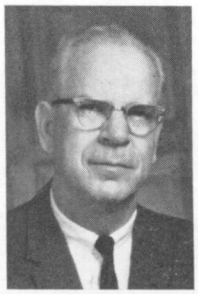
HIGHLIGHTS

of agricultural research

VOL. 19, NUMBER 2/SUMMER 1972

Agricultural Experiment Station
AUBURN UNIVERSITY

DIRECTOR'S COMMENTS



E. V. Smith

NEWSWRITERS use the symbol "30" to mark the end of an article. Perhaps they'll forgive me for taking the license to substitute "40" as I write my last "Director's Comments" for *Highlights*. Forty years ago last September 1, I returned to my alma mater to begin what was to be 40 years of uninterrupted employment as teacher, researcher, and administrator in Auburn's School of Agriculture-Agricultural Experiment Station.

As a teacher during my early years on the faculty, I came to know our students intimately. One of the greatest rewards of my job has been that of seeing our graduates become leaders in farming, forestry, agribusiness, science, education, natural resource development, and even politics.

As a researcher, I had the satisfaction of participating in two pioneering research programs. The hoe was the principal method for controlling weeds when George Fick, and later E. L. Mayton, and I began research on weed control during the early 1930's. There was no scientific information on the management of water for fish production when H. S. Swingle and I initiated the "farm ponds" project in 1934. Later, Auburn researchers have become recognized leaders in weed research while Swingle and his associates have gained worldwide recognition.

I gave up teaching and personal research for fulltime administration 28 years ago. Although I've had little contact with students and no time for personal research, these have been rewarding years. The reputations that many of our teachers enjoy as being among the best on campus, and the scientific achievements of our researchers, have been sources of great personal pride.

In the final analysis, the greatest reward from my life at Auburn has been the privilege of knowing so many fine people – students, faculty, alumni, dirt farmers, foresters, biologists, agricultural leaders, agribusinessmen, and many in fields far removed from agriculture. Although most of my associations have been with Alabama people, I have had the opportunity to know and work with scientists and agricultural administrators throughout the United States as well as some foreign countries.

In retrospect, the 40 years have passed quickly. Now, I am looking forward to retirement on June 30. I am grateful for the overwhelming support that the School of Agriculture-Agricultural Experiment Station have received from you, the people, during my 21 years as Dean and Director. I solicit your support for my successor.

"40"

look for these articles

may we introduce . . .

Dr. Rodrigo Rodriguez-Kabana, coauthor of the article on page 3, is Alumni Associate Professor in the Department of Botany and Microbiology. A native of Las Villas, Cuba, Dr. Rodriguez-Kabana received the B.S., M.S., and Ph.D. degrees from Louisiana State University. He has both teaching and research responsibilities at Auburn, and he has authored numerous scientific and popular articles on the relationship between nematodes and crop production. Dr. Rodriguez-Kabana's undergraduate major was agronomy and his graduate study was in plant pathology with special emphasis on nematodes. He was employed as a Research Assistant at LSU before coming to Auburn. Dr. Rodriguez-Kabana is a member of Phi Eta Sigma, Phi Kappa Phi, and Alpha Zeta. In recognition of his outstanding work, he was named Alumni Assistant Professor in 1970 and promoted to Associate rank in 1972. Dr. Rodriguez-Kabana became an American citizen in 1971.

HIGHLIGHTS of Agricultural Research

SUMMER 1972 VOL. 19, NO. 2

A quarterly report of research published by the Agricultural Experiment Station of Auburn University, Auburn, Alabama.

ON THE COVER. H. F. Yates stands between a treated and an untreated plot of soybeans as described on p. 3.

Response of Bragg Soybeans . . .

R. RODRIGUEZ-KABANA
Dept. of Botany and Microbiology

. . . to Commercial Nematicides

H. F. YATES
Gulf Coast Substation

THE SOYBEAN PLANT is a favorite host for a variety of plant parasitic nematodes. Prominent among these are root knot, cyst, lesion, spiral, and stubby root nematodes. Development of tolerant soybean varieties has helped to eliminate a major portion of the yield losses incurred by the use of nematode-susceptible varieties. However, the appearance of nematode races capable of attacking previously tolerant varieties has made it important to look for alternative methods of control. The use of nematicides on soybeans is not widespread in Alabama at present because it is believed that the increased benefits over that from the use of tolerant soybean varieties would not justify their cost. A study was designed to test the feasibility of using nematicides on soybeans in an effort to provide alternative or supplementary methods of control.

This experiment was conducted at the Gulf Coast Substation, Fairhope, in a field heavily infested with root knot nematode (*Meloidogyne incognita*). The field was divided into plots, each having four rows measuring 38 in. x 50 ft. The nematicides and rates (lb. active/A.) were: Dasanit 15G, 2 lb.; Nemacur 15G, 3 lb.; and Mocap 10G, 2 lb. These materials were broadcast and incorporated with rotary hoes. An additional Mocap 10G treatment of 2 lb./A. was included but was not incorporated. Nemagon was applied at ¾ gal./A., using chisels in the conventional manner, to represent the standard nematicide application. Each treatment and the control were replicated in four plots arranged in four randomized blocks. Bragg (tolerant) soybean was planted immediately after application of nematicides. The field received adequate rainfall within a week after planting. Samplings for nematode assessments were performed in July and September.

Nematodes present in these plots were root knot, meadow, spiral, and stubby root, with root knot occurring in significant numbers, see table. Results from the July sampling indicated that all nematicide treatments significantly reduced numbers of root knot larvae in soil below the number in control plots, but the differences among nematicide treatments were not significant. Root knot larvae in nematicide plots increased significantly from July to September until differences between treated and control plots were small at the final sampling. Significantly higher yields occurred in all nematicide treatments than in control plots, Figure 1.

TABLE 1. ROOT KNOT NEMATODE LARVAE IN SOIL OF SOYBEAN PLOTS TREATED WITH NEMATICIDES

Treatment		Sampling date	
		July	Sept.
Lb. active/A.		*No.*	*No.*
1. Control		2,896	3,223
2. Mocap 10G	2	67	2,735
3. Mocap 10G PR	2	52	1,200
4. Dasanit 15G	2	80	4,112
5. Nemacur 15G	3	102	2,513
6. Nemagon	¾ gal.	26	2,158

The lack of significant differences in root knot larvae counts between treatment and control at the September sampling was expected, since by that time most of the root system in the control plants had been destroyed and nematode populations had declined while in the nematicide plots the chemical was lost or degraded by September, probably resulting in a rapid increase in nematode numbers.

Yield data indicate that the increased soybean production in treated plots, as compared with untreated controls, justifies the use of nematicide where a nematode problem exists. This is particularly apparent when the cost of nematicide applied ($7-8/A. for 2 lb. active ingredient/A.) is compared with dollar returns, Figure 2. The figure does not include cost of application, which is assumed to be negligible since the material can be applied in conjunction with regular operations of soybean culture.

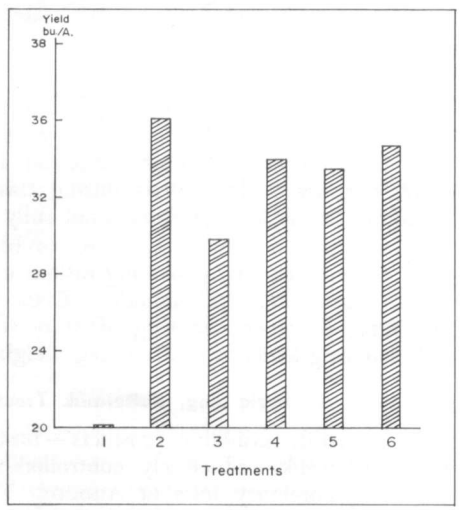


FIG. 1 Yield response of Bragg soybeans to nematicide treatments.

Research at present is being directed to determine the most efficient and economical way of applying nematicides on soybeans and to evaluate rates and methods of application to avoid increased cost.

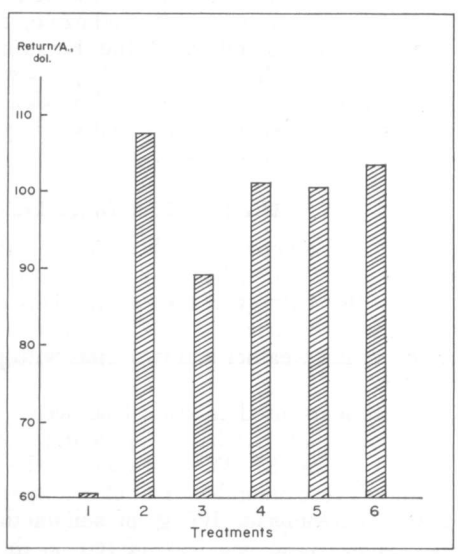
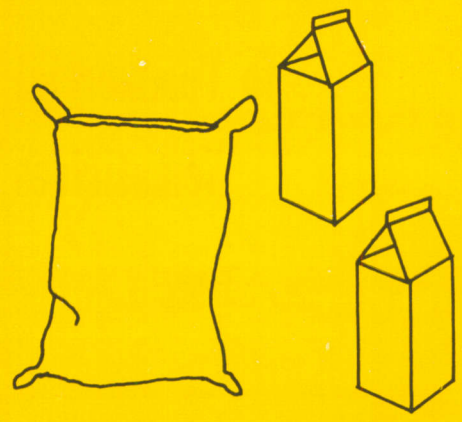


FIG. 2 Effect of nematicide treatment on dollar returns of Bragg soybeans.



Simple Methods for Controlling Common Scours in Pigs

C. D. SQUIERS, *Department of Animal and Dairy Sciences*
H. A. KJAR, *Dept. of Large Animal Surgery and Medicine, School of Veterinary Medicine*

COMMON SCOURS are often a problem among 2- to 8-week-old pigs, even in well managed operations. Passive immunity to coliform organisms, acquired from colostrum and milk, declines to low levels during this period, and active immunity to these organisms is not fully developed.

Most producers try to minimize trouble with scours during this critical period by providing rations containing high levels of antibiotics and sulfonamides. Even with these drugs in the feed, however, scouring often occurs. Unless checked, this scouring leads to reduced pig weights at 8 weeks old.

Basic Slag, Buttermilk Treatments

Two readily available products – basic slag and live-culture buttermilk – effectively controlled scours when fed to pigs in preliminary tests at Auburn. These products were tested with litters of pigs that had developed persistent types of diarrhea despite the presence of Aureo SP 250 in their rations. Basic slag was offered on the pen floor for free-choice consumption by the pigs. Buttermilk was given orally in the amount of 3 cc. per pig.

Both materials proved effective in stopping scours after one to three daily treatments. In fact, the basic slag treatment had to be stopped soon after diarrhea ceased. Continued feeding caused constipation of many pigs.

Because of these results, the use of basic slag in combination with aureomycin, sulfamethazine, and penicillin in the ration became standard at the Experiment Station's swine breeding research unit. Basic slag was supplied weekly to all pigs between the ages of 2 and 8 weeks, and more frequently to litters affected by scours. Satisfactory growth and control of diarrhea were obtained.

Effect Without Drugs Evaluated

It was not known whether either buttermilk or basic slag would control diarrhea and maintain normal growth when used without drugs in the ration. This question was investigated in five trials in 1970-71 – three with pigs farrowed in warm or hot weather and two trials with pigs farrowed during winter.

Treatments used in each trial were: (1) Aureo SP 250 plus basic slag, (2) basic slag, and (3) buttermilk. In treatment 1, Aureo SP 250 was used in the ration at the manufacturer's recommended level of 5 lb. per ton, which supplied 100 g. aureomycin, 100 g. of sulfamethazine, and 50 g. of penicillin. Basic slag was offered on the pen floor once per week and when pigs on this treatment had scours. Buttermilk was given orally (3 cc. per pig) to pigs on this treatment, once per week and when scours were present in individual litters. The buttermilk used had been pasteurized before culturing and contained living *S. Lactis* bacteria.

All treatments were begun when pigs were 2 weeks old and terminated at 8 weeks of age. Assignment of litters to treatments was determined by farrowing sequence, a particular treatment being given to every third litter in each of the five farrowing groups. Basal rations were the same for all pigs and supplied levels of protein, minerals, and vitamins equal to or above recommendations of National Research Council. Each litter was confined to an open-front pen with solid concrete floor.

Weights at 56 and 112 days are reported in the table, by individual tests and as a summary of the experiment. Although marked differences in pig growth were noted among trials, no consistent treatment effects were found.

Diarrhea was encountered in some litters in all trials. In every case, either basic slag or buttermilk was effective in correcting the scours.

EARLY GROWTH OF PIGS ON THREE TREATMENTS FOR SCOURS

Treatment	Number of pigs	56-day weight	112-day weight
	No.	*Lb.*	*Lb.*
Trial 1, June-July 1970			
Aureo S.P. 250 + basic slag	59	42.7	119.1
Basic slag	62	40.6	113.1
Buttermilk	66	38.7	106.1
Trial 2, August-September 1970			
Aureo S.P. 250 + basic slag	50	38.7	116.0
Basic slag	36	42.2	117.8
Buttermilk	42	37.0	112.1
Trial 3, November 1970-January 1971			
Aureo S.P. 250 + basic slag	44	48.7	134.6
Basic slag	31	53.9	141.6
Buttermilk	39	46.3	133.6
Trial 4, February-March 1971			
Aureo S.P. 250 + basic slag	77	45.3	138.6
Basic slag	71	46.8	136.9
Buttermilk	72	46.8	138.6
Trial 5, May-June 1971			
Aureo S.P. 250 + basic slag	70	40.1	110.6
Basic slag	60	39.5	106.0
Buttermilk	57	43.6	113.0
Summary, five trials[1]			
Aureo S.P. 250 + basic slag	300	43.0	123.5
Basic slag	260	43.9	121.9
Buttermilk	276	42.6	120.5

[1] Neither 56-day nor 112-day weights differed significantly among treatments.

Clover growth on March 11 as affected by normal rate of inoculation (left), double the normal rate (center), and inoculating and pelleting seed with calcium carbonate (right).

INOCULATION ESSENTIAL FOR PRODUCTION OF YUCHI ARROWLEAF CLOVER

R. H. WADE, *Lower Coastal Plain Substation*
C. S. HOVELAND and A. E. HILTBOLD, *Department of Agronomy and Soils*

WINTER PRODUCTION of high quality forage is a major asset of Yuchi arrowleaf clover. However, inadequate nodulation with resultant poor clover growth has been a serious problem when this crop is planted for the first time on many soils.

Results of Auburn experiments show that the inoculation problem can be largely overcome by (1) increasing amount of inoculum applied to seed, or (2) pelleting inoculated seed with powdered lime (calcium carbonate).

Field experiments were on Cahaba fine sandy loam at the Plant Breeding Unit, Tallassee, and Lucedale fine sandy loam at the Prattville Experiment Field. Both soils were at pH 6.7 and had not been planted with any clover for at least 10 years. Scarified clover seed were planted on prepared land in September, using treatments shown in the table. Plots with soil to be fumigated were treated under plastic covers with methyl bromide prior to planting.

Pelleting was accomplished by mixing commercial peat-base inoculum, water, methyl cellulose, and clover seed in proportion by weight, 0.4:3:1:5. After the mixture coated the seed, 20 parts powdered lime was added. Normal inoculation consisted of mixing inoculum and seed in proportion of 0.4:5 with a small amount of water for sticker immediately before planting.

Data in the table clearly show that the normal rate of inoculum was inadequate for rapid clover nodulation and maximum winter forage production. Increasing the inoculum rate, pelleting the seed, or fumigating the soil increased annual dry forage yields as much as 2,500 lb. per acre. Winter forage yields were increased threefold by pelleting inoculated seed with calcium carbonate.

FORAGE YIELD OF YUCHI ARROWLEAF CLOVER AS AFFECTED BY INOCULATION TREATMENT

Seed treatment	Dry forage yield per acre			
	Tallassee		Prattville	
	Mar. 11	Total	Apr. 5	Total
	Lb.	*Lb.*	*Lb.*	*Lb.*
Calcium carbonate pellet	870	6,690	1,520	5,360
3X normal inoculation rate	----	----	820	4,420
2X normal inoculation rate	680	6,160	----	----
Soil fumigation-normal inoculation rate	520	6,590	1,110	5,260
Normal inoculation rate	290	4,130	500	4,250
Not inoculated	80	4,700	230	4,430

Growth chamber experiments have shown increasing nodulation and growth of arrowleaf clover with added inoculum up to 5 times normal application. At the normal rate of inoculum, pelleting seed with lime markedly increased nodulation. In fumigated soil, however, this advantage disappeared and both normally inoculated and pelleted seed produced vigorous plants. Fumigation appears to eliminate or reduce soil microorganisms that inhibit the effectiveness of seed-borne inoculum.

Results of the Auburn investigations indicate that the normal rate of inoculum applied to seed is not adequate for nodulation and early growth on soils not previously in Yuchi clover. Responses to increased inoculum rates and adequacy of the normal rate on fumigated soil indicate antagonism or competition among applied and indigenous microorganisms prior to root infection and nodule formation. Pelleting the seed appears to preserve the viability or nodulating effectiveness of bacteria applied to the seed.

Growth of the clover fosters development of a large population of nodule bacteria in the soil so that inoculation in successive years is not usually a problem. In the first year, however, additional inoculum or seed pelleting is beneficial.

CHARACTERISTICS of ALABAMA'S POPULATION

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

PEOPLE ARE our most important resource. Together with capital and land, they provide the growing important ingredients of management and labor essential for production. People are also the source of demand, based on funds available to them, for the products and services produced. Numbers of people and their characteristics are of vital importance in our economic system.

Alabama's population is constantly changing. The 1970 Census of Population and certain other sources provide some insights into the characteristics and changes.

Total Alabama population increased 5.4% from 1960 to 1970. The absolute net increase was 177,425 people or a simple average increase of 17,742 people per year. The percentage increase was the lowest since that for the decennial period which ended in 1870. A major reason for the low percentage increase for 1970 was outmigration.

Thirteen other states of the U.S. were in the category of having less than 6% increase in population from 1960 to 1970. Average increase for the U.S. was 13.3%.

By counties the change in population varied considerably. Generally, counties in northern Alabama increased while those in central and southeastern Alabama decreased from 1960 to 1970, Table 1. With the exception of Etowah and Cherokee counties, all counties north of a horizontal line through Jefferson County increased in population for the 10 years ending in 1970. Black Belt counties generally registered the highest percentage declines. Dale and Madison counties were the only two counties to increase more than 50% in the last 10 years.

Jefferson, Mobile, and Montgomery counties with major metropolitan centers grew only slightly or, in the case of Montgomery, decreased 1% in total population. In certain cases counties surrounding these three counties grew substantially, thus a growing use of the term "bedroom county." It appears that this trend of living some distance away from place of work may continue.

A total of 32 counties in Alabama decreased in total population from 1960 to 1970 while 35 counties increased in population. Only 10 of the 35 counties that increased in population had increased greater than the national average (13.3%).

Urbanization

Alabama has become an increasingly urbanized State. In 1970, 58.4% of the total population was classified as urban. This meant living in a city of 2,500 or more population or in the metropolitan area of a city of 50,000 or more people. Between 1950 and 1960, Alabama's population reached the 50% mark in being urban. As recent as 1940, less than one in three persons in Alabama was classified as urban. The percentage urban population out of the total has more than doubled since 1930.

The 1970 percentage urban population varied from 88% for Jefferson to no urban population reported for the following counties: Bibb, Cherokee, Choctaw, Clay, Coosa, Crenshaw, Lamar, Lawrence, Lowndes, Washington, and Wilcox. In total, 50 counties were below 50% in urban population while 17 counties were above the 50% level in 1970.

White population as a percentage of the total increased from 1960 to 1970. This trend existed for previous decennial periods since 1900. White population was 73.6% of the total in 1970 compared with 54.7% in 1900.

By counties the percentage Negro and other races was above 50% in Bullock, Dallas, Greene, Hale, Lowndes, Macon, Marengo, Perry, Sumter, and Wilcox counties in 1970. Less than 10% Negro and other races were reported in Blount, Cherokee, Cleburne, Cullman, DeKalb, Franklin, Jackson, Marion, Marshall, Morgan, Walker, and Winston counties.

Age Distribution

The age distribution of Alabama's population is changing according to the 1970 Census data. In 1960 34% of our population was under 15 years of age, Table 2. In 1970, only 30% was under the age of 15. At the other end of the age distribution it is evident that a larger portion of the State's population is in the older age brackets. Almost 14% of the total population was above 60 years of age in 1970 compared to 11% in 1960.

Females continue to outnumber males in the State in a large measure because the life expectancy of females is somewhat greater. In 1960, females accounted for 51.3% of total population, little different from 51.8% for 1970.

In 1970 there were 1,034,113 households in Alabama, an increase of 17% over 1960. Average number of persons per household was 3.25 in 1970 and 3.62 in 1960. The rural population, as an average, had a somewhat greater number of persons per household than did the urban population. By counties, number of persons per household varied from 4.15 in Lowndes to 3.02 in Covington.

TABLE 1. PERCENTAGE CHANGE IN ALABAMA COUNTY POPULATION, 1960-1970

Increase		Decrease	
Autauga	30	Barbour	9
Baldwin	21	Bibb	4
Blount	6	Bullock	12
Calhoun	8	Butler	10
Clarke	4	Chambers	4
Clay	2	Cherokee	4
Cleburne	1	Chilton	2
Coffee	14	Choctaw	7
Colbert	7	Conecuh	12
Cullman	15	Coosa	1
Dale	70	Covington	4
DeKalb	1	Crenshaw	12
Elmore	10	Dallas	2
Escambia	4	Etowah	3
Fayette	1	Geneva	2
Franklin	9	Greene	22
Houston	12	Hale	19
Jackson	7	Henry	13
Jefferson	2	Lowndes	16
Lamar	0[1]	Macon	7
Lauderdale	11	Marengo	12
Lawrence	11	Monroe	7
Lee	23	Montgomery	1
Limestone	14	Perry	11
Madison	59	Pickens	7
Marion	9	Pike	4
Marshall	13	Randolph	6
Morgan	28	Russell	2
Mobile	1	Sumter	15
Shelby	18	Talladega	0[2]
St. Clair	10	Tallapoosa	3
Tuscaloosa	6	Wilcox	13
Walker	4		
Washington	6		
Winston	12		

[1] 0.4 per cent increase.
[2] 0.3 per cent decrease.

TABLE 2. AGE DISTRIBUTION OF ALABAMA'S POPULATION, 1960 AND 1970

Age group	Percentage of total	
	1960	1970
Under 5	12.0	9.0
5-9	11.3	10.0
10-14	10.7	10.7
15-19	8.6	9.9
20-24	6.3	8.0
25-34	12.2	12.0
35-44	12.3	11.1
45-54	11.1	10.7
55-59	4.4	5.0
60-64	3.3	4.3
65-74	5.2	6.0
75 and over	2.6	3.3
TOTAL	100.0	100.0

Sicklepod Competition and Control in Cotton

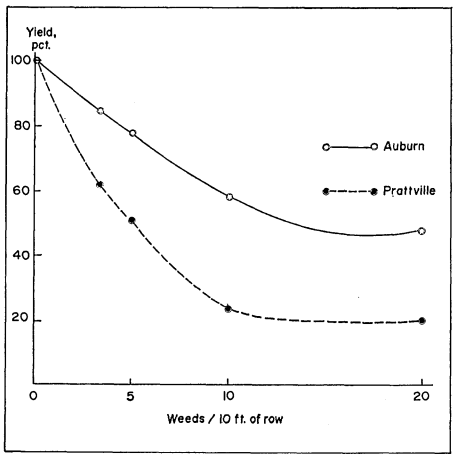
G. A. BUCHANAN, E. R. BURNS*, and R. D. McLAUGHLIN
Department of Agronomy and Soils

SICKLEPOD (*Cassia obtusifolia* L.) would make anyone's list of "Ten Worst Weeds of the South." It is a vigorous, non-nodulating legume that will often reach heights of 7 feet under good growing conditions. It produces an abundance of seed, most of which are hard. This ensures adequate seed infestation for years to come after a single successful seed crop. The relatively large size of seed permits germination at considerable depths in the soil – thereby further complicating control procedures with herbicides.

Previous research has shown that sicklepod will germinate and grow over a wide range of temperatures and, like most other tropical legumes, will make substantial growth on acid soils. Conversely, the weed is tolerant to pH levels as high as 8.0. Its response to soil fertility is similar to cotton. Consequently, all of these factors contribute to the success of sicklepod as a weed.

Because of its widespread occurrence in agronomic crops in Alabama, particularly cotton, studies were initiated in 1966 to document its competitiveness at specific densities. Experiments were conducted by the Auburn University Agricultural Experiment Station at Auburn (4 years) and at Prattville Experiment Field (2 years).

Cotton seed were planted in 40-in. rows to give a stand of 6 to 10 plants per ft. of row. Immediately following, sicklepod seed were planted in the cotton row at a rate of 20 to 30 seeds per ft. of row. After the cotton and sicklepod had emerged, the sicklepod plants were thinned to four densities, see table. These densities were maintained throughout growing season. All other weeds which emerged were hand removed. Each plot was 4 rows wide and 20 ft. long. Each sicklepod density was replicated four times. At the end of the season, the middle two rows of each plot were hand harvested. The yield of cotton in each test for each year was compared to its respective check, which was kept weed-free throughout the growing season.



Effect of sicklepod density on cotton yield.

Sicklepod grown with cotton at 1 weed per 3 ft. of row caused a reduction in cotton yield in 5 of 6 experiments. Yield reduction averaged 14% at Auburn and 38% at Prattville at this density, see figure. Each increase in sicklepod density caused a further loss in yield. Results from this study illustrate the extremely competitive nature of sicklepod in cotton. That sicklepod was more competitive with cotton at Prattville than at Auburn was clearly evident. Sicklepod seedlings were more vigorous at Prattville than at Auburn early in the growing season and were generally larger throughout the year.

Sicklepod need not be a problem in cotton. Herbicides such as fluometuron, diuron, and prometryne applied preemergence usually give effective control. Either of these herbicides followed by one of the arsenical herbicides – MSMA or DSMA – is particularly effective when applied postemergence to small (less than 2 in.) sicklepod plants.

Control of sicklepod is complicated by many factors. Its large seed enables it to germinate deep in the soil, often escaping the preemergence herbicide. Another unique feature of sicklepod is its ability to fold its leaves together, sometimes referred to as "being asleep." This often occurs at night or during periods of drought stress. When this occurs it is virtually impossible to effectively apply a postemergence herbicide treatment.

Treatment with a preemergence herbicide followed by one or more applications of MSMA or DSMA appears to be the most effective control program for sicklepod in cotton. Sicklepod seedlings need to be removed until the cotton has attained adequate size to effectively compete with sicklepod. When this is done, those sicklepod seedlings which escaped the preemergence and post-emergence herbicide applications will generally be small and have little or no effect on the total yield of cotton. On the other hand, if sicklepod seedlings are left uncontrolled early in the growing season, they will have a drastic effect on the yield of cotton as indicated by the results in these experiments. Effective control of sicklepod throughout the season costs money and requires labor; however, the alternative is much less desirable. Effective control of sicklepod means higher yields, greater profits, and less infestation of sicklepod for the following years.

* Former Graduate Assistant, now Extension Specialist, Weeds, Cooperative Extension Service.

EFFECT OF DENSITY OF SICKLEPOD PLANTS ON YIELD OF SEED COTTON

Weed density	Yield reduction[1]					
	Auburn				Prattville	
	1966	1967	1968	1969	1967	1968
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
1 weed/3 ft. of row	23	1	10	22	38	39
1 weed/2 ft. of row	33	18	14	20	51	47
1 weed/1 ft. of row	47	28	40	52	78	75
1 weed/6 in. of row	69	38	48	52	80	78

[1] Yields of weed-free cotton averaged 2,160 lb./A. at Auburn and 2,650 lb./A at Prattville.

Feral Dogs in East-Central Alabama

M. DOUGLAS SCOTT and M. KEITH CAUSEY, *Dept. of Zoology-Entomology*

Feral, or "wild", dogs have been accused of causing many problems in the Southeast. One author stated that the Georgia livestock industry suffered yearly losses of over $200,000 due to dogs killing swine, cattle, and sheep. Biologists from North Carolina, Virginia, and Georgia believe that dogs present a serious threat to deer and wild turkey populations. Cases of "wild" dog attacks on humans have also been reported.

A feral animal is any animal that is ordinarily domesticated but has reverted to the wild. The animal may have turned wild in its own lifetime, or it may be a descendant of individuals that turned wild.

Apparently, Alabama has its share of dog problems. Earl F. Kennamer, Extension Specialist in Wildlife at Auburn, reported that seven of nine county Extension chairmen responding to a mail questionnaire indicated that dogs were a problem. These answers, plus personal communications with residents of other counties in the State, indicate that feral dogs are widely regarded as a nuisance.

Studies of feral dogs in the past have been based on opinion questionnaires rather than scientific fact. A research project on their life history was conducted by the authors during 1969-71 to investigate whether or not feral dogs are actually a problem. Objectives of the study included determining where feral dogs lived, sizes of packs, travel of packs, food habits (including predation on livestock and deer), and danger of feral dogs to humans.

Dogs were studied in two areas of the State. One was a 4,000-acre enclosure maintained by the Alabama Army Ammunition Plant near Childersburg. The other was the 9,000-acre Saugahatchee Research Area, administered by the Cooperative Wildlife Research Unit at Auburn University.

Field studies quickly revealed that feral dogs were not easily distinguished from other types of dogs. Dogs that were not feral were classified in two categories: tame and free-ranging. Tame dogs spent most of their time at a home and usually were well cared for, while free-ranging dogs spent a large part of their lives roaming the woods and fields and only occasionally returned to a home for limited food and shelter. All three types of dogs were very shy of humans when encountered in the field. Consequently, just seeing a very shy dog without a collar did not necessarily mean it was truly wild. The best method of determining if a dog was truly feral was to follow it continuously with the aid of radio-telemetry equipment. Dogs suspected of being feral were trapped and equipped with a small battery-powered radio transmitter that emitted a signal which could be detected by a portable receiver. If a dog was tracked with this equipment and never found associated with humans, it was known to be feral.

Feral dog that was trapped and fitted with a radio transmitter so that his movements could be charted.

Three packs of feral dogs, ranging in size from two to five animals, were found on the Saugahatchee Research Area. Only one feral dog was located on the Childersburg area. Both areas had high numbers of tame and free-ranging dogs.

Feral dog packs did not travel randomly over the countryside but occupied definite living areas, known as home ranges, which varied from 1,100 to 2,600 acres in size. Dogs were most active at night, with the greatest movements occurring at dawn and dusk. The packs traveled from less than ½ to over 5 miles within their home range during a 24-hour period.

Visual observations and scat analyses indicated feral dogs were not preying on livestock or deer. Some of the foods eaten included garbage from nearby dumps, cottontail rabbits, mice, persimmons, and carrion.

Feral dog packs were approached and surprised over 40 times, and the dogs never tried to attack. Two females were even frightened away from their pups without attacking the interfering human.

Behavior of free-ranging dogs differed from feral dogs in that two of the several known packs of free-ranging dogs acted aggressively, but did not actually physically attack, when encountered in the woods. Also, feral dogs were never observed chasing livestock or deer, while free-ranging dogs were observed doing this. However, no animals were known to have been caught by the dogs.

It appears from this study that feral dogs may not be causing the problems for which they have been blamed. Free-ranging dogs, which were seen far more often during this study, may be the animals responsible for the majority of the problems. If so, the people with whom these dogs occasionally associate should be encouraged to keep the dogs tied or else have them humanely destroyed.

COSTS and RETURNS of Producing Grade A MILK in ALABAMA

SIDNEY C. BELL and JOHNNY W. JORDAN

Department of Agricultural Economics and Rural Sociology

OPERATING COSTS, returns, and investments required for producing Grade A milk and the effect of size of enterprise and efficiency on costs, returns, and investments is of vital interest to the dairyman.

A total of 75 dairymen participating in the Alabama DHI Program were interviewed to determine this relationship. Farmers taking part in the study were selected by stratified random sampling of all DHI Program members with the stratification being five different size groups based on number of cows in northern and southern Alabama.

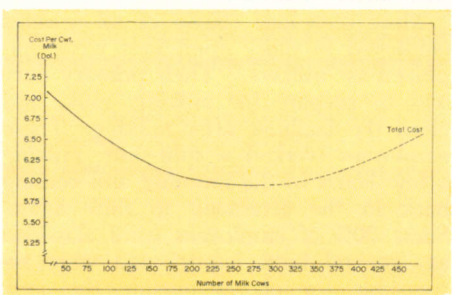
The average total cost per cwt. milk sold was $6.73. Feed cost (excluding pasture cost) averaged $2.82 per cwt. milk sold and accounted for 42% of total cost.

Average gross receipts per 100 lb. of milk sold were $7.51 with the average price received for milk per cwt. being $6.59. Gross receipts included change in inventory and the sale of cull cows, heifers, bulls, and calves. Average net return to land, labor, and management was $1.99 per cwt. milk sold. Average net return to land and management was $.71 per cwt. Total labor utilized per cwt. was .90 hr. with hired labor accounting for .55 hr. Average investment was $9.00 per cwt. with an average annual per cent return to investment (excluding land) of 14.7%.

AVERAGE COSTS AND RETURNS PER HUNDREDWEIGHT OF MILK SOLD, BY COST OF PRODUCTION, 75 DAIRY ENTERPRISES, ALABAMA, 1969

Item	Producer groups		
	Low cost	Middle cost	High cost
	Dol.	*Dol.*	*Dol.*
Gross receipts			
Milk sales	6.20	6.69	6.87
Livestock sales	.59	.58	.74
Inventory change	.31	.32	.19
Total	7.10	7.59	7.80
Costs			
Feed	2.34	2.91	3.20
Non-feed variable	1.25	1.54	1.84
Total fixed	.89	1.17	1.32
Total	4.48	5.62	6.36
Net returns			
Returns to land, labor, and management	2.62	1.97	1.44
Labor cost	.90	1.14	1.54
Returns to land and management	1.72	.83	—.10
Average investment[1]	7.53	9.16	10.29
Return to investment	2.20	1.38	.52
Per cent return to investment	29.2	15.1	5.0
No. of producers	25	25	25
Average 100 lb. of milk sold	17,246	15,861	11,793

[1] Average investment does not include land value.



Relationship between the unit cost of producing Grade A milk and size of enterprise for 75 dairy enterprises, Alabama, 1969.

The five size groups were used to determine if economies of size were present. Average total cost per cwt. of milk decreased at a decreasing rate as herd size increased. The average total cost was $7.42 for the smallest size group and $6.47 for the largest size group.

Non-feed variable, fixed, and labor cost decreased to some degree as herd size increased, but labor cost was the major factor that decreased as herd size increased. Feed cost was the largest single cost item for all size groups and accounted for a larger percentage of total cost as herd size increased.

The relationship between size of enterprise and cost of producing Grade A milk was estimated. Cost per cwt. decreased as size increased from 26 to about 300 cows, see figure. Beyond this herd size data were inadequate to determine an accurate estimate but the limited data indicated that costs per cwt. would probably increase for herds above 300 cows.

To determine why some producers were more efficient than others, data were divided into three producer groups based on cost of production. The average total costs for the low, middle, and high cost groups were $5.38, $6.76, and $7.90 per cwt. milk sold, respectively, see table.

The largest difference in cost among the three producer groups was the difference in feed cost. This was an indication that the low cost group had a better feed efficiency. Feed costs averaged $2.34, $2.91, and $3.20 per cwt. milk sold for the low, middle, and high cost producer groups, respectively.

The low, middle, and high cost groups had gross receipts of $7.10, $7.59, and $7.80 per cwt. milk sold, respectively. Net return to land, labor, and management ranged from $2.62 to $1.44 per cwt. milk sold for the low and high cost groups, respectively. The high cost group was the only group with a negative return to land and management.

Another measure of greater efficiency by the low cost group was the hours of labor utilized per cwt. milk sold. The low cost group used only .69 hr. of labor per cwt. milk sold while middle cost groups used .83 hr. and high cost group used 1.17 hr.

The differences in feed and labor efficiency were the major factors that contributed to a higher net return for the low cost producers. Based on this study improving these two factors should result in improving net returns.

DAIRY LABOR— A MAJOR PROBLEM IN ALABAMA

ROBERT C. KEEN and LOWELL E. WILSON
Department of Agricultural Economics and Rural Sociology

ALABAMA DAIRYMEN sold more than $58 million worth of milk in 1970. And the State's 700 dairymen paid out an estimated $8 million plus for labor. Of this $8 million, $5.5 million was for full-time hired help.

Finding and keeping dependable labor continues to be a major problem for Alabama dairy producers. The problem has been intensified by the lagging increase in farm wages as compared with non-farm pay, as well as by a decrease in the supply of farm labor.

A 1971 study of full-time hired dairy labor in Alabama described trends in the use of hired workers and factors affecting labor supply. In addition, the analysis pointed to management practices that help retain hired workers. Sixty of Alabama's larger dairy farms were selected for study, 23 each in northern and central regions and 14 in southern Alabama.

Dairymen interviewed were randomly selected in seven counties in which dairying was a leading enterprise. Characteristics of dairymen and laborers that were identified point to reasons for labor problems and should be helpful in overcoming the problems.

Average age of milk producers was 48 years, 2 years older than reported in a 1969 study. Dairymen in the southern and northern regions averaged 45 years of age; those in the Black Belt (central) averaged 54 years. Alabama dairymen in each region reported an average of 13 years of education.

Dairies in the southern region generally had been operating a shorter time, averaging 12 years as compared with 22 and 18 years, respectively, for central and northern Alabama. Dairymen reported an average of 4.6 persons per family, with 1.3 employed on the farm. In most cases the operator was included in the 1.3 average. Therefore, little family labor was used on these farms.

Average size of dairy farms was 669 acres, with 478 acres owned and 184 rented. Dairymen used 23% of this acreage to support non-dairy enterprises. Largest dairy farms were in southern Alabama, 755-acre average. Northern and central region dairy farms averaged 611 and 675 acres, respectively.

Based on herd size, farms tended to be larger in the Black Belt. Total number of cows on farms averaged 127 in that region, as compared with 106 and 101 for southern and northern regions. Average for the State was 112.

The 60 dairies surveyed employed a total of 151 full-time workers. The average worker was 39 years of age, had 7 years of formal education, and had been on his present job for 6 years. In the Black Belt, where a parallel study of other types of farming operations was conducted in 1971, average tenure was 9 years. Most studies indicate that tenure of dairy workers tends to be lower than on other farms.

More than half (62%) of all workers employed in dairy operations were employed as "milkers." Their primary duty was to prepare for milking, milk, and clean the facilities after milking. These employees worked a split-shift, milking a few hours in the morning and coming back in the afternoon to milk again. Some 30% of employees were classified as "general farm hands" and were responsible for chores outside the milk barn. Most dairymen preferred that "milkers" not get involved in general farm work.

Dairy employees worked an average of 48 hours per week with 1 day off. The operator or members of his family usually did the milking on employee off-days. Cash wages paid dairy employees averaged $1.49 per hour. Highest wages were paid in the southern region ($1.59) and lowest in the Black Belt ($1.43).

Most employees were paid on a weekly basis, but larger dairies usually paid by the hour. Dairymen employing larger numbers of people come under the Fair Labor Standards Amendment of 1966. Therefore, the trend toward larger dairies and more hired labor means that dairymen can expect to turn more and more to paying on an hourly basis.

Dairy employees received 24% ($92) of total monthly wages in perquisites. These benefits included Social Security payments, housing, milk, utilities, farm grown meats and vegetables, and various incentive and bonus plans. Most perquisites were furnished on a monthly basis, except bonus pay was usually paid once a year.

The problem of obtaining and retaining dairy labor is particularly crucial on dairy farms. Agricultural workers contend with longer hours and lower wages than workers in industry. This study showed that dairy employees earned an average of $348 in total monthly wages. In comparison, production workers in Alabama manufacturing industries in 1971 averaged $530 per month.

Continued growth and development of Alabama's dairy industry is dependent to a large degree on an adequate supply of full-time labor. The quality of farm labor and the capabilities of labor management are major determinants in achieving higher productivity per man hour, holding a good farm labor force, and competing with non-agricultural job opportunities.

CHARACTERISTICS OF 151 FULL-TIME HIRED EMPLOYEES ON ALABAMA DAIRY FARMS, BY REGION OF STATE, 1971

Characteristic	Southern region	Central region	Northern region	State total or average
Employees in sample, number	39	63	49	151
Employees age, years	39	38	40	39
Employees education, years	8	6	7	7
Average tenure, years	5	8	5	6
Job description, per cent				
Milker	54	70	57	62
General farm hand	38	22	35	30
Both	8	8	8	8
Hours worked per week	49	45	50	48
Days off per week	1	1	1	1
Hourly wage, dollars	1.59	1.43	1.49	1.49
Weekly cash wage, dollars	71.97	62.00	71.00	67.51
Monthly cash wage, dollars	312.00	269.00	307.00	292.00
Monthly perquisites, dollars	97.00	71.00	114.00	92.00
Total monthly wage, dollars	409.00	340.00	421.00	384.00

Rural Youth Need Help with Career Decisions

A. B. PRATT and J. E. DUNKELBERGER
Dept. of Agricultural Economics and Rural Sociology

COUNSELING SERVICES in rural high schools are often either inadequate or nonexistent. But the need for information and advice concerning occupational opportunities in agribusiness, industry, and the professions is especially acute among rural youth. Increasing the availability of employment information, job location and placement services, and occupational counseling is a pressing need. High school counseling, if adequately staffed, is one mechanism through which some of this need may be met in rural areas.

To what extent are counseling services available to high school students attending rural and small city schools in Alabama? Information relative to this question was provided from 1968 and 1972 surveys of 17 high schools in four northeastern counties. Principals were asked to provide information concerning the quality of the counseling program and to allow students to evaluate its helpfulness to them. Results of this survey should be of interest to parents, teachers, school administrators, and others concerned about rural young people.

Status of High School Counseling

Two schools had no specially trained counselor and offered no formal counseling services. Half of the remaining schools had teachers who used half or less of their time for counseling. The remaining schools employed full-time counselors. Generally, the larger schools had full-time counselors possessing specialized graduate training in counseling. The five smallest schools that provided counseling used teachers who lacked training in this area. Between 1968 and 1972 little up-grading of counseling programs had occurred in these rural schools. Two small schools had actually eliminated counseling.

Who Uses Counseling?

In 1968, slightly more than half of the students attending the 15 high schools offering some form of counseling program had used counseling services during the school year. This student use was not equally distributed among all schools. Students attending the larger high schools which staffed full-time, professional counselors made more use of counseling than did students attending smaller schools with part-time and often untrained counselors. Both boys and girls showed similar patterns of counseling use.

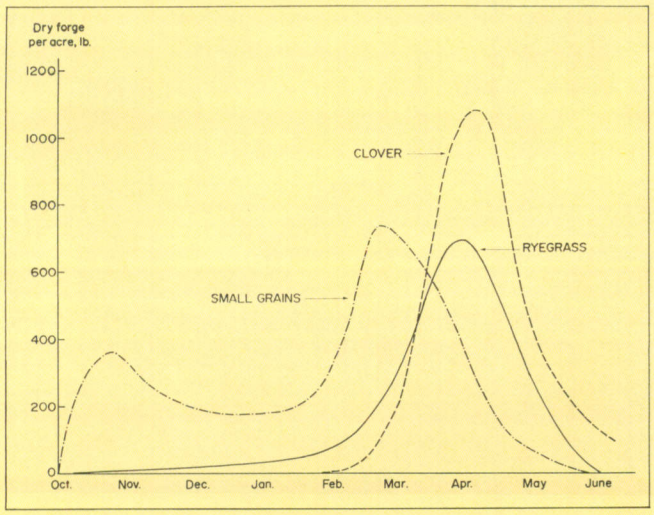
Differences that occurred were related to the student's course of study and desire to attend college. Middle and upper class students taking the academic curriculum were more likely to use counseling than were working class or farm youth pursuing a general or vocational curriculum. This was particularly true for students attending the larger high schools where a more varied choice of curriculums was offered.

Students living on farms were much less likely to use counseling than were either rural nonfarm or town residents. Only about half the farm youth had used counseling. Considering the fact that most farm youth will have to seek employment in nonfarm jobs and to move off the farm into towns or cities, it is reasonable to believe that they could benefit most from high school counseling programs. Counseling is needed in the smaller rural schools attended by a larger proportion of farm reared students just as much and perhaps more than it is needed in the larger more urban high schools.

Is Counseling Helpful?

Each student was asked to indicate the helpfulness of educational and occupational counseling services. The most helpful rating was awarded educational counseling. Over 85% of the students who had used it rated it helpful. Occupational counseling was rated helpful by 70% of those who had used it concerning their employment decisions. These data suggest that high school counselors placed greater emphasis on educational than on occupational counseling. More counseling emphasis related to skilled crafts and trades associated with nonfarm jobs is greatly needed by rural youth – particularly those students who felt they were not receiving any help from existing counseling programs.

Farm youth who took advantage of counseling were found to rate it very helpful to them in making their career plans. However, farm reared youth need to seek the assistance available through their high school counseling program. Farm youth and those nonfarm youth from the rural areas need professional assistance in learning about job opportunities. They need to orient their education, whether academic or vocational, to obtaining those skills that are salable in an urbanizing society.



Seasonal growth distribution of winter annual grasses and clover at the Lower Coastal Plain Substation is illustrated here.

How Much N for Winter Annual Legumes and Grasses?

C. C. KING, JR., *Dept. of Agronomy and Soils*
V. L. BROWN and JOHN RICHBURG[1], *Lower Coastal Plain Substation*

ONE OF THE BEST methods of getting economical gains with yearling beef cattle is to graze cool season winter annual legumes and grasses. How to best use such crops was the subject of 1969-71 tests at the Lower Coastal Plain Substation. Measurements made were (1) effects of nitrogen rates on several annual grasses with and without crimson or Yuchi arrowleaf clover, and (2) seasonal and total forage production.

Recommended varieties and seeding rates of oats, wheat, rye, ryegrass, crimson clover, and Yuchi clover were used in the combinations given in the table. Nitrogen rates and application schedules were: 50 lb. N per acre, all applied at planting; 100 and 200 lb. per acre, half applied at planting and the other in February. Lime, P, and K were applied according to soil test.

The 1969-70 test was planted in late September. There were two tests in 1970-71, one planted in mid-September and the other in mid-October. Small grains were planted in rows 1 ft. apart. Ryegrass or clover, or both, were broadcast uniformly over the plot in treatments including these crops. Harvests were made from a 32-in. swath cut from the center of each plot whenever plant height reached 6 to 8 in.

Total yields of the forage combinations as affected by nitrogen rates are presented in the table. Some comparisons that can be made between certain treatments are as follows:

1. Grasses alone, when fertilized with 100 and 200 lb. N per acre, produced 3,000 and 4,600 lb. dry matter (DM) per acre, respectively.

2. Grasses and clovers getting 50 and 100 lb. N produced 3,900 and 4,400 lb. DM per acre, respectively.

3. Both rye and ryegrass produced about 800 lb. DM per acre more than oats or wheat.

4. Adding ryegrass to wheat increased DM yield by 800 lb. per acre.

5. Adding crimson clover to oats, wheat, or rye increased DM 1,200 lb. per acre.

6. Rye + crimson produced about 800 lb. DM per acre more than oats + crimson or wheat + crimson.

7. Adding Yuchi clover to rye increased DM by 2,100 lb.

8. Rye + Yuchi yielded about 950 lb. DM per acre more than rye + crimson.

9. Rye + ryegrass + Yuchi produced about 900 lb. more DM per acre than rye + ryegrass + crimson.

10. Adding crimson to oats + ryegrass increased DM 1,000 lb. per acre.

11. Adding crimson to rye + ryegrass increased DM by 900 lb. per acre.

Practically all fall and winter production was from small grains, with peak growth occurring in March. Forage production from small grains tapered off in April and was completed in May. Ryegrass and the clovers produced little forage until March, peaked sharply in April, and declined rapidly in May. The clover yield in June was entirely from Yuchi.

As noted earlier, the grasses responded with about ¾ ton per acre yield increase when nitrogen was increased from 100 to 200 lb. On the average, the first two harvests (up to mid-February) from the 200-lb. N rate produced almost twice as much early forage as the 100-lb. rate. This earlier and greater total production would seem to justify using 200 lb. of N per acre for annual cool season grasses. However, this would not be true unless the forage from the last half of the season could be profitably utilized. A more practical approach might be to use 100 lb. N in the fall and 50 lb. per acre in February.

The data are less conclusive about the best rate of N when crimson or Yuchi was grown with the grass. Generally, 50 lb. per acre in the fall seemed adequate. Using another 50 lb. in February resulted in only about 500 lb. of additional forage. However, in the one instance where 200 lb. of N was applied to rye + ryegrass + crimson clover, a ¾-ton yield increase was obtained over production from the 100-lb. N rate. This is the same type response as with grass.

FORAGE YIELDS OF WINTER ANNUAL GRASS AND LEGUME COMBINATIONS AS AFFECTED BY NITROGEN RATE, LOWER COASTAL PLAIN SUBSTATION, 1969-71[1]

Pasture combination	Dry matter/acre, by N rate			
	0	50	100	200
	Lb.	*Lb.*	*Lb.*	*Lb.*
Oats	-----	-----	2,500	3,900
Wheat	-----	-----	2,700	3,700
Rye	1,000	-----	3,300	4,800
Ryegrass	-----	-----	3,100	5,100
Oats + ryegrass	-----	-----	3,000	4,500
Wheat + ryegrass	-----	-----	3,300	4,800
Rye + ryegrass	1,500	-----	3,200	5,600
Oats + crimson	-----	3,200	3,600	-----
Wheat + crimson	-----	3,400	3,900	-----
Rye + crimson	3,400	4,100	4,600	-----
Rye + Yuchi	-----	5,200	5,400	-----
Ryegrass + crimson	-----	3,800	4,000	-----
Oats + ryegrass + crimson	-----	3,400	4,000	-----
Wheat + ryegrass + crimson	-----	3,500	4,000	-----
Rye + ryegrass + crimson	3,000	-----	4,500	6,000
Rye + ryegrass + Yuchi	-----	4,500	5,400	-----

[1] Average of three tests. Planting dates: late September 1969, mid-September 1970, and mid-October 1970.

[1] Resigned.

Ground Beef Quality, Price Affect Consumer Preference

J. R. WAITE, D. L. HUFFMAN, and J. R. ADAMS, *Dept. of Animal and Dairy Sciences*

GROUND BEEF is the most popular fresh meat item among food shoppers. Despite its popularity, however, there is considerable confusion among shoppers as to what type of ground beef represents the best buy.

Ground chuck was found to be the preferred ground beef product in a recent Auburn study that evaluated four types of ground beef and measured consumer preferences. Composition and acceptability were measured with ground round, ground chuck, pre-packaged ground beef (made of beef trimmings and boneless cow meat in the central warehouse), and store-ground beef (made of beef trimmings in the store). Ground chuck, round, and store-ground beef were from Choice beef. Moisture and fat content of uncooked ground beef were determined with accepted methods of analysis and protein content was estimated by difference.

Patties were made, weighed, broiled to medium-well (165° F.), drained on absorbent paper, and reweighed to determine shrink. The patties were rated by a trained, six-member panel. Results are given in the table.

Consumer Evaluation of Products

All samples were subjected to consumer evaluation (visual preference), taste panel, and chemical analysis. In the visual preference test, 17 panelists were first asked to rank 1-lb. packages of ground beef (covered with clear plastic film) for general appearance. Price was not shown on the package. In the second test, prices were on packages and panelists were asked to rank the four types considering price as well as color and appearance.

Chemical analysis showed ground round was the leanest product (4.2% fat) and was highest in both moisture (74.3%) and protein (20.4%). Moisture level was considerably higher than in other types of ground beef since fat contains little moisture. Some of this moisture would likely be lost during freezing and thawing in normal home use of ground round. In this study, cooking shrink of ground round reflects primarily loss of moisture rather than loss of fat as in other types of ground beef.

Ground Chuck Most Pleasing

Ground chuck's composition of 63.7% moisture, 16.9% fat, and 18.4% protein is the preferred combination, according to findings in a large consumer acceptance study completed recently at Auburn.

Ground beef (hamburger) prepared in the store had similar fat content of that prepared in the central warehouse. Typical hamburger available in the supermarket is formulated to contain approximately 20% visible fat and less than 30% fat on a chemical basis. Moisture percentage was lower in both hamburger samples because fat content was higher and fat contains little moisture.

Cooking shrink is of major concern to the homemaker, and this ranged from 41.6% for store-ground beef to 26.0% for ground round. This shrink is a reflection of loss of moisture as well as fat. There was little difference in cooking shrink between ground round and ground chuck even though ground chuck contained about 12% more fat; therefore, ground round may lose acceptability because of moisture loss.

Taste panel evaluation for overall acceptability and juiciness was nearly identical for pre-packaged ground beef, ground chuck, and ground round. There was a marked decrease in acceptability for store-ground beef because: (1) excessive cooking shrink (41.6%) left this product with undesirable textural properties; and (2) trimmings at the store level may not always be as fresh as those used in other types of ground beef, and this could result in less desirable flavor of store-ground beef.

That color of lean and ratio of fat to lean are major determinants of fresh meat quality when price is not a factor was verified by panelists. When four types of ground beef were ranked with no price attached, ground chuck was ranked best, followed by ground round, pre-packaged ground beef, and store-ground beef. It was interesting to note that panelists preferred ground chuck containing some fat rather than the nearly fat-free appearance of ground round. Store-ground beef had inferior appearance because of lack of freshness with resultant discoloration.

Price Didn't Change Preference

Even when price was a factor, the panel still preferred the higher priced ground chuck. Pre-packaged ground beef rated higher than store-ground beef because of superior appearance and slightly lower cost. Ground round was least desired, presumably because of higher price.

This study clearly shows that ground chuck is the preferred ground beef product. It contained approximately 17% fat, was bright cherry red, and moderately priced.

EVALUATION OF GROUND BEEF

Type of ground beef	Moisture	Fat	Protein	Cooking shrink	Panel acceptability 1-9 scale	Juiciness 1-9 scale	Ranking, no price	Ranking by price	
								Price/lb.	Rank
	Pct.	*Pct.*	*Pct.*	*Pct.*				*Dol.*	
Store-ground	56.0	27.6	15.4	41.6	4.0	5.7	4	0.69	3
Pre-packaged	54.2	28.8	16.0	35.9	6.0	6.3	3	.67	2
Ground chuck	63.7	16.9	18.4	28.8	6.0	6.3	1	.89	1
Ground round	74.3	4.2	20.4	26.0	6.3	6.3	2	1.19	4

VIRUS-INFECTED CORN and SORGHUM more SUSCEPTIBLE to FUNGAL ATTACK

S. P. S. BENIWAL and ROBERT GUDAUSKAS
Department of Botany and Microbiology

MAIZE DWARF MOSAIC is an important disease of corn and sorghum in Alabama and is caused by the maize dwarf mosaic virus (MDMV).

Development of resistant varieties offers most promise for control of the disease. The Agricultural Experiment Station has been engaged in screening corn and sorghum hybrids for MDMV susceptibility for several years.

While conducting tests for virus resistance in grain sorghum on the Upper Coastal Plain Substation in 1970, it was observed that some plants previously inoculated with MDMV developed large, conspicuous necrotic lesions, Figure 1. Healthy plants, not inoculated with MDMV, showed only tiny necrotic lesions. Isolations from both types of lesions consistently yielded a fungus which was identified as *Helminthosporium maydis* Race T, causal agent of the southern corn leaf blight epiphytotic of 1970.

These field observations indicated that MDMV-infected sorghum plants were more susceptible, or predisposed, to attack by *H. maydis*. Tests were conducted in the laboratory, greenhouse, and controlled environment chamber to define this apparent predisposition and to determine whether this phenomenon occurs in corn.

Experimental procedures used for sorghum and corn were similar. Half of a group of healthy seedlings were inoculated with MDMV, and the remaining half left uninoculated. Ten to 15 days later, when symptoms were apparent on MDMV-infected plants, all plants were inoculated with *H. maydis*. This was accomplished by spraying the plants with a suspension of *H. maydis* spores. Plants were placed in a moist chamber to promote infection by the fungus. Following sufficient time for fungus infection to occur, the plants were analyzed by standard methods to determine if those infected by the virus showed any evidence of change in susceptibility to the fungus.

Five of 16 sorghum hybrids tested were more susceptible to the fungus when they were also infected with MDMV than when not infected by the virus. This increased susceptibility was indicated by the facts that MDMV-infected plants after inoculation with *H. maydis*: (1) developed more and larger *H. maydis* lesions, typical of those observed in the field, Figure 1; (2) supported more rapid and abundant sporulation of *H. maydis;* (3) and contained larger amounts of pathotoxin than did non-MDMV-infected plants. Pathotoxin is a substance produced by *H. maydis* that is responsible for much of the symptoms associated with *H. maydis* infection. In addition, when pathotoxin produced in artificial culture was sprayed onto plants, only those that were infected with MDMV developed lesions typical of *H. maydis* infection.

Five corn hybrids each of N- and T-cytoplasm types were tested (T-cytoplasm types are very susceptible to *H. maydis* Race T; N-cytoplasm types are resistant). Regardless of hybrid or cytoplasm type, corn was more susceptible to *H. maydis* when plants were also infected with MDMV. Such plants developed larger *H. maydis* lesions with more rapid and abundant sporulation, Figure 2, than did plants of the same hybrid and cytoplasm type that were not infected with the virus. As with sorghum, greater amounts of pathotoxin were produced by *H. maydis* in MDMV-infected corn than in non-MDMV-infected plants.

Results of this study established that some corn and sorghum hybrids are more susceptible or predisposed to attack by *H. maydis* when the plants are infected with MDMV. A recent report from the Midwest has indicated that MDMV also predisposes corn to fungi that cause root rots. The mechanism(s) by which MDMV alters susceptibility of corn to *H. maydis* and other fungi is unknown. However, it is known that infection by the virus causes many physiological and cytological changes in plants; some of these could be involved.

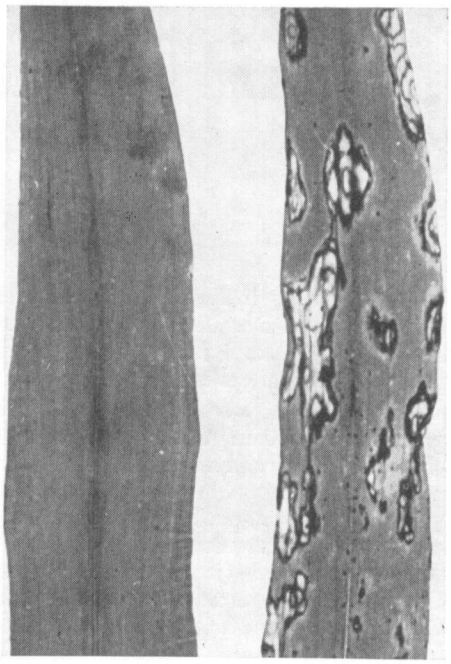


FIG. 1. H. maydis lesions on healthy (left) and MDMV-infected (right) sorghum.

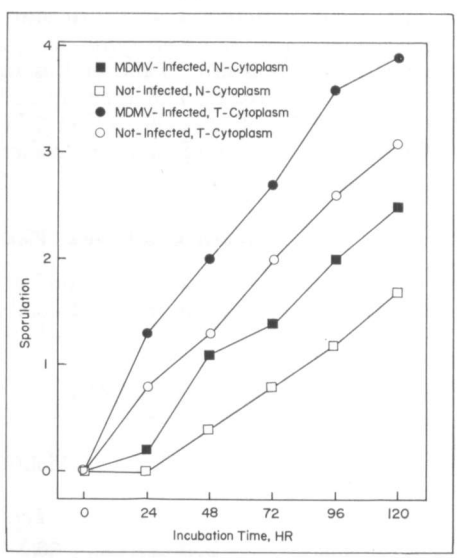


FIG. 2. Sporulation of H. maydis in lesions on MDMV-infected and non-MDMV-infected corn seedlings of the same hybrid type.

HOMEMAKER PREFERENCE for FOOD INFORMATION SOURCES

RUTH A. HAMMETT
Department of Agricultural Economics and Rural Sociology

THE AVERAGE HOMEMAKER spends much of her time, energy, and family income with food selection, preparation, service, and cleanup.

Thousands of Alabama urban homemakers have expressed opinions through a study on buying behavior about preferred sources of food information. These women comprised three groups: the active seeker of specific information, those satisfied with current practices, and the uninterested.

The greater numbers of women were open to suggestions, but action was improbable without need-motivation. To be used, food information must appeal to the active seeker with a problem, such as weight control, poor eaters, pathological conditions, income pressures, or interest in exotic food preparation. Answers to some of these problems may be found in magazines, government publications, clinics, the Expanded Food and Nutrition Programs, or clubs or groups of persons with similar interests.

Over the years, homemakers accumulate a vast store of knowledge by hit and miss methods against which is measured the appeal in new information. For most women, experience is the most important information source for day-to-day situations. In one study, respondents were given a list of situations involving food together with a list of possible avenues for advice.

More than half the homemakers relied on their own experience in planning a child's menu for a day, in preparing a guest meal in which prestige was important, in making up the refreshment list for a woman's group, or the contribution for a covered dish supper. When small groups were concerned, the cookbook was the second most used source.

In the preparation of an unfamiliar meat, the cookbook was most important. The man behind the meat counter would give advice on the amount of rump roast needed to serve 12 people. If placed in charge of a church supper for 200 persons, the chairman who had the previous assignment or the professional home economist would be consulted.

Recipes are an important tool in the changing of food habits. Millions of dollars are spent in bringing glamorous recipes for product use to the attention of homemakers. Drawers overflow with clippings, but the recipe that is used most often comes from a friend or relative, with or without a sample. The most used recipes are for desserts or complicated dishes. Recipe swappers were usually homemakers in their 30's or 40's with 12 or more years of education, moderate size families, and incomes sufficient for some freedom in food selection. The young, the old, the poor, the Negro, and the small family were poor targets for most recipes.

Homemakers said they preferred to get food information in newspapers and magazines, or in other printed sources such as cookbooks. Such items could be read at leisure, were often illustrated, and were in a form convenient to clip and store. However, studies showed that a fifth of those interviewed would not have access to a newspaper. Magazines with food articles were most popular in middle and upper class white families.

The major newspaper reader was the affluent, white, middle-aged woman with a small family. A survey of food sections in large city newspapers revealed that coupons, prizes, and prices were the major information offered. Food information placed in newspapers in two cities showed that those most in need of its use did not see, read, or remember the items.

When facts about poultry were placed on the radio or in store displays, the homemaker who recalled one or more items was most often the woman with above average income and education. She appeared to be reinforcing previous knowledge, as she mentioned that broilers were an economical protein source useful at all meal and snack times.

However, the information source used by homemakers in actual purchases was of most value to the food marketing system. In a statewide sample of urban homemakers, more than half had been influenced to buy a specific food because of information, usually recipes, on food containers, requests of family members, and food store advertisements in newspapers.

More than a third of the women bought a particular food because they heard about it from friends or relatives, needed it for a recipe in a cookbook, or saw it in a quickie recipe on television. About a fourth of the respondents bought a food because of a sample tasted in the store, food articles in magazines, and store displays. Lesser influences were the food section in the newspaper, food advertisements on the radio, single food advertisements in newspapers, and cooking demonstrations on television.

Current concern about rising food prices, the prevalence of poor food habits at all income levels, the popularity of snack foods, and the increase in purchased meals make consumer and nutrition education necessary for all persons. To be effective, factual food information should be available in a readily usable form at the time of need. Existing media can be vital links in consumer education when trained personnel provide unbiased food facts backed by competent research.

Controlling Traffic Increases Cotton Yields

W. T. DUMAS and F. A. KUMMER, *Department of Agricultural Engineering*
L. A. SMITH, *AERD, ARS, USDA*

THERE ARE many tillage systems used in the United States today, but the most prevalent for row crop production in the Southeast is to plow with a moldboard plow, disk harrow two or more times, and plant.

The common practice of pulling the moldboard plow with one rear wheel of the tractor in the furrow often develops a hard plow pan. Dropping one wheel in the furrow places almost half the weight of the entire tractor on this wheel. In some cases, for large tractors, this amounts to as much as 4 tons. Also, this wheel is often operating on soil having a moisture level ideal for compaction so it often compresses the soil in the bottom of the furrow to densities great enough to restrict moisture movement and root growth.

During harrowing, the equipment is operated at random, without regard to row location, across the loosely plowed soil. This prepares the soil surface for easy planting and good seed emergence, but much of the root bed is compacted sufficiently to restrict root growth.

After the crop is planted, sprayed for weed and insect control, cultivated, and harvested, most of the interrow area will have been trafficked and 70% or more of the soil surface recompacted. This restricts root development and increases water runoff and soil erosion.

The Agricultural Experiment Station in cooperation with USDA is conducting a study on the effects of tractor wheel traffic on cotton production. The experiment, which is being conducted at the Agricultural Engineering Research Unit on a Norfolk sandy loam soil, consists of the following treatments:

1. Controlled traffic using a four-wheel tractor and sprayer with front and rear wheels spaced 120 in.
2. Normal traffic using a tricycle tractor with rear wheels spaced 80 in. No sprayer traffic on this treatment.
3. Normal traffic plus sprayer traffic using a tricycle tractor with rear wheels spaced 80 in. and a tricycle high-clearance sprayer with rear wheels spaced 80 in.

PER ACRE YIELD OF SEED COTTON FROM DIFFERENT TRAFFIC CONDITIONS

Treatment	1969	1970	1971	Avg.
	Lb.	*Lb.*	*Lb.*	*Lb.*
1. Controlled traffic	3,305	3,715	3,649	3,556
2. Tractor traffic	2,708	3,276	3,329	3,104
3. Tractor & sprayer	.....	2,985	2,862	2,923

Note: This project is a cooperative effort with the National Tillage Machinery Laboratory, ARS, USDA.

To eliminate the effects of primary tillage traffic, the tillage prior to planting, for all treatments, was performed with the wide wheel tractor and consisted of chiseling, rotary tilling, and bedding. The chiseling was performed with a 10-chisel plow covering a width of 80 in. and a depth of 18 in. An 80-in. rotary tiller, tilling 6 in. deep, followed the chisel plow. All plots were then bedded with a two-row disk bedder.

The plots were planted in 40-in. rows in a 2 and 1 skip row pattern. The 40-in. skips between pairs of rows were not tilled and served as permanent traffic lanes in the controlled traffic treatment.

Yield data, see table, show that cotton yields can be increased by controlling traffic. The average yield from the controlled traffic plots, treatment 1, was 452 lb. of seed cotton per acre more than the tractor trafficked plots, treatment 2, and 633 lb. per acre more than the tractor plus sprayer trafficked plots, treatment 3.

In addition to yield data, soil strength, moisture utilization, and plant growth data emphasized the importance of avoiding compaction from tractor wheel traffic.

AGRICULTURAL EXPERIMENT STATION
AUBURN UNIVERSITY
AUBURN, ALABAMA 36830
E. V. Smith, Director
PUBLICATION—Highlights of
Agricultural Research 6/72 10M

POSTAGE PAID
U.S. DEPARTMENT OF
AGRICULTURE

U.S.MAIL