small but consistent flow of boron from soil into the plant. On a given soil, plants under moisture stress do not absorb as much boron as plants with adequate moisture. For this reason, boron deficiency is more prevalent under droughty conditions.

It is possible to have boron deficiency when no deficiency symptoms are evident. A yield reduction of 50 lb. of seed cotton per acre has been recorded in tests when there were no visible differences. Severe boron deficiency symptoms in cotton have been more prevalent in Mississippi and Arkansas than in Alabama. The most dramatic demonstration of boron deficiency ever observed in Alabama was in a field on the farm of C. P. Storrs near Wetumpka. This cotton had failed to bloom by July 24, 1963. The field was then sprayed with Solubor by airplane, and in 10 days it was in full bloom.

Deficiency symptoms in cotton vary from one field to another. In some cases there may be only one visible symptom. In severe cases many symptoms are manifested.

Deficiency Symptoms Described

Boron deficiency affects fruit, leaves, and stems of cotton, and each has definite symptoms.

These 8 fruit symptoms are typical:

(1) Ruptured squares or peduncle (small stem supporting the square), or both.

(2) Excess shedding of squares and young bolls.

(3) Dying of squares and young bolls that remain on plant.

(4) Excessive flow of plant sap from the leaf nectaries and fruit.

(5) Dark discolorations at base of boll.

(6) Small mature bolls.

(7) Deformed bolls with flat side or "hooked bill."

(8) Prevalent boll rot.

Leaf symptoms include the following:

(1) Short leaf petioles with small surface ruptures.

(2) Ring appearance on leaf petiole.

(3) Pith in leaf petiole discolored.

(4) Thick, brittle, dark green leaves.

(5) Rosetting in tops of plants.

(6) Green leaves until frost.

Stalks show the following symptoms:

(1) Short internodes.

(2) Enlarged nodes.

(3) Bushy appearance caused by excessive branching.

(4) Loss of main stem dominance.

Careful Application Suggested

Since only small amounts of boron are needed, careful application is necessary. This can be done by fertilizer, pre-emerge, or foliar methods.

Fertilizer application – add 0.3 to 0.5 lb. of elemental boron per acre by using fertilizer borate, FB-46 (14.3% B) or FB-65 (20.2% B), either of which can be included in the fertilizer.

Pre-emerge application – boron can be mixed with herbicide and applied with pre-emerge treatment at planting. Use same amount of boron as in fertilizer application, using Solubor (20.5% B).

Foliar application – apply a highly water soluble material, such as Solubor, with insecticide as spray application. Use 0.1 lb. boron per acre for each of 3 to 5 applications.

SOURCES OF BORON

Source	Boron content	Materials required for 1 lb. boron
	Pct.	*Lb.*
Borax fine granular	11.36	8.80
Fertilizer borate FB-46	14.30	7.00
Fertilizer borate FB-65	20.20	4.95
Solubor	20.50	4.88

GETTING STARTED in FARMING

B. R. McMANUS* and
J. E. OSBORN
Dept. of Agricultural Economics

FOR YOUNG MEN, careers in farming are limited!

The reason – mainly because of rapidly rising costs of modern farming, increasing land values, and technological progress. Too, an efficiently operated farm depends on management skills and experience.

A young farmer must combine land, labor, and capital to his advantage. Such an arrangement should make it possible for him to accumulate a reasonable amount of equity in the business. Basic types of business arrangements may be classified as father-son, tenant, owner, and laborer.

The father-son arrangement was most common in a study of 29 beginning farmers in Alabama, Table 1. Next in order were tenant arrangements that included share-rent and cash-rent agreements. Last was the laborer arrangement. Working as a laborer to obtain experience and accumulate capital, and then buy a farm was uncommon. This was because of the low rate of savings and high investment necessary for farming.

Father-Son Arrangements

Depending upon father's interest and son's desire, the father-son arrangement provides a good opportunity for the son to start farming with limited capital and experience. It can serve as a testing period of the son's genuine desire to farm or to follow other vocational interests.

Father-son agreements varied from the son being a laborer to a full partner. The major input by the son was labor while that of the father was land. Contribution of machinery, operating capital, and management varied with each agreement.

Although variations may occur, each agreement should include the following basic points: (1) purpose of agreement, (2) time period covered by agreement, (3) continuity provisions, (4) contributions and divisions of income provisions, and (5) basis for arbitration of disagreements. Status of the business arrangement is especially important to a young farmer if one of the parties should die.

Tenant Arrangements

Tenant arrangements give a beginning farmer an opportunity (1) to try a particular type of farming, (2) to gain experience, and (3) to determine the possibilities of a particular farm. Also, tenant arrangements allow a young farmer to explore his own managerial abilities.

It was found that the combinations of inputs that were contributed by the landlord and tenant varied considerably. However, distribution of returns was based on the contributions of each party.

Share rent was the most common way of renting. This method gave a beginning farmer an opportunity to start with a small amount of capital. As capital was accumulated and experience was gained, cash renting became more attractive. In some cases farms were rented for cash with an option to buy at a stipulated price. This gave the tenant an opportunity to take advantage of rising land prices.

Although rental arrangements may vary, there are some basic considerations for each agreement. These are: (1) anticipated volume of business, (2) share in costs and returns, (3) payment for capital improvements, and (4) time period. Reimbursement for capital improvements and length of agreement are related. Although the agreement may contain reimbursement provisions, length of the agreement may not provide an incentive to make capital improvements. Special consideration should be given to the duration of agreement so that the young farmer can make production plans in line with types of enterprises and farming operations planned.

Part-Time Farming

Part-time farming is a temporary answer to the most difficult problems in getting established in farming. These include (1) finding an adequate farm, (2) gaining experience, and (3) accumulating capital. Ability to accumulate capital by part-time farming depends in part on willingness of family to save. It was found in this study that 32% of the farmers used some form of part-time farming to get a start. Two-thirds of these did part-time work in nonagricultural industries.

Family Assistance

In this study 89% of the beginning farmers reported some kind of family assistance, Table 2. In some cases the amount was small but sufficient to help the young farmer get started. Assistance by gifts and inheritance was reported by 54% of the beginning farmers. Assistance in obtaining loans was reported by 46%.

Summary

Beginning farmers with minimum capital and experience have found the father-son business arrangement a means of getting started in farming. Higher levels of capital are required for a tenant than for a father-son farming arrangement. Part-time farming permits a beginning farmer to accumulate capital and experience without depending on the farm for sole source of income. Whatever business arrangement used, family assistance plays an important part. A young man seeking a career as a farmer should examine the different ways of making a start and select the one that best fits his situation. Getting started in farming is difficult but not impossible.

TABLE 1. TYPES OF BUSINESS ARRANGEMENTS USED IN FARMING BY 29 BEGINNING FARMERS, ALABAMA, 1963

Type of arrangement	Per cent
Father-son	48.4
Tenant	37.9
Owner	6.9
Part owner	3.4
Laborer	3.4

TABLE 2. FAMILY ASSISTANCE RECEIVED BY 29 YOUNG FARMERS DURING THE FIRST YEAR OF FARMING, ALABAMA, 1963

Type of assistance	Per cent
Gifts	43
Loans	32
Co-signing of loans	14
Inheritance	11

* Resigned.

Lush forage growth like this is possible only when enough nitrogen is available to the crop. Even when adequate amounts of some nitrogen sources are put on lime soils, deficiency may occur because of gaseous loss.

Efficiency of Nitrogen Sources Varies on Alkaline Soils

C. E. SCARSBROOK, *Department of Agronomy and Soils*
H. W. GRIMES and L. A. SMITH, *Black Belt Substation*

BLACK BELT SOILS are unusual.

One of the biggest differences is that many soils of the area have a high content of free lime. The most extensive lime soil of the Black Belt area is the Sumter series, which may contain 50% or more free lime.

Differences in management required for the alkaline (lime) soils have long been recognized. An important consideration is that nitrogen sources may differ in efficiency when applied to the surface of these lime soils.

Large N Losses Possible

Studies at the Black Belt Substation show that large losses of nitrogen may occur when ammonium fertilizers are put on the surface of alkaline soils during warm weather. This loss is in the form of ammonia gas, and results from use of fertilizers that either contain or produce ammonia.

Amount of nitrogen loss that can occur in warm weather is indicated by results of the study with johnsongrass during 1962-64. In the experiment, nitrogen was applied in two equal applications — in spring (about April 15) and after the first harvest. Adequate phosphate and potash were applied to all plots. The grass was cut when largest plants were in the early bloom stage.

Nitrate Nitrogen Proved Best

Largest forage yields were produced when all nitrogen was in the nitrate form, see table. Yield increases listed in the table are relative increases over the no-nitrogen plot, using the increase from the all nitrate form as 100%.

JOHNSONGRASS FORAGE PRODUCED WITH SEVERAL SOURCES AND RATES OF NITROGEN

Source of N	Yield per acre		Relative yield increase
	Average 1962-63	Increase	
	Lb.	*Lb.*	*Pct.*
No nitrogen	1,900	-----	-----
40 lb. N			
Sodium nitrate	2,800	900	100
Ammonium sulfate	2,200	300	33
Urea	2,300	400	44
Ammonium nitrate	2,900	1,000	111
80 lb. N			
Sodium nitrate	4,100	2,200	100
Ammonium sulfate	2,600	700	32
Urea	3,200	1,300	59
Ammonium nitrate	3,500	1,600	73
120 lb. N			
Sodium nitrate	5,000	3,100	100
Ammonium sulfate	3,300	1,400	45
Urea	3,600	1,700	55
Ammonium nitrate	4,500	2,600	84

The lowest yields were harvested on plots getting ammonium sulfate and urea. Ammonium sulfate contains ammonium, and the nitrogen in urea is soon converted to ammonium after addition to soil. When all three rates were averaged and compared with sodium nitrate, yield increases were 39% for ammonium sulfate and 55% for urea.

Ammonium nitrate containing half nitrate and half ammonium nitrogen produced forage yields intermediate between the all ammonium sources. The average relative yield increases of ammonium nitrate averaged 84% as much as that from sodium nitrate for the three rates.

Moisture conditions during 1962-63 were unfavorable for growth of johnsongrass, but were favorable for large losses of ammonia. The nitrogen materials remained in the surface soil during hot weather and had numerous wetting and drying cycles as a result of dews or light showers.

Yields reported in the table are low as a result of moisture deficiency. This production is in contrast to yields of 9,000 to 13,000 lb. per acre of johnsongrass recorded in another experiment when annual nitrogen rate was 80 lb. per acre or higher during the 4-year period.

Incomplete data for 1964, when rainfall was adequate, show higher forage yields and reduced loss of ammonia. Yield increases about twice those shown in the table were harvested before September in 1964. Relative yield increases compared with sodium nitrate were 56, 69, and 100% for ammonium sulfate, urea, and ammonium nitrate.

Moisture, High Temperature Involved

Ammonia loss occurs only when there is moisture present on the soil surface and temperature is high. The loss will not occur when nitrogen is disked into the soil or washed into the soil by rain.

The same reactions that release ammonia gas on the surface also occur down in the soil. However, there is no escape of the gas. The ammonia released is quickly absorbed by the soil particles or water in the soil.

Losses of the size shown can occur regardless of whether nitrogen is applied in liquid or solid form. Most liquid nitrogen fertilizers contain ammonium, or produce it in the soil.

As shown by results of the Black Belt tests, possible losses of nitrogen may result from surface application of ammonium fertilizers to alkaline soils. These possible losses, along with price and ease of application, must be considered when choosing nitrogen for use under such circumstances.

FEWER BUT LARGER PRODUCERS *of* GRADE A MILK

LOWELL E. WILSON and KENNETH H. COBB
Department of Agricultural Economics

THERE WERE 40% fewer Grade A milk producers in Alabama last summer than 10 years ago. Yet milk sales were almost double. These are significant changes in the State's dairy industry.

In the early 1950's, there were about 2,000 Grade A producers in Alabama. By August 1964, the number of dairymen selling Grade A milk to distributors had dropped to 1,197. Despite this sharp dropout, sales were up nearly 100% mainly because of larger dairy units, increased production per cow, and installation of labor-saving equipment.

Study Made of Alabama Producers

A study of supply adjustments made by Alabama Grade A milk producers was initiated by the Auburn University Agricultural Experiment Station in 1963. One objective of the study was to determine those characteristics of dairymen that influence their decisions to expand or get out of the dairy business.

A prepared questionnaire was mailed to each Grade A milk producer. Approximately 60% of the producers returned completed questionnaires. A total of 800 questionnaires were used in the analysis of producer characteristics.

Size of Herd

An analysis of the survey data was made by size of herd. Average number of cows in the Grade A herds was 78. Of this number, 61 were being milked in October 1963 and 17 were dry. A total of 278 dairymen, or 34% of those answering the questionnaire, had herds of less than 50 cows, but produced only 14% of total milk sales, Table 1. About one-fifth of the producers had herds of 110 or more cows; however, this group produced more than 40% of the total milk sales.

Herd size distribution in 1963 was compared with herd size distribution in 1959 (Auburn Univ. Agr. Expt. Sta. Bul. 331). The comparison showed that during the past 5 years the average number of cows in milk in dairy herds increased 20%. Also, during this period milk handlers have become increasingly dependent on producers with large herds for most of their milk supply. The 1959 study indicated that herds of 80 or more cows produced about one-third of the total milk supplies. In contrast, herds of this size supplied about two-thirds of the milk in 1963.

Several characteristics of dairymen indicative of changes in number and size of herds were compared. Average age of dairymen in the survey was 48 years. Generally, younger dairymen operated medium-sized production units. Average age of dairymen with herds under 30 cows was 50 years, or slightly older than average age in the other groups, Table 1.

The analysis showed that dairymen with large herds made more use of technological advances in milk production than the small operators. Use of production testing, artificial breeding, mechanized feeding systems, and pipe-line milkers increased with larger herd sizes. Dairymen with herds of more than 50 cows were more likely to adjust production to meet market demand as indicated by the percentage of dairymen purchasing milk base.

Average Daily Milk Sales

The trend of either expanding production units or going out of business is further shown in Table 2. In 1958, about one-half of all dairymen in Alabama sold less than 550 lb. of milk per day. By 1963, less than one-fourth of the dairymen sold milk in amounts under 550 lb. Average daily deliveries jumped from approximately 780 lb. in 1958 to 1,350 lb. in 1963, an increase of 73%.

More than 50% of all dairymen selling less than 550 lb. of milk daily in 1958 went out of the dairy business by 1963. Most of the small dairymen staying in milk production increased sales substantially. Although some producers in all size categories left dairying, the percentage declined in larger herd sizes. Only 14% of the producers selling more than 2,200 lb. daily quit dairying.

Because of a heavy dropout of small operators and the concurrent expansion in milk sales by those remaining, total number of herds selling under 1,100 lb. daily decreased between 1958 and 1963. Number of herds selling more than 1,100 lb. daily increased 75%.

Summary

The trend of larger and fewer production units, characteristic of American agriculture, is occurring in Alabama's dairy industry. Larger herds make it necessary for dairymen to purchase labor-saving equipment. Smaller producers who cannot afford such equipment or who fail to increase herd size are likely to drop out of milk production. Thus, the Grade A milk industry in Alabama is becoming concentrated in the hands of larger, specialized, and more efficient milk producers.

TABLE 1. CHARACTERISTICS OF ALABAMA GRADE A MILK PRODUCERS BY SIZE OF HERD, 1963

Size of herd	Dairy herds		Total milk sales	Av. age of dairyman	Using production testing	Using artificial breeding	Purchased milk base
	No.	*Pct.*	*Pct.*	*Yr.*	*Pct.*	*Pct.*	*Pct.*
Under 30	99	12	3	50	28	63	7
30-49	179	22	11	47	30	62	8
50-69	176	22	16	46	43	70	20
70-89	125	16	16	46	45	64	24
90-109	69	9	11	47	49	72	20
110 and over	152	19	43	49	61	68	24
Total	800	100	100	48	42	66	17

TABLE 2. DISTRIBUTION OF ALABAMA DAIRYMEN BY DAILY MILK SALES, 1958 AND 1963[1]

Year	Proportion selling specified daily amounts					
	Under 550	550-1,099	1,100-1,649	1,650-2,199	2,200 and over	Total
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
1958	49	32	10	5	4	100
1963	22	32	21	11	14	100

[1] Average daily milk sales during base-building period (September 1 through last day of February).

GEORGE E. HAWKINS, GARY E. PAAR, and JOE A. LITTLE
Department of Dairy Science

TOP COASTAL MAINTAINS MILK PRODUCTION

DELAY IN CUTTING Coastal bermudagrass hay lowers quality of the forage and in turn results in reduced daily production of milking dairy cows.

When adequately fertilized, Coastal bermuda produces high yields of hay. For this reason, it is one of the cheapest sources of harvested forage for dairy cows.

To determine the range in feeding value of such forage for milking dairy cows, tests have been made on 15 Coastal bermuda hays by Auburn University Agricultural Experiment Station.

The test hays were grown on six different farms. The wide range in quality is shown in table by digestible protein, total digestible nutrients (TDN), and estimated net energy (ENE) values.

Hay No. 11 was the only one that could be classified as excellent in quality. Its crude fiber content was only 25.9% as compared with the highest, 32.8% of hay No. 4. Hays No. 11 and 12, grown on the same farm, were first cuttings on June 3 and June 30, respectively. Delay in harvest of No. 12 resulted in reduced quality as indicated by decreases in digestible protein, TDN, ENE, and 3.4% more crude fiber.

The digestible protein content of the 15 tested hays as fed ranged from a low of 2.3% to a high of 8.6%, an average of 5.1%. The high TDN content was 56.6% as compared with the low of 46.5%. On the average, there was a decrease of about 1% in TDN for each 1% increase in crude fiber.

The study of milk production involving the hays was conducted during a 3-year period, with hays 1-7, 8-10, and 11-15 being fed in successive years. The rations consisted of 50% Coastal bermudagrass hay and 50% concentrates (70% grains, 29% cottonseed meal, and 1% salt) fed at a rate of 120% of recommended estimated net energy (ENE) allowances. The FCM production levels given in table are adjusted to a common starting level of 39.8 lb. per cow daily. Average daily milk production per cow during the 5-week test period ranged from a low of 30.6 to a high of 37.1 lb.

During the production tests, the average daily FCM production of cows fed the highest quality Coastal hay, No. 11, decreased only 2.7 lb. In contrast, the average daily FCM production of cows fed a low quality Coastal hay (No. 10) dropped 9.2 lb. In addition, a comparison of Coastal hays No. 11 and 12 shows the importance of growth stage at cutting time on quality of the hay produced and on milk production. Cows fed No. 12 hay produced 2.3 lb. less FCM daily than cows fed No. 11 hay, which was cut 27 days earlier. In a 100-cow milking herd, those fed Coastal hay equal in quality to No. 11 would be expected to produce an extra 230 lb. of milk per day more than the amount that would be produced by cows fed hay of the same quality as No. 12. This increase would amount to 34,500 lb. of milk during a 5-month barn feeding period. This is reason enough for dairymen to shoot for production of top quality Coastal hay by cutting at an immature stage of growth.

DIGESTIBLE PROTEIN, TDN, ENE OF COASTAL BERMUDAGRASS HAYS AS FED[1] IN RELATION TO MILK PRODUCTION

Hay no.	Digestible protein	TDN	ENE[2]	Daily FCM/cow
	Pct.	*Pct.*	*Therms/ 100 lb.*	*Lb.*
1	4.4	49.8	36.7	35.2
2	4.2	48.2	34.6	32.2
3	2.8	48.3	34.6	35.2
4	6.7	46.5	33.1	35.0
5	8.6	49.9	36.8	36.3
6	7.7	50.2	37.9	36.7
7	5.3	48.9	35.9	35.2
8	2.9	50.2	37.5	31.9
9	2.3	49.5	36.4	32.1
10	2.9	50.8	38.4	30.6
11	8.5	56.6	47.0	37.1
12	6.2	51.3	38.9	34.8
13	6.0	51.8	39.6	36.1
14	5.2	52.7	40.5	34.8
15	2.9	48.6	34.9	36.4

[1] Dry matter content of hays ranged from 89.0 to 92.9%.
[2] This is same value as "quality code" in forage testing reports.

Most of the differences in milk production from the different hays fed were associated with amount of ENE consumed daily as hay per 100 lb. body weight of the cows. The amount of hay consumed per 100 lb. of body weight varied from a low of 1.2 lb. to a high of 1.6 lb.

After deducting needs for body maintenance, the cows converted an average of 82% of the ENE into milk with the other 18% being used for gains in body weight. However, there were variations between hays in use of ENE available for milk production with a range of 68.4 to 95.2%. Thus, the relatively large decreases in milk production from most of the hays reflected: (1) failure of cows to consume their full allowances of the hays, and (2) an inefficient conversion of ENE to milk.

There was a wide range in the quality of Coastal bermudagrass hays used in this experiment. The highest quality hay, No. 11, as measured by ENE and by amount consumed, maintained an acceptable milk production persistency. To produce such quality Coastal hay, the first cutting should be made by June 1 and later cuttings every 3 weeks.

Furthermore, this study showed that digestible protein and TDN contents of Coastal bermudagrass hays can be determined with a high degree of accuracy by forage testing.

Figure 1 at left shows results of annual burning with a hot head fire. Figure 2 at right was burned every third year permitting some seedlings to survive.

WOODS BURNING affects SEEDLING SURVIVAL

G. I. GARIN, *Department of Forestry*

BEFORE WORLD WAR II many people believed frequent woods burning to be a good practice.

The purpose of burning was not to increase timber production, but to improve grazing conditions. Improved pastures were practically nonexistent, and woods were used for cattle range. Prices paid for standing timber were low in comparison with those of today. Young trees, in particular, had no cash value because the pulpwood market was just beginning to develop and its potential was not recognized. In this setting an experiment was started in 1941 by the Auburn University Agricultural Experiment Station to evaluate the effect of periodic burning on the forest stand itself.

Experiment Established

Four acres of a second growth forest stand in an experimental forest in Barbour County were selected for this study. The forest was located in hilly country just north of Clayton. The area had been cleared and cultivated during the first part of the present century, then abandoned. Wind-borne seed soon established a stand of second growth trees consisting mainly of shortleaf pine with some loblolly and longleaf pines. The stocking of pines was very light, but when the experiment was begun nine large trees per acre produced an abundant supply of seed at frequent intervals.

Treatments

Eight, one-half acre plots were established in two groups. Four treatments assigned to the plots of one group were repeated in the second group. One pair of plots was burned annually with a hot, head fire during the hot part of the day to simulate a wild fire. The second pair was burned annually with a cooler back fire, which was set toward the end of the day when the air was cooling and becoming moist.

The third pair of plots was burned every third year. Usually a heavy accumulation of fuel on these plots produced a hot fire in spite of an attempt to have a cool fire. All burning was done in January or February. The fourth pair of plots was left unburned to show how complete fire protection would affect the forest.

Results Tallied

Pine seedlings were tallied before fires were set. Results of this tally for 3 representative years are given in the table. Burning created seedbed conditions favorable for germination. The numbers of small, new seedlings varied from year to year, but they were always high on plots that had been burned. Fires destroyed most of the small seedlings, Figure 1. Seedlings surviving the first fire were frequently killed by subsequent fires. On plots burned annually only a small number of seedlings reached a height of more than 2 ft.

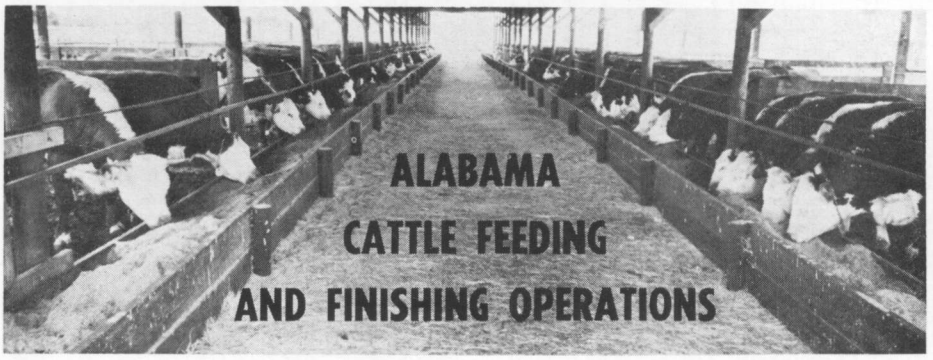
Burning at 3-year intervals was less destructive to larger seedlings. In 2 years without fire a substantial number of seedlings attained a height of 2 ft. or more. Although many of these seedlings were killed, a substantial number was able to escape destruction by fire, Figure 2. Their numbers progressively increased with time. Some of these seedlings were able to grow to sapling size and eventually to small trees.

On plots protected from fire, new seedlings appeared in substantial numbers. This indicated favorable conditions for seed germination, which can be attributed to the sparse overstory of large trees. These seedlings grew to 2-ft. size in substantial numbers. An adequate number of seedlings further developed toward a good stocking of well established saplings. The saplings finally developed to small trees, thus creating a forest stand capable of growing wood at a favorable rate.

This experiment demonstrates the necessity of fire protection in attaining good stocking of small trees in a sparse stand of old trees. Annual fires proved to be contrary to this goal. Partial fire protection was very helpful in allowing some pine seedlings to pass beyond the seedling stage.

PER ACRE STOCKING OF PINE SEEDLINGS IN LATE WINTER BEFORE FIRES WERE SET IN SELECTED YEARS

Height	Year	Annual hot (wild) fire	Annual cool fire	Fire every 3rd yr.	No fires
Feet		*No.*	*No.*	*No.*	*No.*
0-½	1944	868	1,027	27	2,500
	1948	10,308	12,208	5,358	6,708
	1959	207	285	420	75
½-2	1944	68	106	0	43
	1948	546	436	7,720	6,167
	1959	375	85	280	470
2-4½	1944	20	18	13	117
	1948	16	11	126	188
	1959	15	0	1,200	1,195



ALABAMA CATTLE FEEDING AND FINISHING OPERATIONS

JULIAN E. HOLMES and JOHN A. LEE
Department of Agricultural Economics

By 1980 the United States will need an estimated 40-45% more beef to supply the expected 30% population increase. With this potential demand in mind, Alabama farmers are considering the possibility of increasing numbers, weight, and finish of cattle sold.

Several problems must be overcome to increase cattle feeding in the State. Being in a grain-deficit area is one of these, but expanded use of shipped-in grain is possible because of recent decreases in rail rates for multiple-car units. Local grain production might also be increased.

Lack of capital to establish a feeding operation is a serious handicap for many Alabama farmers. Where large-scale feedlots have been established, the initial investment in cattle, feed, and facilities has been sizeable. However, a majority of those feeding cattle in Alabama are using existing facilities, such as old barns, sheds, or lots.

Management also poses a serious problem because of the special skills needed. Since cattle feeding is relatively new in the South, many feeders have limited experience and "know-how." There is often a small margin between profit and loss, so knowledge of feeding, markets, and marketing is of prime importance.

Detailed information concerning Alabama cattle feeding was obtained in an Auburn contract research study for the Southern Railway System. The 60 cattlemen interviewed were divided into three classifications: Group A raised animals for the feedlot; Group B bought and grazed feeder animals before placing them in feedlot; and Group C bought animals and placed them directly in feedlot. Average number of cattle fed per lot was 115, see table.

Grades of animals entering feedlots were generally low, with only 26% estimated by farmers to grade Good. Group B and C operators started twice the percentage of animals in the Good grade as did Group A. This high percentage of low grade animals limited the potential for finishing to high quality.

Animals leaving the feedlot graded higher than when put on feed in all three groups. About one-fourth (24%) graded Choice when finished. Feeders in Groups B and C finished the greatest percentage of Choice animals.

Group B operators fed animals an average of 94 days and rate of gain averaged 2.29 lb. per day. Group C operators fed for the same average number of days, but daily gain averaged 2.05 lb.

Cost per pound of beef sold was calculated for each feedlot group. This included feed, labor, interest on investment, fencing, veterinary service, water, buying, selling, and other costs. For Groups A and B, cost included value of animals when they were put in the feedlot. Actual purchase price was used in calculating Group C costs.

All costs were divided by cwt. of beef sold to get unit cost. Cost averaged $24.35 per cwt. sold, for which $22.63 was received. Feed cost almost equalled selling price – $21.74 per cwt. Of the 60 feeders interviewed, 19 received less per cwt. than cost of production.

Profits in cattle feeding depend to a large extent on two factors: (1) price margins, which result from selling the purchased weight at a price different from purchase price or cost of raising the animal; and (2) feed margin, which is the difference between price received per pound and cost per pound of gain.

The two margins may be small, and errors made in dealing with either can cause financial trouble. Thus, feedlot operators must carefully weigh decisions about buying, selling, and feeding, using best available information.

For Alabama farmers to profitably increase production of finished beef, each feeder must use the best possible management to fit his own situation. He must calculate costs as accurately as possible and seek ways to reduce expenses.

CHARACTERISTICS OF ALABAMA FEEDLOT OPERATIONS, 1962-63

Item	Unit	Group A	Group B	Group C	Average
No. of farms	No.	22	18	20	60
Animals fed					
Range	No.	6-350	18-520	17-493	...
Average	No.	59	160	136	115
Breed					
Hereford	Pct.	48	15	17	28
Angus	Pct.	22	0	16	13
Mixed	Pct.	30	85	67	59
Sex					
Steers	Pct.	73	91	78	80
Heifers	Pct.	27	9	22	20
Grade in					
Good	Pct.	15	30	34	26
Standard	Pct.	41	50	41	44
Utility or commercial	Pct.	44	20	25	30
Beginning wt.					
Range	Lb.	300-800	300-850	275-751	...
Average	Lb.	465	675	528	549
Ending wt.					
Range	Lb.	400-975	400-1,100	450-1,050	...
Average	Lb.	653	901	808	779
Grade out					
Choice	Pct.	6	30	38	24
Good	Pct.	54	54	60	56
Standard	Pct.	44	16	2	22
Gain per head, av.	Lb.	188	226	280	230
Daily gain					
Range	Lb.	.95-2.92	1.67-2.89	.97-3.18	...
Average	Lb.	2.06	2.29	2.05	2.13
Days on feed, av.	Days	94	136	94	107
Cost/cwt., av.	Dol.	25.91	24.32	22.67	24.35
Selling price/cwt., av.	Dol.	22.21	23.10	22.67	22.63

LIQUID FEEDING of Growing-Finishing Hogs

HOWARD F. TUCKER, *Department of Animal Science*
LAVERN BROWN, *Lower Coastal Plain Substation*

LIQUID FEEDING is a new term applied to an old method of feeding.

Actually the term is misleading in that the feed is not a true liquid but rather an indefinite ratio of water to feed to form a slop. Renewed interest in liquid feeding has arisen for two reasons: (1) The Europeans have suggested an improved efficiency with liquid feed, and (2) feed of this consistency could be conveyed easily through mechanical feeding systems.

Feeds Compared

Tests have been conducted by researchers of the Auburn University Agricultural Experiment Station under confinement conditions comparing liquid and dry feeding methods. Results were obtained at two locations, the Main Station at Auburn and Lower Coastal Plain Substation. Pigs were divided according to sex, litter, and weight into groups and then randomly assigned to each treatment trial. Full feeding was accomplished in all trials. Fresh water was available at all times. Pigs were removed for carcass evaluation or market at approximately 200 lb.

At both locations, pigs that received the liquid (slop) rations gained considerably faster than those that received air-dry feed. Feed efficiency was only slightly in favor of the dry-fed group at the Main Station, whereas at the Lower Coastal Plain there was no difference. These results differ from the generally accepted positive relationship between rate of gain and efficiency of gain. Feed wastage appeared to be greater in the liquid-fed groups. This may account in part for the differing results. Hamphire, Landrace, Duroc, and Hampshire-Landrace crosses have all shown favorable response to liquid feeding.

TABLE 2. EFFECTS OF LIQUID AND DRY FEEDING ON PERFORMANCE OF GROWING-FINISHING HOGS

Group	Treatment	Initial weight	Final weight	A.D.G.	Av. daily feed	Feed eff. (feed/lb. gain)
		Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
I	Full-dry	43	177	1.64	5.5	3.34
II	Daily ration same as Group I-liquid	43	179	1.66	5.5	3.29
III	Full-liquid	43	188	1.77	6.2	3.51

Gains Determined

Another test was conducted to determine why liquid-fed hogs gain faster. Group I was full-fed a dry ration; Group II was daily fed an amount of dry feed equal to that of Group I, but as a liquid; and Group III was full-fed a liquid ration. The performance of pigs in Groups I and II were very similar, but as before the full-fed liquid pigs gained faster and were less efficient. Pigs on the full-fed liquid ration consumed 0.7 lb. (6.2 lb. vs. 5.5 lb.) more feed per day than pigs receiving either of the other two rations.

Carcass Evaluations Made

Carcass evaluations were made of a representative portion of the market hogs, Table 3. Hampshire carcasses from the dry and wet treatments were similar in all measurements. Durocs fed the liquid ration had carcasses with less back-fat and smaller loin-eyes. However, percentages of lean cuts and of primal cuts were similar for the two treatments.

TABLE 3. CARCASS MEASUREMENTS FROM HAMPSHIRE AND DUROC HOGS ON LIQUID AND DRY FEEDS

Treatment	Pigs	Slaughter weight	Back-fat	Loin-eye	Lean cuts of chilled carcass	Primal cuts of chilled carcass
	No.	*Lb.*	*Lb.*	*Sq. in.*	*Pct.*	*Pct.*
Hampshire						
Liquid	12	200.3	1.33	4.27	52.0	65.9
Dry	12	197.2	1.33	4.27	52.5	66.4
Duroc						
Liquid	8	190.4	1.51	3.44	49.7	63.4
Dry	7	195.3	1.60	3.78	49.7	63.1

TABLE 1. EFFECTS OF LIQUID AND DRY FEEDING ON PERFORMANCE OF GROWING-FINISHING HOGS

Treatment	Pigs	Initial weight	Final weight	A.D.G.	Feed eff. (feed/lb. gain)
	No.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
Main Station (4 tests)					
Liquid	32	50.7	205.2	1.82	3.59
Dry	31	50.6	204.9	1.69	3.50
LCP Substation					
Liquid	16	55.3	205.3	1.77	3.92
Dry	32	55.3	200.2	1.60	3.93

Results

Pigs that were liquid-fed gained considerably faster than those that received air-dry feed. This was attributed to an increased daily consumption of the wetted feed. They also required slightly more feed to produce a pound of gain. Carcass measurements were not affected by either treatment.

POULTRY MANURE valuable for VEGETABLE CROPS

L. M. WARE and W. A. JOHNSON
Department of Horticulture

PROPER USE OF poultry manure produced each year in large quantities by Alabama's poultry industry can convert a problem into a valuable asset.

Studies at the Auburn University Agricultural Experiment Station for many years have shown the importance of organic materials in intensive vegetable production. During the past 3 years results have shown poultry manure to be an excellent form of animal manure. These studies have included rates and sources of poultry manure, and method and time of application. They were conducted on both sandy and clay soils on which both summer tomatoes and fall crops were grown. Records were kept on tomato yield, grade, earliness, fruit size, cracking, and culls and included both current and residual effects.

Results are given only on effects of manure on tomatoes on a sandy loam and only with rates and time of application of manure. These results extend over a 2-year period, 1962 and 1963. The manure came from a five-brood broiler operation. It was applied broadcast 1, 3, and 6 weeks and in the row 3 weeks before tomatoes were transplanted. Manure was applied to summer and fall crops in 1962, but to the summer crop only in 1963. An 8-8-8 fertilizer was applied at the rate of 1,500 lb. per acre. It was divided into two equal applications, one-half applied immediately before transplanting and one-half applied about 4 weeks after transplanting.

Average total yields, marketable yields, and percentage marketable yields for 1962 and 1963 are given in Table 1. Data on total yields, cracks, and culls are given in Table 2 for 1963.

Comparisons were made of effects of commercial fertilizer without manure, of manure without commercial fertilizer, and of both fertilizer and manure together. The yield of marketable tomatoes was 39,161 lb. from commercial fertilizer alone, 54,756 lb. from manure alone, and 58,845 lb. from both commercial fertilizer and manure. Percentage of marketable yields for the corresponding treatments were 71.5, 70.8, and 71.2. Marketable yields therefore, were 15,595 lb. higher from manure alone than from fertilizer alone, and 19,684 lb. higher from manure than from no manure when fertilizer had been added.

Application of manure to the row reduced stand, plant vigor, and yields. Marketable yields of tomatoes were 58,845 lb. where 6 tons of manure was applied broadcast 3 weeks before transplanting; yields were 17,024 lb. lower where the same rate of manure was applied in the row; yields were 7,162 lb. higher where 6 tons of manure was applied broadcast 3 weeks before transplanting than when applied 1 week before setting. There was essentially no difference in yield from applying 6 tons of manure 3 and 6 weeks before transplanting.

TABLE 1. TOTAL YIELD, MARKETABLE YIELD, AND PERCENTAGE OF MARKETABLE TOMATOES, 1962-63

Treatment	Fertilizer, 8-8-8 per acre	Manure			Yields per acre		Percentage marketable
		Amt. per acre	Application				
			Before planting	Method	Total	Marketable	
No.	*Lb.*	*Tons*	*Wk.*		*Lb.*	*Lb.*	*Pct.*
1	1,500	0	--		54,774	39,161	71.5
2	1,500	6	1	B[1]	75,136	51,683	68.8
3	1,500	6	3	B	82,656	58,845	71.2
4	1,500	6	6	B	80,797	57,172	70.8
5	1,500	6	3	Row	60,745	41,821	68.8
6	0	6	3	B	77,373	54,756	70.8

[1] B is broadcast.

TABLE 2. AMOUNT AND PERCENTAGE CRACKS AND CULLS, 1963

Treatment	Fertilizer 8-8-8 per acre	Manure			Amount per acre		Percentage of totals		Total yields per acre
		Amount per acre	Application						
			Before planting	Method	Cracks	Culls[1]	Cracks	Culls	
No.	*Lb.*	*Ton*	*Wk.*		*Lb.*	*Lb.*	*Pct.*	*Pct.*	*Lb.*
1	1,500	0	--	--	9,990	9,370	19.2	18.0	51,929
2	1,500	6	1	B[2]	16,333	13,562	21.0	17.4	77,709
3	1,500	6	3	B	17,049	13,933	19.4	15.8	87,961
4	1,500	6	6	B	13,088	14,707	14.7	16.5	89,248
5	1,500	6	3	Row	11,981	11,830	17.4	17.2	68,851
6	0	6	3	B	14,713	12,691	17.6	15.2	83,456

[1] Exclusive of cracks.
[2] B is for broadcast.

An opinion is prevalent that manures increase cracking of fruits and increase culls. Data from these tests do not substantiate this opinion. While the weight of cracked fruit was 9,990 lb. from use of commercial fertilizers compared with 14,713 from use of manure alone, the percentage was 19.2 from fertilizer alone and 17.6% from manure alone. The percentage of cracked fruit was the same from use of commercial fertilizer and manure as from commercial fertilizer alone. The highest percentage cracked tomatoes came from use of the standard fertilizer rate with manure applied 1 week before transplanting.

In total culls, the largest percentage (18%) culls came from use of commercial fertilizer alone, while the lowest percentage (15.2%) came from use of manure alone. The percentage of culls from use of the standard fertilizer rate (1,500 lb.) and the standard rate of manure applied broadcast to the land 3 weeks before transplanting tomatoes was 15.8%.

High Analysis vs. Low Analysis Fertilizers

L. E. ENSMINGER and J. T. HOOD
Department of Agronomy and Soils

TODAY'S FERTILIZERS look much like those used 20 years ago. But there are important differences that cannot be seen, even on close examination.

In the past, most mixed fertilizers were made with ordinary superphosphate and contained dolomite as a filler. Such fertilizers contained appreciable amounts of calcium, magnesium, and sulfur.

The modern-day trend toward high analysis fertilizers has decreased the use of dolomite as a filler. This means that much of the fertilizer used now – and to be used in the future – contains little or no magnesium and less calcium, and is acid forming.

Ammonium phosphates are coming into large scale production for use in high analysis fertilizers. When this source of phosphorus is used, the resulting fertilizer contains only a trace of calcium and may be low in sulfur. As sources of nitrogen and phosphorus, ammonium phosphates have been found to be excellent. However, their continued use may create fertility problems not encountered by use of lower analysis fertilizers made from superphosphate and containing some dolomite as filler.

Problems that can be expected from high analysis fertilizers were brought to light in Auburn University Agricultural Experiment Station studies. High and low analysis fertilizers were compared on the basis of germination and seedling injury, secondary elements, and micronutrients.

Germination and Seedling Injury

Certain fertilizer materials will lower germination if improperly placed. Ammonium phosphates placed with cottonseed lowered germination much more than ordinary superphosphate. When gypsum was mixed with diammonium phosphate, considerable stand improvement resulted. Effects of different materials (60 lb. P_2O_5 per acre) on cottonseed germination are given below:

Fertilizer material	*Pct. germination*
Untreated check	100
Monoammonium phosphate	35
Diammonium phosphate	25
Ordinary superphosphate	95
Diammonium phosphate + gypsum	55

Effect of ammonium phosphates on roots of cotton seedlings when placed directly under the seeds is illustrated in the photograph. Diammonium phosphate caused more damage than monoammonium phosphate.

Secondary Elements and Micronutrients

Low analysis fertilizers often contain appreciable amounts of the secondary elements – calcium, magnesium, and sulfur. This is because such fertilizers are usually made from ordinary superphosphate – a mixture of monocalcium phosphate and calcium sulfate – and contain some dolomite as a filler. It seems reasonable to expect that continued use of high analysis fertilizers, which contain little or no secondary elements, will increase the need for lime and other supplements.

A comparison of longtime effect of ammonium phosphate and calcium phosphates is shown by data in the table. During the last 4 years, unlimed plots produced much less cotton when monoammonium phosphate was used. Differences in favor of the calcium phosphates were much less on limed than on unlimed plots, although only one application of lime was made at the beginning of the experiment. Differences between sources may have been even less had lime been applied according to soil test.

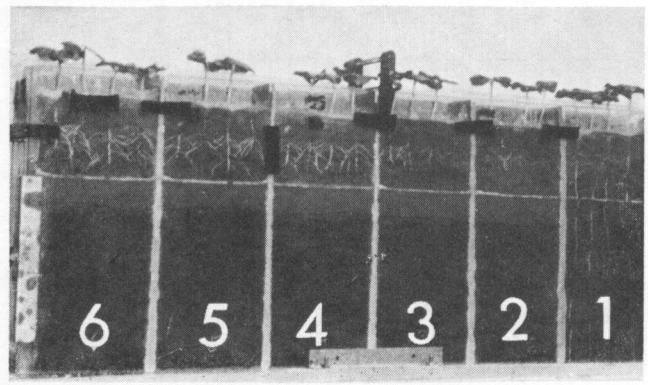
Most fertilizer materials do not contain appreciable quantities of micronutrients, such as copper, zinc, manganese, and boron. Content of these nutrients is about the same in ammonium phosphates made from wet-process phosphoric acid as in superphosphates made from the same source of raw rock phosphate. Therefore, use of ammonium phosphates would not necessarily cause additional micronutrient problems.

While the Auburn studies pointed to possible problems from use of high analysis fertilizers, results also reveal how to use these materials satisfactorily. Steps to follow in using ammonium phosphate containing materials include: (1) to prevent germination and seedling injury to row crops, fertilizer should be placed 2 to 3 in. to the side and 2 to 3 in. below the seed; (2) soils should be limed according to soil test, preferably with dolomite limestone for soils low in magnesium; and (3) if fertilizers contain little or no sulfur, a planned program of sulfur additions will be needed for most sandy soils of the Southeast.

EFFECT OF 16 YEARS' USE OF MONOAMMONIUM PHOSPHATE AND CALCIUM PHOSPHATES ON YIELDS OF COTTON ON NORFOLK SANDY LOAM SOIL

Phosphorus source[1]	Limed[2]			Unlimed		
	Final soil pH	Seed cotton yield increase, av./acre		Final soil pH	Seed cotton yield increase, av./acre	
		First 4 years	Last 4 years		First 4 years	Last 4 years
		Lb.	*Lb.*		*Lb.*	*Lb.*
Monoammonium phosphate	5.6	71	252	5.0	62	—228
Monocalcium phosphate	5.6	149	394	5.1	120	42
Dicalcium phosphate	5.7	89	342	5.3	74	268
Superphosphate, ordinary	5.6	76	384	5.1	83	157

[1] Plots received 36 lb. N from ammonium sulfate, 60 lb. P_2O_5 from sources listed, and 24 lb. K_2O from potassium chloride.
[2] Limed to pH 6.5 at beginning of experiment.



Effects of ammonium phosphates on cotton roots are illustrated here by these comparisons (all got 60 lb. P_2O_5, but source varied). Compartments from right; 1—no fertilizer; 2—all from diammonium phosphate; 3—75% diammonium and 25% monoammonium; 4—50% from each; 5—25% diammonium and 75% monoammonium; and 6—all monoammonium phosphate.

Trend Toward Longer Life Has Social Implications

JOHN E. DUNKELBERGER, *Dept. of Agricultural Economics*

THE AVERAGE AMERICAN born in 1920 could expect to live about 60 years. A newborn infant in 1964 can expect to live 11 years longer – to about 71.

This trend toward longer life is a significant U.S. accomplishment. However, the growing number and proportion of aged people in the population have social implications. Many people reaching age 65 can look forward to many more active years. But occupational retirement at this age is becoming mandatory for more and more, forcing them to reorganize their lives.

Trend Toward Longer Life

A good indication of trends in life expectancy is the proportion of "senior citizens" (persons 65 or older) in the population. This is shown by the following census information:

Census year	*Percentage 65 and older*	
	U.S.	*Alabama*
1960	9.2	8.0
1950	8.1	6.5
1940	6.9	4.8
1930	5.5	3.8
1920	4.7	3.5
1910	4.3	3.1
1900	4.1	3.0
1890	3.8	2.8
1880	3.4	2.7
1870	3.0	unknown
1860	4.3	3.3
1850	4.1	3.0

Data for Alabama and the United States show similar trends. One slight difference is the lower proportion of aged persons in the State. One reason for this is the traditional value placed on large families by rural people. Until recently Alabama was predominently rural and this value was strong. Also, the migration of Alabamians to other states reduced the proportion of aged persons relative to children and teenagers.

Where Are Senior Citizens?

An important question concerning aging involves distribution of Alabama's senior citizens in various locations and types of residences. As shown by data in the table, the small, rural towns and villages of Alabama have the heaviest concentration of aged persons. Being of fewer than 2,500 inhabitants, these towns tend to reflect the rural values and customs of the surrounding countryside. Thus, they attract the retired farmer or farm widow who sells the family farm and moves to the local community to remain near family and friends. This occurs often enough to create a high proportion of senior citizens in these areas.

The proportion of senior citizens among small city residents and nonfarm persons in open-country areas of Alabama is highly similar. On the other hand, large cities and their suburbs have the smallest proportion of residents in the aged category. This is the result of heavy rural to urban migration, mostly young adults, and the rapid growth rate of these cities during the past few decades. Many of the migrating young adults move to the suburbs as soon as possible. This movement pattern has caused the suburbs to have the lowest proportion of senior citizens of all residence categories considered.

Many Aged Persons on Farms

Aside from small towns, there is a higher proportion of persons 65 or older living on farms than in any other residence classification. Since farming refers to an occupation, as well as a type of residence, it is obvious that age 65 has a different retirement meaning for farmers than for those in other occupations. Many farmers continue to operate their farms after reaching retirement age.

In some cases where retirement income is available, the farm operation is reduced to a level that supplements income but allows more leisure time. Under other circumstances, hired hands do the actual labor of farming with the aged farmer supplying managerial skill, land, and capital. In still other cases, particularly where there is no retirement income or the farm is too small to support hired labor, the aged operator continues full-time farming as long as his health permits.

Farming has a higher proportion of persons past retirement age still working than any other occupation. In 1960 there were more than 20,000 farm operators in Alabama of retirement age. This represented more than 17% of all farm operators in the State. Moreover, the median age of farm operators was 51 years as compared with 40 years for all male workers in Alabama. This indicates that age is a major factor in assessing the future of Alabama's farm enterprises.

Social Implications

An aging population has these major social implications:

(1) The aged person has different needs for goods and services, and is more conservative with his money.

(2) New pressures are created for specialized recreational, health, and welfare facilities for the growing aged population.

(3) Considerable political power is held by the senior citizens.

(4) Conservative attitudes of older persons are felt in the organizational and social life of a community, which can result in lost appeal for younger members of the community.

RESIDENCE OF ALABAMA'S "SENIOR CITIZENS," 1960

Residence	Total population	Population 65 years and older	
		Number	Percentage
Urban	1,791,721	131,832	7.4
Large cities, 10,000 or more	1,168,988	86,676	7.4
Suburbs (around large cities)	308,839	18,151	5.9
Small cities, 2,500-10,000	313,894	27,005	8.6
Rural	1,475,019	129,315	8.8
Small towns, 1,000-2,500	109,506	10,946	10.0
Open-country, nonfarm	962,658	81,795	8.5
Farm	402,855	36,574	9.1
State total	3,266,740	261,147	8.0

ANNUAL FLOWERING PLANTS for HOME LANDSCAPE

HENRY P. ORR and WILLIS C. MARTIN, JR.
Department of Horticulture

NEW ANNUAL FLOWERING PLANTS are now available for many landscape purposes. Plant breeders today are interested in larger flowers, new or clearer colors, different flower forms – all in the development of plants that best fit the gardener's needs. You may now obtain annuals to fit a seasonal need in window boxes, hanging baskets, porch boxes, urns, tubs, as edging, in mixed borders, and around patios, terraces and similar outdoor living areas.

If you buy your annuals from your local florist, nurseryman, or garden center, choose top quality plants. Younger plants that have not been forced too rapidly or have not begun to harden will usually give more satisfactory results. Plants should be properly labelled. Plan to buy or grow top quality plants and to continue them in good sustained growth.

Instead of buying plants after the danger of the last frost, you may wish to grow your own plants from seed. Generally, seed of annuals should be planted about 2½ months prior to the time the plants are desired for transplanting. Any well-drained but moist sterile soil mixture can be used. A mixture that has been successful in horticulture research at the Auburn University Agricultural Experiment Station consists of ½ screened peat moss and ½ sandy loam by volume.

Annuals by height and specific usage include *tall:* amaranthus, celosia, cleome, cosmos, datura, larkspur, marigolds (Crackerjack, Climax), ricinus (castor bean), scabiosa, snapdragons (rockets), zinnia (Gold Medal mixture, cactus flowers mixture and Lilliput mixture).

Medium: balsam, basil, celosia (medium cristata types such as Fireglow) coleus (Straight Color Mix), gaillardia, gomphrena, helichrysum, impatiens, nicotiana, pentstemon, petunias (F1 hybrid grandiflora and multiflora types), Rudbeckia (Gold Flame), salvia (St. John's Fire), snapdragons (Vacationland), and zinnia.

Low: ageratum, alyssum, (Carpet of Snow and Rosie O'Day), dwarf balsam, browallia, begonias, celosia (dwarf plumosa types such as Fiery Feather and dwarf cristata types such as Jewel Box, Golden Feather), dianthus (Bravo), gomphrena, impatiens, marigolds (Petite mix, Color Magic), phlox (Globe Mixture), salvia, snapdragons (Floral Carpet), torenia, verbena (Ideal Florist Strain), vinca, and zinnia.

Spreading or trailing: lantana, lobelia (Heavenly, and Crystal Palace), nierembergia, portulaca, and verbena.

For bedding: fibrous-rooted begonia, browallia, celosia, coleus, dianthus, impatiens (shade), lantana, lobelia (shade), marigold, nicotiana, petunias, phlox, salvia, torenia, and zinnia.

For mixed border: ageratum, alyssum, balsam, marigold, nicotiana, petunia, salvia, cleome, cosmos, lantana, snapdragon, and zinnia.

For edging: dwarf ageratum, alyssum, fibrous-rooted begonia, coleus, dianthus, lobelia, dwarf marigold, nierembergia, petunia, phlox, portulaca, torenia, verbena, vinca, and dwarf zinnia.

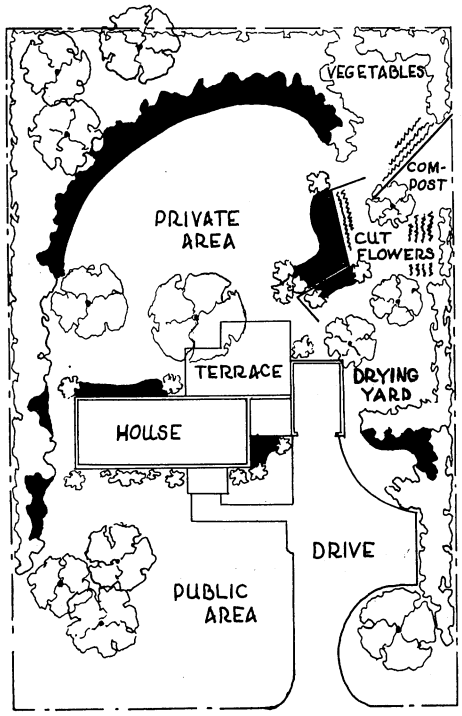
For ground covers: portulaca, sweet alyssum, and vinca.

For part shade: balsam, begonia, browallia, calendula, coleus, impatiens, lobelia, nicotiana, pansy, and torenia.

For window boxes: alyssum, begonia, coleus, lantana, lobelia, nierembergia, cascade petunias, and thunbergia.

For the rock garden: alyssum, candytuft, and verbena plus other ground covers.

For cutting: celosia, cosmos, gaillardia, gomphrena, marigold, petunias, salvia, scabiosa, snapdragons, verbena, and zinnia.



Darkened areas on chart show ideal locations for planting new annual flowering plants.

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