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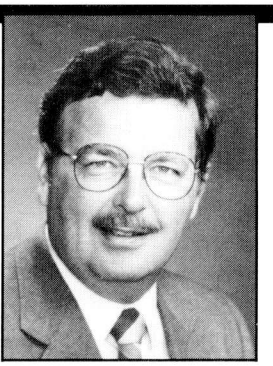
Alabama Agricultural Experiment Station Auburn University
Lowell T. Frobish, Director Auburn University, Alabama

HIGHLIGHTS

OF AGRICULTURAL RESEARCH

DIRECTOR'S COMMENTS



LOWELL T. FROBISH

Problems facing Alabama producers of food and fiber are more complex today than ever before. In years past, we were concerned primarily with producing products to feed and clothe the population. Today the same goal is present, but the road to achieve this goal is filled with many speed bumps that slow us down. Today's business-oriented agriculture is concerned with generating a return to support a quality life style. At the same time, our concern for conservation of natural resources and preservation of the environment requires careful integration of production practice with existing regulations. Research in one area sometimes provides answers that cause problems in other areas, so we at the Experiment Station must consider all implications of our research.

To help alleviate agricultural problems, there is a renewed interest into a systems approach in our research. Teams of scientists are working together to solve today's production problems while protecting and improving the environment. Extension specialists are more involved in identifying problems and helping the basic and applied scientists in developing research programs to solve the problems. The research teams include botanists, plant and animal pathologists, soil and animal scientists, weed scientists, social scientists.....and the list could go on and on. It is through a team approach that we will be able to continue to assist in the production of food and fiber in Alabama.

You, the producer and consumer, are an integral part of this research team. Your comments help to establish our research program, your support and assistance assist in obtaining research funds, and your generous enthusiasm for Alabama sustains us. The latter is evident many times in the research gifts that are provided to the faculty. Recently, our program in sport fisheries research was given a tremendous boost with the dedication of the William R. Ireland Fisheries Research Laboratory. With the aid of Mr. Ireland's gift and some additional assistance, this laboratory strengthens an existing fisheries and aquaculture program that is recognized around the world. We thank Mr. Ireland for his contribution.

Many other organizations contribute to our research programs through check-off funds, direct grants, and other support. This clearly exemplifies the true team approach. On behalf of all the scientists associated with the Alabama Agricultural Experiment Station, we say "Thank You."

MAY WE INTRODUCE

Dr. David Bransby, Associate Professor of Agronomy and Soils. A native of Pietermaritzburg, South Africa, Bransby came to Auburn in 1987 where he has focused his research efforts on livestock and forage management.

Bransby earned his B.S. degree in grassland science from the University of Natal in South Africa before coming to the United States to earn his M.S. in agronomy from the University of Missouri-Columbia. He then returned to the University of Natal to earn the Ph.D. in grassland science and also earned a post graduate diploma in marketing research and advertising from the University of South Africa.

Bransby taught and conducted research at the University of Natal from 1975 to 1987 where he earned the rank of senior lecturer, similar to a professor's rank in the United States. He also spent a 1-year sabbatical at Texas Tech in 1984.

His studies at Auburn have helped identify optimal grazing management methods for fungus-infected fescue and have explored the many facets of rotational versus continuous grazing. He reports on the possible benefits and difficulties of a rotational grazing system on page 3 of this issue of Highlights.

ON THE COVER. Wildflowers similar to these growing near Mobile promise to beautify Alabama's roadways. See story on page 4.

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D.I. BRANSBY, D.D. KEE, and W.H. GREGORY

INTENSIVE ROTATIONAL GRAZING NOT ALWAYS BENEFICIAL

A 2-YEAR GRAZING experiment on winter annual pasture showed that intensive (10-paddock) rotational grazing in spring did not provide higher animal gains than traditional continuous grazing. This is in stark contrast to many recent claims that intensive, controlled grazing increases carrying capacity and animal gains when compared to traditional methods of grazing.

In September of 1987 and 1988, pastures were planted with a mixture of Marshall ryegrass (25 lb. per acre), Bonel rye (45 lb. per acre), and McNair 1003 wheat (45 lb. per acre) at the E.V. Smith Research Center of the Alabama Agricultural Experiment Station in Shorter. Nitrogen was applied as ammonium nitrate at a rate of 100 lb. per acre at planting and 60 lb. per acre in early March. Soil test results were used to correct levels of phosphorus and potassium prior to planting. Good stands were established both years and pastures were lightly grazed in late fall and winter prior to the start of the experiment.

In February of both years, 625-lb. steers were assigned either to continuous grazing (no subdivision) or rotational grazing which involved grazing each of 10 subdivisions for 2-3 days at a time. Both continuous and rotational grazing were conducted at four stocking rates: 1.0, 2.0, 3.0, and 3.7 steers per acre. Grazing continued for an average of 84 days, and average daily gain (ADG) was computed from beginning and ending weights of steers for all treatments.

Steer ADG and gain per acre were higher for continuous grazing at light to moderate stocking rates, but slightly lower at moderate to high stocking rates, see table. However, this difference was small and the data in the table show that choice of stocking rate is more important than the choice of rotational or continuous grazing. A stocking rate of about 2.5 steers per acre would probably have been optimal, providing a reasonable compromise between maximum gain per animal and maximum gain per acre.

Results of this study emphasize that rotational grazing, which is a labor intensive system, cannot be justified for all situations and is unlikely to provide significantly higher gains than continuous grazing except under specific pasture conditions. Rotational grazing may be most beneficial when dealing with pasture species such as alfalfa which do not withstand continuous grazing or when animal selection in multispecies pastures needs to be controlled. It may also be beneficial during periods of limited or curtailed pasture growth, such as drought or cold weather, when rotational grazing could more efficiently ration accumulated forage or when pastures are irrigated with animal wastewater which makes pastures temporarily unpalatable.

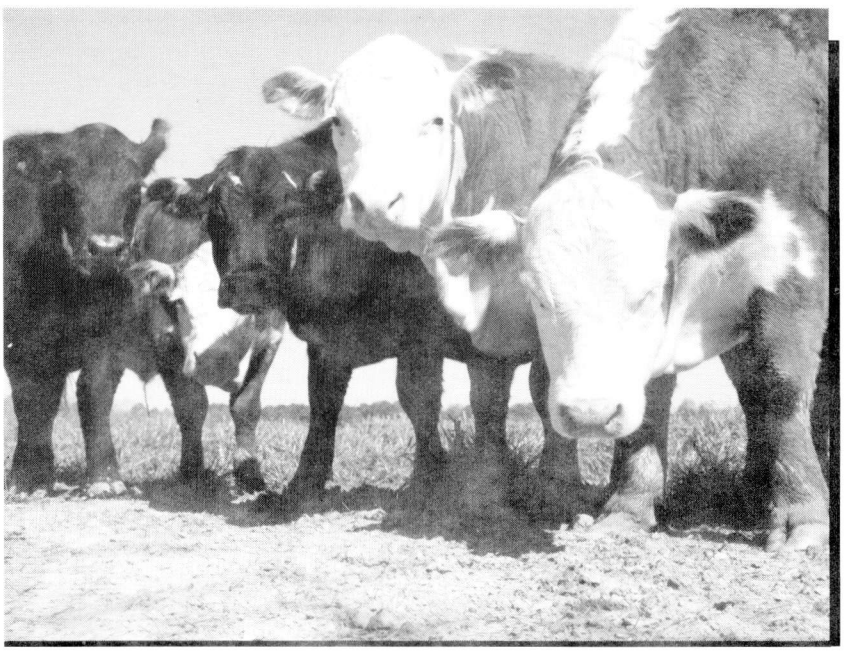
The study suggests that rotational grazing is probably undesirable when management time is limited or when rainy conditions make pastures vulnerable to livestock trampling damage under high stock concentrations. Also, rotational grazing may be unsuitable when pasture seedhead production is detrimental to animals because it usually allows more seeding than continuous grazing. For example, fungus-infected fescue and dallisgrass are usually more toxic during seeding.

Consequently, it is important to consider all factors and estimate potential benefits before embarking on sophisticated, labor-intensive rotational grazing schemes.

AVERAGE DAILY GAIN AND GAIN PER ACRE FOR ROTATIONAL AND CONTINUOUS GRAZING AT FOUR STOCKING RATES

Grazing method	Gain, by stocking rate				
	1.0	2.0	3.0	3.7	Mean
	Lb.	*Lb.*	*Lb.*	*Lb.*	*Lb.*
	Average daily gain				
Continuous	2.50	1.93	1.36	0.96	1.69
Rotational	2.26	1.84	1.42	1.13	1.66
	Gain per acre				
Continuous	210	324	343	299	294
Rotational	190	309	358	350	302

Bransby is Associate Professor and Kee is Research Associate of Agronomy and Soils; Gregory is Superintendent of the Beef Unit at the E.V. Smith Research Center.



R. DICKENS, C. DIXON, and D. TURNER

WILDFLOWERS ADD COLOR TO ALABAMA ROADWAYS

OVER THE PAST DECADE the Alabama Highway Department has developed a vegetative management program utilizing selective herbicides to reduce mowing and control noxious weeds. It has eliminated many undesirable plants and converted miles of roadside to uniform stands of common bermudagrass, providing the State's motorists with safer roadsides and saving taxpayers over $1.5 million annually in maintenance costs. One drawback to the program is a lack of species diversity and color on roadsides.

Research in the Alabama Agricultural Experiment Station is underway to develop wildflower species that are both compatible with Alabama's highway maintenance program and add color to the State's roadways. A survey conducted in 1988 identified showy eveningprimrose, and roadside verbena, shown above, as species most prominently growing along roadways in the State. Both are perennial species which occur throughout Alabama, but they are more prominent in the southern part of the State.

Germination studies indicate seeds from local populations of both species germinate poorly. Varying light, temperature, and storage conditions and mechanical scarification of seed failed to improve germination. Verbena spreads from creeping rootstock and there is no commercial source of seed. Thus, studies are underway to propagate this species by planting sections of rootstock of varying lengths at predetermined depths. Application of herbicides during 1988 for selective control of grasses had no effect on the amount of lateral spread of either species in 1989.

Experimental plantings of 15 additional species were established using commercially available seed at 40 locations throughout the State. Seeds were planted in October and November with a drill seeder especially designed for uniformly planting seeds of varying sizes. The seeds were planted in plots sprayed in September with Roundup at 2.0 lb. active ingredient per acre and/or flail mowed to eliminate standing vegetation. Plots were examined in spring and summer, and though results varied throughout the State, the species listed in the table produced the greatest density of flowers. Over half of these species planted are perennials, so evaluations will need to be continued for at least 3 years to fully assess the relative potential of the individual species.

Once current investigations are completed, information should be available for developing criteria for wildflower management procedures compatible with other practices in the State's highway vegetation management program. Implementation of the plan should help bring about more colorful and interesting vistas for motorists.

WILDFLOWERS WHICH PRODUCED SATISFACTORY STANDS FROM COMMERCIAL SEED AT LOCATIONS THROUGHOUT ALABAMA IN 1988-89

Common name	Flower color	Life cycle
Cornflower	blue	annual
Plains coreopsis	yellow	annual
Indian blanket	red, yellow	annual
Lemon mint	pink	perennial
Corn poppy	red, pink	annual
Drummond phlox	red, pink	annual
Blackeyed susan	yellow	perennial

Dickens is Professor of Agronomy and Soils; Dixon is Landscape Engineer, Alabama Highway Department; Turner is Research Associate of Agronomy and Soils.

C.C. MITCHELL and D.M. BALL

HIGH ALFALFA YIELDS POSSIBLE IN ALABAMA

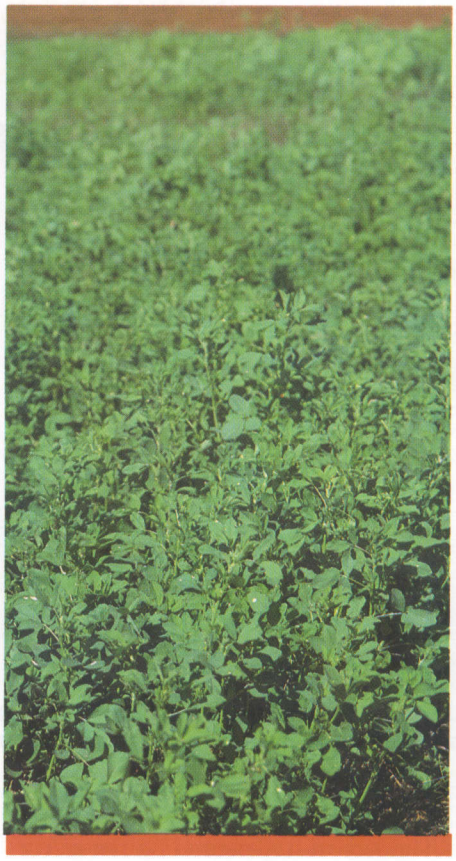
ALFALFA is experiencing a slow but steady comeback in Alabama and the Southeast. With newer varieties, better insect control, and improved soil fertility practices being used, Alabama farmers are producing around 5 tons per acre per year. But much higher yields are possible, and Alabama Agricultural Experiment Station research is seeking methods of producing up to 10 tons per acre.

Maximum yield tests were begun in 1986 at the Tennessee Valley Substation and in 1987 at the Gulf Coast Substation. The objective was to determine soil fertility and other soil factors necessary for top yields. The highest recorded alfalfa yield in past Experiment Station research was 7.6 tons, but the target for this test was 10 tons per acre.

Treatments listed in the table include various rates of phosphorus (P) and potassium (K), some based on soil test recommendations and some based on anticipated removal in hay. A yield of 5 tons per acre is known to remove 70 lb. P_2O_5 and 300 lb. K_2O, and removal by higher yields would be expected to be in the same proportions. Soil fumigation was included in one treatment to determine effects of nematodes and diseases on yield. Other practices tested included irrigation, deep lime incorporation (to 36 in.), and high rates (5 tons per acre) of agricultural gypsum.

Apollo was the variety used at the Tennessee Valley Substation and Florida 77 at the Gulf Coast Substation. Forage was harvested first when 10% of the plants were blooming and every 30 days thereafter. This resulted in 7 harvests the first year, 6 harvests the second year, and 5 harvests the third year at the Tennessee Valley Substation and 8 harvests and 7 harvests for the 2 years at the Gulf Coast Substation.

First-year yields were 9.7 tons per acre at the Gulf Coast Substation—a new record—and 7.5 tons at the Tennessee Valley Substation. These yields were produced on plots receiving the highest P and K rate (0-240-600 lb. N-P_2O_5-K_2O). Average yields for the 3- and 2-year periods were less than the first year, but went as high as 7.4 tons, as recorded in the table.



Soil fumigation actually reduced first-year yields at the Tennessee Valley Substation. The treatment resulted in rapid, lush growth during establishment, which was severely damaged by subsequent cold weather. This did not happen at the Gulf Coast Substation, so yields were improved by fumigation. Since growth on the soil fumigation treatment recovered quickly, soil fumigation resulted in the highest average annual yields at both locations.

Nematode assay showed that root-knot nematodes were extremely high in nonfumigated plots at the Tennessee Valley Substation. At the Gulf Coast Substation, dagger and root-knot nematodes were present in nonfumigated plots.

The gypsum treatment had a highly positive effect on yields, producing yields as high as on the fumigated treatment. In 2 years of production at the Gulf Coast Substation, irrigation did not improve alfalfa yields or stands.

Soil fertility was a more important factor in yields and stand longevity at the Gulf Coast Substation than at the Tennessee Valley location. Initial soil tests indicated that P was 'low' and K was 'high' at the Tennessee Valley Substation, with an annual soil test recommendation of 0-120-120. The Gulf Coast location tested 'high' in P and 'low' in K, with an annual recommendation of 0-0-240. The Tennessee Valley Substation yields indicated only a small response to P and K application. At the Gulf Coast Substation, yields indicated no response to P but large responses to K fertilization. The no-K (0-240-0) and low-K (0-240-120) treatments resulted in losses of stand and more weed problems at the end of the first harvest season.

Soil testing apparently does a good job of predicting P fertilizer needs for alfalfa. With yields as high as those produced at the Gulf Coast Substation, however, rates of K based on anticipated crop removal may be a better approach.

Mitchell is Assistant Professor and Ball is Professor of Agronomy and Soils.

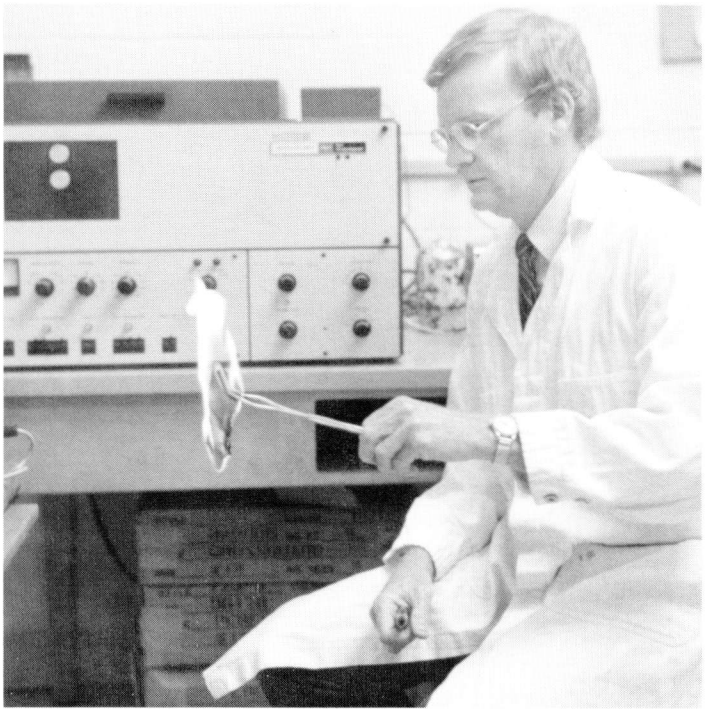
RESULTS OF ALFALFA MAXIMUM YIELD TEST AT TWO ALABAMA LOCATIONS

Treatment, lb. N-P_2O_5-K_2O[1]	Av. yield/acre Tenn. Valley 3 years	Gulf Coast 2 years
	Tons	*Tons*
0-0-600 (no P)	---	6.3
0-60-600 (low P)	6.0	---
0-240-0 (no K)	---	4.7
0-240-120 (low K)	6.2	5.2
0-240-300 (intermediate K)	6.6	5.9
0-120-120[2]	6.1	---
0-0-240[3]	---	5.6
0-120-600[4]	6.3	6.5
0-240-600 (high P)	6.4	6.3
0-240-600 + deep lime	---	6.5
0-240-600 + soil fumigation	6.7	7.4
0-240-600 + 5 tons gypsum	---	7.4
0-240-600 without sulfur	---	6.3

[1]Annual rate of N-P_2O_5-K_2O; other treatments applied before planting. The same treatments may not have been applied at both locations.
[2]Soil test recommendations for Tennessee Valley soils.
[3]Soil test recommendations for Gulf Coast soils.
[4]Rate based on crop removal.

I.R. HARDIN

METHODS SOUGHT TO MAKE COTTON FABRIC NONFLAMMABLE



Understanding the burning process of cotton helps in development of new ways to make cotton sleepwear flame retardant.

FOR THE PAST 15 years, Americans have been unable to buy children's sleepwear made of cotton, even though cotton is one of the more comfortable, durable fabrics available. The reasons for this date back to the early 1950's and involve three related situations: (1) federal laws that require children's sleepwear to be flame-resistant, (2) cotton's natural flammability which necessitates the addition of expensive flame retardant finishes to ensure nonflammability, and (3) the tendency for metal ions found in hard water to combine with compounds in phosphate-free detergents and dilute the effectiveness of flame retardants on cotton.

Researchers exploring the reasons for the third problem soon discovered that the chemical reactions involved were extremely complicated. Because of this and cost factors, many sleepwear manufacturers rejected cotton and turned to fabrics which could be managed more easily and less expensively.

Research on the flammability of cotton by the Alabama Agricultural Experiment Station has continued to explore this intricate process. This research has been directed at understanding and then overcoming the problems associated with making cotton sleepwear flame-resistant.

Cotton fibers are composed almost entirely of cellulose, long-chain molecules which form the basis for most plants, including all trees. Previous research has shown that when cellulose burns and undergoes thermal decomposition (pyrolysis), many different chemical products are formed. The relative amounts of these products produced depend on the speed of pyrolysis. Rapid burning allows the cellulose chain to break into small fragments and produce tarry substances (anhydrosugars) which sustain the flame and promote burning. Flame retardants work by encouraging the formation of water and inhibiting the fragmentation of cellulose so the fabric chars rather than ignites.

The key to understanding the effect of metal ions on the flammability of cotton is to explain how the ions influence the course of this thermal breakdown. Because the process is extremely complicated, the reaction of pure cellulose was first studied; then, various organic salts and metals were added to the process to test their influence on the pyrolysis. Cotton fabric was thoroughly cleaned, and then sodium, potassium, magnesium, and calcium salts of chlorine and carbonate were applied to or formed in the fabric. The concentrations of positively charged ions, or cations, on the fabrics varied from 0.01% to 3%. Pyrolysis of these samples was performed at various heating rates and temperatures.

Following pyrolysis, the resulting products were separated and identified. Carbon monoxide and dioxide, water, and a variety of organic gases were the predominant products formed by pyrolysis. Glycolaldehyde, a small organic molecule, was the predominant organic material formed. Cations of equal electrical charge had similar effects on the yields of most pyrolysis products, while generally the amounts of all gaseous products generated from sodium- and potassium-treated samples were lower than those from calcium- and magnesium-treated samples.

Almost all inorganic salt additives, regardless of their type, increased the amount of carbon dioxide, water, and carbon monoxide. Rather than leveling off, the yields of most pyrolysis products increased or decreased as additional salts were added, depending on the type of salt used.

This research, which helps explain how ions change the chemistry of burning, is the first step toward explaining the complex process involved in cotton pyrolysis. Once this process is understood, new flame retardant finishes could be developed for cotton which could lead to cotton reclaiming part of a market now closed to it, and allow consumers a wider choice.

Hardin is Associate Professor of Consumer Affairs.

K.F. BRONSON, J.T. TOUCHTON, and R.D. HAUCK

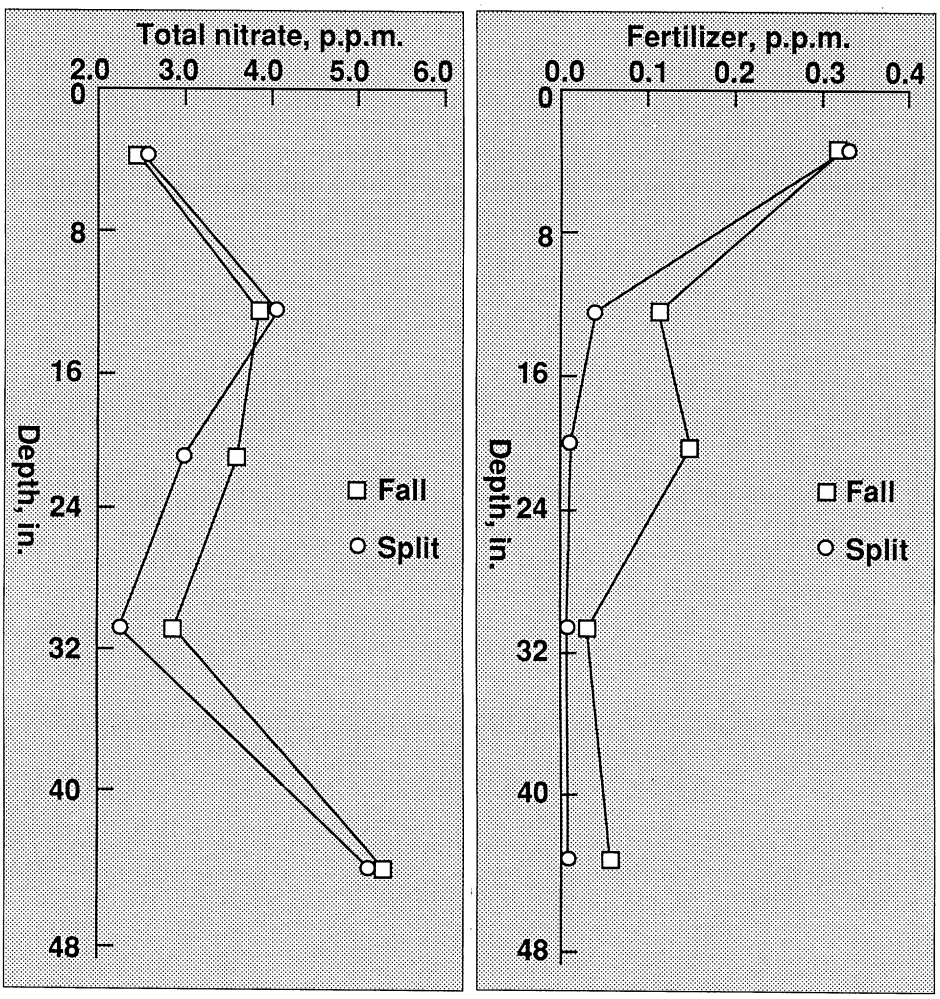
N LEACHING UNDER WINTER WHEAT MINIMAL ON SANDY SOILS

CONCERN OVER groundwater contamination from agricultural chemicals has increased in recent years, and nitrates from heavy nitrogen fertilizer applications on small grain are a frequently accused culprit. However, tests by the Alabama Agricultural Experiment Station indicate that leaching of nitrogen (N) fertilizers is not a major problem. Nitrates leached into the subsoil by N fertilizers are in the tenths of a part per million range and nitrate from organic matter is only a few parts per million.

A field study was conducted from 1987 to 1988 at the E.V. Smith Research Center on a Norfolk loamy sand to determine the effects of timing of N application. To keep track of the urea nitrogen used in the study, it was 'tagged' with the stable isotope 15N.

Treatments consisted of fall applications of N at planting or split applications where 30 lb. N per acre was applied at planting and the balance was topdressed in early spring. Rates of N fertilizer were 60, 90, and 120 lb. per acre, but nitrate leaching was monitored only for the 120 lb. per acre rate.

FIG. 1 (left). Total nitrate leached at harvest from winter wheat as affected by time of nitrogen application (120 lb. N per acre). FIG. 2 (right). Fertilizer nitrate leached at harvest from winter wheat as affected by time of nitrogen application (120 lb. N per acre).



Wheat yields averaged 68 bu. per acre for split-applied N and 61 bu. per acre for fall-applied N. Results of previous research suggest that split-applied N often gives higher wheat yields than fall-applied N. Yields of more than 60 bu. per acre from an average N rate of 90 lb. per acre indicate efficient crop use of the N fertilizer applied.

Profiles of total residual inorganic N and of fertilizer N (both mostly nitrate) for the 120 lb. per acre N rate are shown in figures 1 and 2. Inorganic N remaining in the surface soil (0-8 in.) at harvest averaged 3 p.p.m. (parts per million), or 9 lb. N per acre. This N originated mostly from organic matter decomposition and only 0.3 p.p.m. was fertilizer N. Split-applied and fall-applied N had similar N profiles at harvest.

While nitrate at levels of 10 p.p.m. is considered potentially dangerous in groundwater, figure 1 shows less than 6 p.p.m. nitrate in soil depths below 8 in. in the Experiment Station tests. Approximately 90% of this came from organic matter breakdown during the growing season. The concentrations of fall-applied fertilizer N that leached were less than 0.5 p.p.m., figure 2, and split-applied N resulted in less than 0.01 p.p.m. nitrogen leached. This equates to about 0.1 and 0.4 lb. fertilizer N per acre leached from split-applied N and fall-applied N, respectively. The beginning of a nitrate front (5.5 p.p.m.), apparent in figure 1, is probably due to N leached from previous cropping seasons.

Near normal rainfall combined with efficient use of the recommended rate of N by growing wheat apparently kept leaching of nitrate to a minimum. Other loss mechanisms of fertilizer N, such as gaseous losses, were likely more important than leaching.

Bronson is a former Graduate Student and Touchton is Professor and Head of Agronomy and Soils; Hauck is Senior Scientist, Tennessee Valley Authority.

R. RODRIGUEZ-KABANA, D.B. WEAVER, and E.L. CARDEN

SOYBEAN YIELDS IN NEMATODE-INFESTED FIELDS BOOSTED BY CROP ROTATION, RESISTANT VARIETIES

SOYBEANS are susceptible to a variety of nematode species, many of which can cause large yield losses. Particularly damaging are the root-knot and soybean cyst nematodes. These two species can cause almost complete yield loss when they occur together. Fumigant nematicides, such as DBCP (dibromochloropropene) and EDB (ethylene dibromide), effectively control nematodes, but these can no longer be used because of EPA restrictions. Alternative nematicides are either ineffective or not economical to use. Thus, effective alternative control methods are needed.

Research on this problem begun in 1986 by the Alabama Agricultural Experiment Station indicates that crop rotations offer an effective alternative. In fact, such rotations more than doubled the yield of soybeans in fields heavily infested with root-knot and cyst nematodes.

Three rotational crops—corn, grain sorghum, and bahiagrass—were compared to continuous soybeans in three separate experiments on nematode-infested fields in Baldwin County:

Experiment 1—soybeans in 1987 following either corn or soybeans the previous year.

Experiment 2—soybeans in 1988 following either grain sorghum or soybeans in 1987.

Experiment 3—soybeans in 1988 following either bahiagrass or soybeans in 1986 and 1987.

Before the experiments were begun, the experimental sites had been in continuous soybeans for several years.

The seven soybean varieties listed in the table were compared for their response to crop rotation in each experiment. Six varieties were common to all experiments, with the seventh variety being Forrest in Experiment 1 and Stonewall in experiments 2 and 3. Each variety was compared with and without nematicidal treatment with aldicarb.

With no nematode resistance, Ransom variety produced poor yields in the continuous soybean treatment.

The aldicarb had little effect on yield, so variety yields with and without nematicide were averaged, as reported in the table.

Although the experiments cannot be compared directly because they were conducted in different years and fields, certain trends are evident. Previous crop had a large effect on yield in all three experiments. Average yield increases from rotation ranged from 31% for beans following corn to 106% for beans following bahiagrass, as compared to continuous soybeans.

Varieties differed widely in their response to previous crop. Varieties with resistance to both root-knot and soybean cyst nematodes (Centennial, Forrest, Gordon, Kirby, and Leflore) had a smaller yield response to rotation. These yielded more in the continuous soybean treatment than varieties with resistance to only one or no nematode species, such as Braxton (resistant to root-knot nematode, susceptible to soybean cyst), Stonewall (susceptible to root-knot nematode, resistant to soybean cyst), and Ransom (no nematode resistance). Leflore yielded particularly well in the continuous soybean plots. When following the rotational crops, however, variety selection was less dependent upon nematode resistance. In experiments 1 and 3, varieties that were less resistant to the nematode complex made the highest yields: Braxton in Experiment 1 and Stonewall in Experiment 3. In Experiment 2, Leflore and Stonewall yielded equally well, despite their difference in nematode resistance.

As shown by results reported, proper crop rotation can boost soybean yield in fields that are infested with root-knot and soybean cyst nematodes. When soybeans follow soybeans as a previous crop, a resistant variety is especially important.

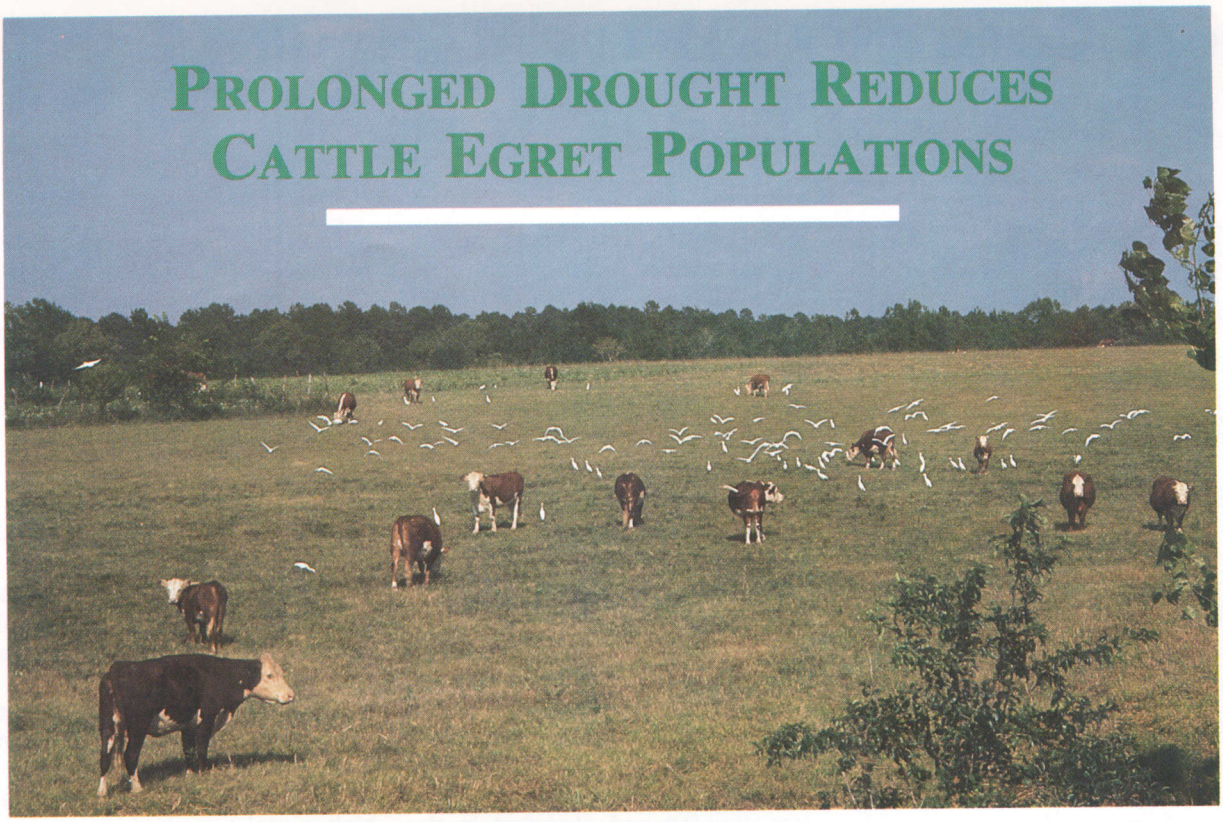
YIELD OF SOYBEAN VARIETIES AS AFFECTED BY PREVIOUS CROP

Variety	Soybean yield/acre					
	Experiment 1		Experiment 2		Experiment 3	
	Following corn	Following soybeans	Following sorghum	Following soybeans	Following bahiagrass	Following soybeans
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*
Braxton	44	25	27	10	36	11
Centennial	41	32	34	23	33	19
Forrest	31	25	--	--	--	--
Gordon	36	29	32	20	31	12
Kirby	39	34	33	25	28	17
Leflore	39	34	42	29	36	27
Ransom	36	27	34	12	36	14
Stonewall	--	--	42	12	42	16
Average	38	29	35	19	35	17

Rodriguez-Kabana is Professor of Plant Pathology; Weaver is Associate Professor of Agronomy and Soils; Carden is Superintendent of the Gulf Coast Substation.

J.L. DUSI

Prolonged Drought Reduces Cattle Egret Populations



SINCE THE 1960's, the cattle egret has been a common sight in Coastal Plain pastures of Alabama. However, the droughts that occurred between 1985 and 1989 have changed this scene.

The cattle egret, a long-legged wading bird that is a member of the heron family, relies on frequent rainfall to sustain feeding and nesting areas. It is commonly found feeding on insects in lush pastures, particularly where cattle or farm equipment have disturbed soil and pastureland to allow the birds easy access to insects. Frequent rains also stimulate the cattle egrets' nesting behavior and keep their swamp nesting colony sites filled with water.

These birds are desirable because they help control populations of undesirable insects. Unfortunately, they can pose sanitation problems if they nest too close to urban areas.

Alabama Agricultural Experiment Station studies had been monitoring four swamp nesting colony sites along the Chattahoochee River in Alabama when the drought period began. This monitoring was done by using airplanes to sight and photograph egret nesting areas. Prior to 1985 these colonies had contained a total of 13,025 cattle egrets. In 1986 the total dropped to 12,400 and by 1987 only three colonies remained. These contained a total of 3,200 birds. In 1988, only one colony remained with a total of 1,251 egrets.

A similar census of the Black Belt area of Alabama identified colonies at Montgomery, Uniontown, and Faunsdale. The Montgomery colony site was located in scrubby trees on an island in Cooter's Pond. The Uniontown and Faunsdale colony sites were in upland stands of cedar trees. In 1985, the Montgomery and Uniontown colonies had a total of 22,000 egrets. The Uniontown colony left that site in 1986 and moved about 7 miles to a similar site northwest of Faunsdale. This Faunsdale colony combined with the Montgomery colony totalled only 5,300 egrets but, by 1987, both colonies totalled 20,000 egrets. In 1988, the Montgomery colony was deserted after a small number of egrets started nesting, but the Faunsdale colony became well established and reached a population of about 57,000.

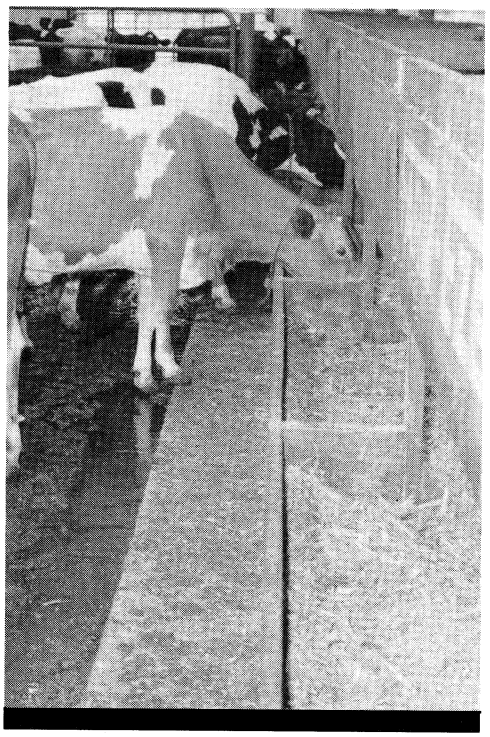
These results indicate that the population of egrets in the swampy sites along the Chattahoochee River, an area with limited access to pastures, declined as the drought progressed until only one colony remained. A total net loss of 11,744 birds resulted. However, colonies in upland sites of the Black Belt region, where pastures are abundant, were not as severly affected. Though the Cooter's Pond colony was lost, the number of birds in the Faunsdale colony showed a net gain of 35,000 nesting cattle egrets. Declines in bird numbers may be due to death or dispersement of colonies, though the loss of the Cooter's Pond colony was likely caused by human harassment early in the nesting season.

This study suggests that the availability of pasture has a direct effect on the cattle egret's ability to withstand drought and that years of severe drought can cause cattle egret colonies to decline or vanish from dry areas.

Dusi is Professor of Zoology and Wildlife Science.

J.E. UMPHREY, B.R. MOSS, K.A. CUMMINS, and D.A. COLEMAN

WHOLE COTTONSEED HELPS MAINTAIN MILK PRODUCTION IN HOT WEATHER



HEAT STRESS is a major concern of Alabama dairy producers. When temperatures exceed 86°F during the day or do not fall below 66°F at night so animals can dissipate heat, milk production can drop as much as 15 to 30%. Production losses are primarily because cattle consume less feed during hot, humid weather. Increasing nutrients, especially energy sources, in the feed can help sustain production levels. However, this must be done carefully to avoid extreme decreases in fiber consumed, which can cause digestive upsets and lower milk fat content.

Whole cottonseed (WCS) is a good option because it is high in energy (about 20% fat) and protein (23%), but not as apt to cause digestive upsets because it is also high in digestible fiber (34% ADF). Feeding WCS is one alternative, though it does not always increase milk and fat production. The recent development of commercial fats which bypass rumen digestion but are digested and absorbed in the lower gastrointestinal tract provides another option.

An Alabama Agricultural Experiment Station study conducted at the E.V. Smith Research Center evaluated the effectiveness and economics of (1) WCS, (2) a commercial fat (Megalac®), and (3) a combination of the two. Megalac is a commercial inert fat which increased milk and milk fat production in early lactation studies.

During June through August of 1987, 32 Holstein cows averaging 130 days of lactation were assigned to one of four treatment groups: (1) a control diet of corn silage, corn, and a protein/mineral/vitamin supplement; (2) the control diet plus 10.3% WCS; (3) the control diet plus 2.6% Megalac; and (4) the control diet plus 5.2% WCS and 1.3% Megalac. These products, which were introduced gradually over a 2-week adjustment period, added about 3.4% fat to diets 2, 3, and 4. These diets had equal amounts of energy and protein, but all were higher than the control diet.

Cows received their feed as a total mixed ration twice daily while confined to tie stalls so individual feed intake could be determined. Cows were milked twice daily and allowed to rest in a closely clipped bermudagrass sod exercise area when not tied. Milk was weighed at each milking and morning and afternoon milkings were sampled at least weekly for butterfat and protein analyses.

Results in the table show that cows receiving WCS, Megalac, or a combination of the two consumed more dry matter than cows on the control diet. This higher intake resulted in increased milk production. Milk fat percentage was slightly lower among cows on the rations containing WCS. Fat-corrected milk was lower on the control diet than on other rations and cows on the control diets were more efficient at converting feed to milk, as indicated by the higher amount of FCM per pound of feed consumed. Cows receiving fat-containing diets produced milk with a lower protein content. Overall, income was higher for cows receiving the WCS or control diet.

Results from this study indicate that milk production can be maintained during periods of heat stress using fat products, however, economics should be considered. Feeding dietary fat products is a strategy that producers may consider at any time, but it seems especially appropriate during periods of heat stress. Feeding these products, especially WCS, is accomplished easier by using a total mixed ration, but feeding in grain mixes has also been done successfully.

EFFECT OF WHOLE COTTONSEED (WCS) AND MEGALAC IN DAIRY RATIONS ON FEED CONSUMPTION, MILK PRODUCTION, AND ECONOMICS

Item	Result, by treatment			
	Control	WCS	Megalac	WSC + Megalac
Daily dry matter consumption/cow, lb.				
Total	35.4	38.9	40.0	38.9
Per 100 lb. body wt.	2.86	3.13	3.19	3.16
Daily production/cow				
Milk, lb.	54.3	59.8	57.0	57.9
Milk fat, pct.	3.37	3.12	3.31	3.18
Protein, pct.	3.09	2.99	3.01	2.84
3.5% fat-corrected milk, lb.	53.0	55.2	55.9	54.3
Economic evaluation[1]				
Feed cost/cow/day, dollars	2.54	2.79	3.61	3.13
Income over feed cost/cow/day	4.75	4.80	4.07	4.34

[1]Based on 1987 feed prices of $130 per ton of WCS and $0.38 per lb. Megalac and $13.75 per hundredweight milk prices.

Umphrey is a former Graduate Student, Moss is Professor, Cummins is Associate Professor, and Coleman is Assistant Professor of Animal and Dairy Sciences.

D.P. DAVIS, T.P. MACK, R. RODRIGUEZ-KABANA, and P.A. BACKMAN

AUNUTS—AAES Developed Expert System Helps Manage Peanut Pests

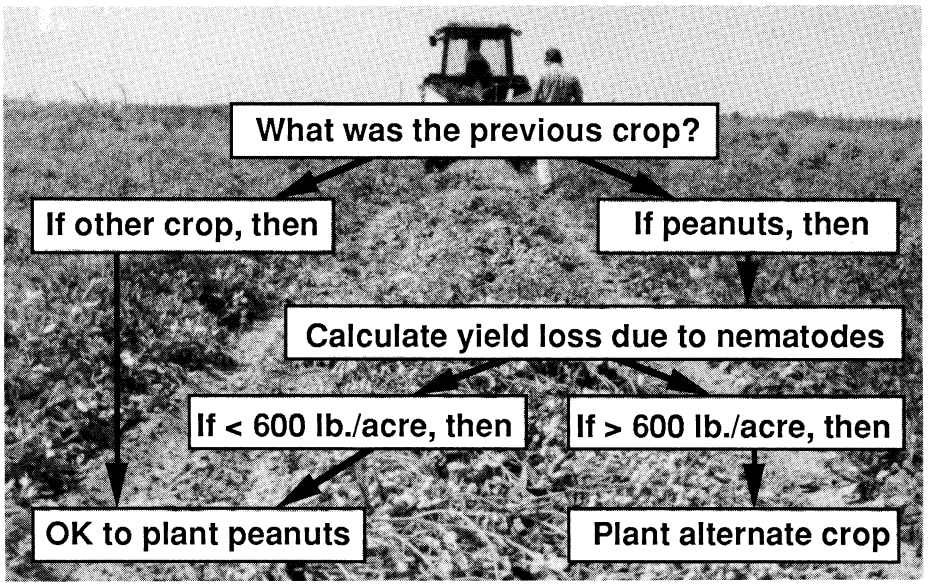
NEW TERMS are appearing with clock-like regularity as agriculture becomes more technology oriented. One of the newest terms is 'expert systems,' which refers to computer programs that use the knowledge of human experts to solve problems. One such system is being developed by the Alabama Agricultural Experiment Station—called AUNUTS—to aid Alabama peanut growers.

The goal of expert systems is to apply expert-like reasoning for decision making by computer when human experts are not available. Most expert systems can even inform the persons using them how a conclusion was reached. Eventually, the user may learn how the expert system arrives at decisions, which has the added benefit of educating the user.

Expert systems differ from traditional computer programs by:

1. Engaging the user in a questioning session that changes as problem conditions vary.
2. Having an expert's knowledge stored in a knowledge base in usable form.
3. Having an expert system shell, a supportive program that allows the user and the knowledge base to interact. It directs the question and answer sessions and determines what information is needed and whether a solution can be generated. It may even inform the user why a particular conclusion was reached.

Over 200 expert systems have already been developed, with applications ranging from geology to medicine. A program called Prospector® helps geologists determine the likelihood that a site contains ores or minerals and one named Mycine® helps doctors determine antibiotic therapy for patients. Of course, the user of such programs must have a working knowledge of the subject area to make use of the recommendation presented by the system.



AUNUTS is an example of the many expert systems being developed for use in agriculture. This AAES-developed system is for managing pests in peanuts, and was designed to be a 'planting-to-harvest' decision aid. Growers may maximize profitability while reducing pesticide use by using AUNUTS to (1) determine yield loss from root-knot nematodes and identify profitable alternatives for nematode control, (2) determine most profitable timing of treatments for fungal diseases, and (3) conduct cost/benefit analyses for control of foliar feeding insects and the lesser cornstalk borer. Management of these pests requires knowledge of pest density, crop value, costs of control, and weather conditions.

The flow chart gives an example of the logic used by AUNUTS in evaluating peanut production where root-knot nematodes, which can seriously reduce yields, are present in the soil. As noted, the expert system would inquire what the previous crop was. If the previous crop was not peanuts (or another crop on which these nematodes survive well), then peanuts could be planted without economic losses from nematodes. If the previous crop was peanuts, then AUNUTS would ask for the number of nematodes extracted from a soil sample.

An equation has been developed that allows prediction of yield loss based on nematodes in soil samples. If this loss is greater than 600 lb. per acre, then AUNUTS would recommend planting an alternate crop. If the loss estimate was less than 600 lb. per acre, then it would recommend planting peanuts. AUNUTS would also ask for the cost of nematicides to determine whether they should be used, and what alternative crops the farmer could plant, to estimate the most profitable rotational schemes.

AUNUTS has several important advantages over other methods of decision making for pest management. It recommends pesticide applications only when they are economically justified, so unnecessary applications will be reduced. Further, AUNUTS integrates the management of insects, diseases, and nematodes into a single unit, since decisions made for one pest affect almost all subsequent actions.

Davis is Postdoctoral Fellow and Mack is Associate Professor of Entomology.

A.G APPEL and L.G. WOODY

Rapid Knockdown Provided by Wasp and Hornet Sprays

Aerosol sprays were applied to bees confined in these cardboard cans.

AEROSOL WASP and hornet sprays are often used for immediate control, or knockdown, of wasps, hornets, yellow jackets, and other stinging insects. These products have four major components—propellants, solvents, insecticides, and synergists—which are critical to the performance of the sprays.

Homeowners are frequent users of these sprays, however, various industries also utilize these products. For example, utility technicians often encounter wasps and other stinging insects infesting outdoor equipment, particularly equipment that is mounted on utility poles. Control of these insects must be immediate to protect technicians who may be working 20 to 30 ft. off the ground when they confront the insects. In addition, sprays used by electric and telecommunications utilities must not damage plastics which are used to form telephones, splice cases, and vitally important wire insulation. These sprays must also be nonconductive, nonflammable, and relatively noncorrosive.

To analyze sprays for industrial use, an Alabama Agricultural Experiment Station study looked at two aspects of available sprays: (1) knockdown efficiency and (2) material compatibility.

Worker honey bees were collected from hives maintained on the Auburn University campus and taken to a laboratory for testing. Honey bees were used because they are a reliable representative stinging insect model, are available year round, and are frequent pests in outdoor electrical equipment. Bees were immobilized in a walk-in refrigerator and gently transferred with flexible forceps into 1-pt. cardboard cans. Ten bees were placed in each can and a single thickness of cheese cloth was secured on the top. Bees were allowed to recover for at least 1 hour before testing began. Knockdown as reported in the table was determined by spraying 2 milliliters (0.7 oz.) of each formulation into the can and counting the number of immobilized bees after 1 minute. Ten cans were treated with each formulation, and mortality was assessed 5 minutes after spraying.

In addition to determining effects on bees, the sprays' effects on plastics were studied. Injection molded 3-in. bars of ABS, Noryl, and polycarbonate plastics, types of plastics commonly used by electrical and telecommunications industries, were tested for stress cracking with each spray formulation. Bars were conditioned for 24 hours at 298 °F (ABS and Noryl) or 249 °F (polycarbonate) prior to testing. The bars were bent to duplicate outer fiber strain of molded plastic and then six pieces of each were treated with each spray formulation. Treatment consisted of thoroughly coating each piece of plastic with the spray and allowing these to stand at room temperature for 48 hours. Each piece was then evaluated as intact or damaged. Six pieces of each plastic were also prepared as above but left unsprayed as control models.

One-minute knockdown ranged from 27 to 100% and could be categorized in three groups: more than 98%, 89-98%, and less than 89%. Except for Wasp Killer II, all formulations that had 100% knockdown also damaged some type of plastic. All formulations having 1-minute knockdown between 98 and 81% also damaged at least one type of plastic. The two formulations with the lowest knockdown ability (Blackflag and SCS) did not damage plastics. All formulations gave 100% kill 5 minutes after spraying.

Additional analysis indicated no correlation between 1-minute knockdown and any of the active ingredients in the wasp and hornet sprays. Instead, swift knockdown was found to result from rapid body temperature depression. Formulations providing the best knockdown lowered body temperature the most. These formulations contained Freons, methylene chloride, and other volatile solvents.

The results further indicate that sprays can be developed that do not damage plastic material.

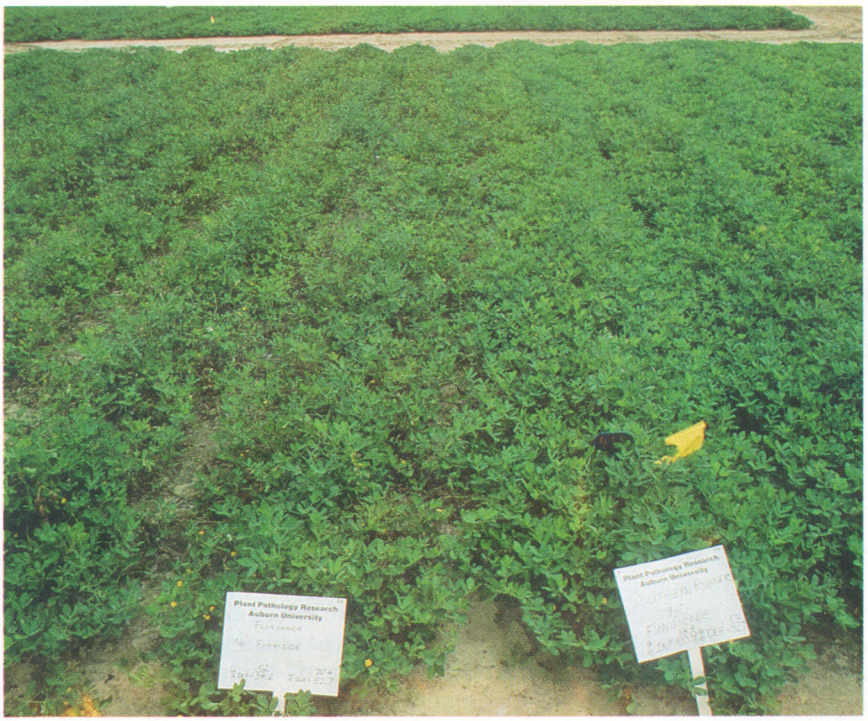
Appel is Assistant Professor of Entomology; Woody is Staff Manager, Product Evaluation and Selection, BellSouth Services.

Knockdown Efficiency and Plastic Stress Cracking of Wasp and Hornet Spray Formulations

Formulation	Knockdown at 1 min.,	Plastic damage		
		ABS-T	Noryl	Polycarb
	Pct.	*Pct.*	*Pct.*	*Pct.*
Adios	100	0	100	100
Blast	100	83	100	83
Do It Yourself	100	17	100	33
Hunter's ZF	100	0	100	100
Marko	100	0	67	67
Wasp Killer II	100	0	0	0
Zep Tox IV	100	100	33	100
Malter NF	98	0	67	100
Multicide	96	50	100	0
Zep Tox III	96	100	100	83
FAWH-15	95	0	33	0
ARI-B	95	0	100	0
Dead Eye	94	33	100	0
CRC	93	17	100	100
Hi-Sting	91	0	50	0
A-15	91	0	67	0
FAHW-25	90	100	100	100
Utilitel #6	89	67	83	0
Enforcer	81	0	17	33
Blackflag	50	0	0	0
SCS	27	0	0	0

J. C. JACOBI, P.A. BACKMAN,
and L.W. WELLS

DISEASE REDUCED BY MANAGEMENT OF SOUTHERN RUNNER PEANUTS



Leafspot damage to Florunner peanuts (left) compared to Southern Runner (right), when both were left unsprayed.

FUNGICIDES provide good control of leafspot on peanuts and some control of other peanut diseases. The downside is that leafspot control alone may cost $50-$60 per acre. Tests at the Alabama Agricultural Experiment Station indicate that alternative management practices and a new peanut variety, Southern Runner, may cut production costs in fields with historically high levels of peanut diseases.

Florunner is by far the most popular peanut variety grown in the Southeast, because of its high yield potential and other beneficial qualities. However, it is highly susceptible to leafspot, white mold, and limb rot. Since the release of Southern Runner by the University of Florida, AAES research has been developing a reduced input fungicide program to take advantage of the new variety's reported resistance.

Tests at the Wiregrass Substation in Headland compared reduced rates of Bravo, longer intervals between Bravo applications, and the use of less expensive and less effective fungicides on both Southern Runner peanuts and Florunner peanuts. Yields of Florunner peanuts decreased more sharply than Southern Runner when the rate of Bravo was decreased from 1.1 lb. (1½ pt.) to 0.55 lb. (3/4 pt.) and when harvest was delayed 14 days beyond optimum harvest date, table 1. The table also shows the amount of defoliation to be comparable in the two varieties; however, Southern Runner apparently tolerates leaf loss better, based on comparative yield loss.

Southern Runner has a more compact growth habit than Florunner and produces more secondary branches. In the figure, neither cultivar received any fungicide, yet Southern Runner, due to increased branching, has a relatively healthy looking canopy compared to Florunner, which looks nearly defoliated. Delaying harvest produced greater yield loss in Florunner than in Southern Runner, especially at high levels of defoliation. The ability of Southern Runner to maintain yield could become important when harvest is delayed due to adverse weather.

Over the past 3 years, Southern Runner has averaged 65% less white mold damage than Florunner in tests at Headland, table 2. Observations of the two varieties indicate Southern Runner is less susceptible to tomato spotted wilt virus, but no differences were detected in limb and pod rot.

These tests indicate Southern Runner can be managed for peanut leafspot less intensively without significant yield loss, and it is less susceptible to white mold. It can be a good varietal choice in fields where serious leafspot or white mold damage is expected. However, Southern Runner is a later maturing variety, requiring about 10 days longer than Florunner to reach harvest maturity.

Table 1. Effects of Full Season Spray Program on Yield and Leafspot Severity of Southern Runner and Florunner Peanuts, 3-Year Average

Treatment[1]	Yield/acre at Optimum harvest date	Yield/acre at Harvest delayed 14 days	Leafspot defoliation[2]
	Lb.	*Lb.*	*Pct.*
Florunner			
Bravo 0.55 lb. .	2,757	2,666	44.7
Bravo 1.1 lb. . .	2,868	2,672	36.0
Manzate 1.5 lb.[3]	2,649	2,114	53.0
Southern Runner			
Bravo 0.55 lb. .	3,124	3,344	46.1
Bravo 1.1 lb. . .	3,179	3,106	31.8
Manzate 1.5 lb.	3,143	2,837	51.2

[1]All rates are in pounds active ingredient per acre.
[2]Defoliation rated prior to harvest.
[3]Equals 2.0 lb. Manzate 200 BF.

Table 2. Incidence of White Mold and Limb Rot in Planting of Florunner Peanuts, 3-Year Average

Treatment[1]	White mold hits/80 row-ft.
Florunner	
Bravo 0.55 lb.	8.1
Bravo 1.1 lb.	11.1
Manzate 1.5 lb.	9.9
Southern Runner	
Bravo 0.55 lb.	3.1
Bravo 1.1 lb.	3.3
Manzate 1.5 lb.	3.7

[1]All rates are in pounds active ingredient per acre.

Jacobi is Research Associate and Backman is Professor of Plant Pathology; Wells is Associate Superintendent of the Wiregrass Substation.

J. L. NOVAK, C.C. MITCHELL, JR., and JERRY R. CREWS

AAES "Old Rotation" Results Identify Least Risky Rotations

FINDINGS FROM 92 years of the Alabama Agricultural Experiment Station's 'Old Rotation' experiment indicate that the 3-year rotation of cotton-winter legumes-corn-small grains-soybeans offered the greatest net return potential. However, this rotation also had a high level of economic risk. The analysis further showed that this risk could be reduced by a farm plan that put part of the cotton acreage into a continuous cotton-winter legume rotation.

In the AAES economic study, data from 92 years of the Old Rotation were used to analyze the effect of alternative rotations on sustainable cotton yields. In particular, the analysis looked at the effect of winter legumes following cotton as a source of green manure and nitrogen for crops included in the rotations. Rotations included in the long-running experiment, as described in the Winter 1988 issue of *Highlights,* are as follows:

1. Continuous cotton, with and without winter legumes and nitrogen fertilizer.
2. Two-year rotations of cotton, winter legumes, and corn, with and without nitrogen fertilizer.
3. Three-year rotations of cotton, winter legumes, corn, and small grain-soybeans double cropped, with nitrogen fertilizer applied to the small grain.

All rotations received 80 lb. of phosphorus (P_2O_5) and 60 lb. of potassium (K_2O) per acre per year applied to the summer crop or winter legume, or split between the summer crop and winter legume.

The net return potential of each of these alternative rotations was calculated using the past 10 years' data. Comparisons were also made of the economic riskiness of the alternative rotations on 570 acres of crop land.

The greatest net return was realized from the continuous cotton with winter legumes and the 3-year rotation of cotton-winter legumes-small grains-soybeans. In contrast, the continuous cotton without winter legumes and nitrogen fertilizer and the 2-year rotation of cotton-winter legumes-corn (without nitrogen fertilizer) did not generate enough income to cover out-of-pocket (variable) costs.

Results of the risk analysis indicate that the most profitable farm plan included the 3-year rotation of cotton, winter legumes, corn, and small grains-soybeans (1/3 of acreage to cotton, 1/3 to winter legumes-corn, and 1/3 to rye-soybeans double-cropped). However, this 3-year rotation also had a high economic risk. To reduce this risk, more and more of the continuous cotton with winter legumes rotation had to enter the farm plan. This shift also resulted in a lowering of potential net return.

Despite a slightly lower net return margin, the best overall management strategy to minimize risk while achieving an expected return of $52,581 involved planting 31% of the cotton acreage in continuous cotton with winter legumes and the remainder to the 3-year rotation of cotton-winter legumes-corn-small grain-soybeans.

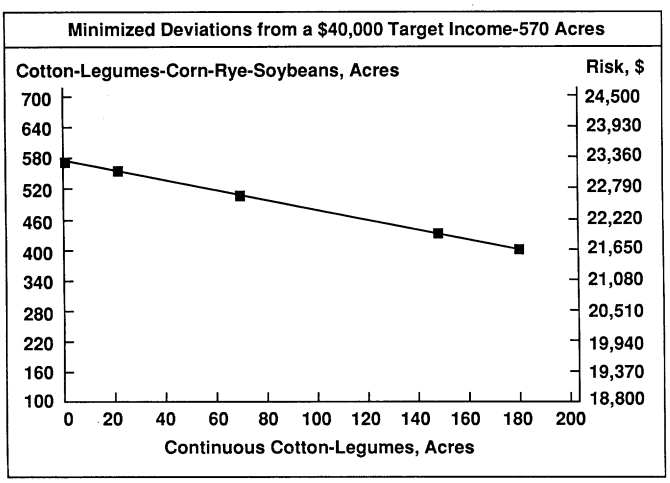
A curve of the production possibilities (illustrated by the graph) shows the highest net return alternative acreages for the 3-year and the continuous cotton-winter legumes rotations. According to this graph, a minimum of a $40,000 net return from 570 acres at a minimum risk to the producer can be attained by planting approximately 392 acres (69%) in the 3-year rotation of cotton-winter legumes-corn-small grain-soybeans and 178 acres (31%) in the continuous cotton-winter legumes rotation. A farmer who is willing to take greater risks may use a higher proportion of his acreage in the 3-year rotation acreage and less in the continuous cotton-winter legume rotation acreage.

The analysis reported would be applicable only to areas with soils and crop adaptation similar to the Old Rotation location. In areas where peanuts was a viable crop, for example, results could be different.

AVERAGE ANNUAL NET RETURNS ASSOCIATED WITH THE OLD ROTATION

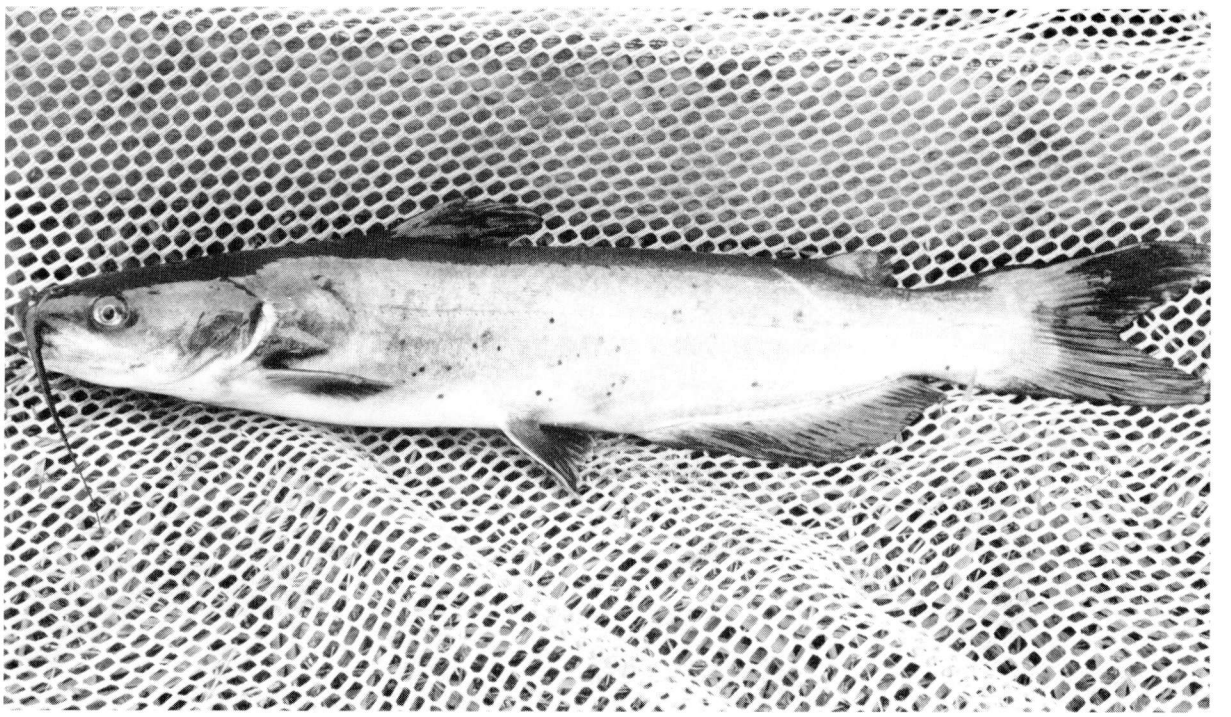
Rotations and fertilization, 1978-85[1]	Net returns over variable costs/acre
Continuous cotton with winter legumes (0-80-60)	$ 55.09
Continuous cotton without legumes (0-80-60)	- 153.98
Continuous cotton without legumes (120-80-60)	21.42
2 years cotton (0-80-60)-legumes-corn (0-80-60)	- .51
2 years cotton (120-80-60)-legumes-corn (120-0-0)	9.89
3 years cotton (0-80-60)-legumes-corn (0-0-0)-small grain (60-0-0)-soybeans	120.31

[1]Values in parenthesis are annual rates of N-P_2O_5-K_2O per acre.



Novak is Associate Professor of Agricultural Economics and Rural Sociology; Mitchell is Assistant Professor of Agronomy and Soils; Crews is Associate Professor of Agricultural Economics and Rural Sociology.

R.T. LOVELL and G. EL NAGGAR



NEW SOURCE OF VITAMIN C FOR FISH FEEDS

PREVIOUS RESEARCH at the Alabama Agricultural Experiment Station showed that channel catfish, unlike farm animals, require a dietary source of vitamin C. Without it they show reduced growth, scurvy (crooked backs, depigmentation), and reduced resistance to infection and other stresses. L-ascorbic acid is the vitamin C source normally used in commercial fish feed. Because this material is sensitive to oxidation, resulting in 40-60% being lost in processing, and its half-life (time required for 50% to be lost) is less than 90 days, a better source of vitamin C is needed by catfish producers.

Ascorbic acid phosphates and sulfates are relatively stable against oxidation, however their potential as sources of vitamin C was previously unknown. Ascorbic acid phosphate, which is used in women's facial cosmetics, had not been evaluated as a source of vitamin C. Ascorbic acid sulfate is sometimes used in salmon feeds, but its vitamin C activity also was not known. The Experiment Station test compared these compounds with L-ascorbic acid for vitamin C activity for channel catfish. Each source of vitamin C was fed at five dose levels: 0, 11, 22, 44, and 132 p.p.m. (parts per million) in purified diets under controlled environment conditions for 14 weeks.

Fish fed no ascorbic acid (control) or the lower levels of ascorbic acid sulfate grew poorly. Although growth improved as the dietary level of ascorbic acid sulfate increased, it never reached the growth rate of the fish fed L-ascorbic acid. By comparison, growth rate of fish fed ascorbic acid phosphate, even at a level near the lower limit of the vitamin C requirement of catfish, was equal to that of the fish fed L-ascorbic acid.

There were no signs of scurvy in any of the fish fed L-ascorbic acid or ascorbic acid phosphate. However, 50% or more of the fish fed the control diet or diets containing 44 p.p.m. or less ascorbic acid sulfate had deformed backs symptomatic of scurvy. Only the highest dose of ascorbic acid sulfate (132 p.p.m.) prevented deformities in catfish.

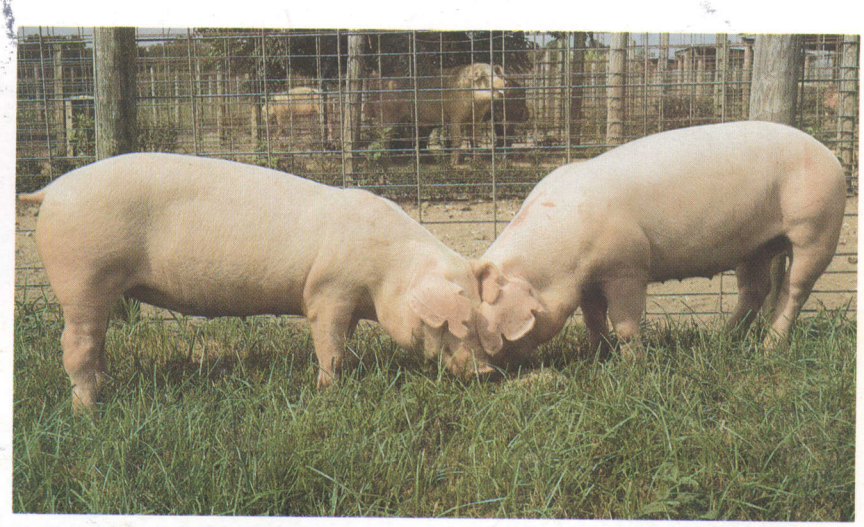
Concentrations of ascorbic acid in liver and kidney tissue increased as dietary ascorbic acid increased with fish fed L-ascorbic acid and ascorbic acid phosphate, but only traces were found in tissue of fish fed ascorbic acid sulfate. Higher concentrations of ascorbic acid were found in tissue of fish fed ascorbic acid phosphate than in fish fed L-ascorbic acid. This indicates ascorbic acid phosphate is more available to catfish than L-ascorbic acid.

During heat processing of catfish feed, only 0 to 20% of ascorbic acid phosphate was lost, compared to 50 to 60% of L-ascorbic acid. Because of increased stability during processing and high vitamin C activity, ascorbic acid phosphate will probably be a major source of vitamin C in fish feeds in the future. This will reduce the level of vitamin C supplementation necessary in fish feeds, which should mean a cost savings and increase the assurance that the feed is sufficient in vitamin C when fed to fish.

Lovell is Professor and El Naggar is Doctoral Graduate Research Assistant of Fisheries and Allied Aquacultures.

D.L. KUHLERS and S.B. JUNGST

GENETIC SELECTION FOR GROWTH GETS FEEDER PIGS TO MARKET QUICKER



GETTING feeder pigs to market early could save producers money by shortening the return time on investments in the animals and reducing labor time. Research in the Alabama Agricultural Experiment Station indicates that genetic selection for pigs that grow more rapidly between weaning and 70 days can shorten production time and save producers money.

In the 6-year Auburn test, a line of Landrace pigs was selected specifically for 70-day weights. These pigs weighed 10.1 lb. per pig more at that age than Landrace pigs not selected for 70-day growth. There was little difference in birth weight or weaning weight of the select line of pigs versus the control pigs, indicating that all the increased growth came between weaning and 70 days, see table.

The experiment was initiated in 1982 using a single population of Landrace pigs, which were weighed at 70 days of age. One line was selected for heavier 70-day weight (select line). The second line was randomly bred, with each sire leaving a son and each sow leaving a daughter to go back into the herd as replacement animals (control line). All other production characteristics, except 70-day weight, were ignored in selection decisions throughout the 6-year test.

Management of the pigs from the select and control lines was as similar as possible, with both groups of animals reared in the same building and fed the same diets. Weights of the pigs were recorded at birth, 21 days, 35 days (weaning), and 70 days of age. Because no outside breeding stock was introduced into either breeding line, the inbreeding of pigs increased to about 21% in both lines at the end of the sixth year. After 6 years of selection, the select-line pigs averaged 10.1 lb. more weight than the control line at 70 days of age, which corresponds to a 13% heritability. However, the select-line pigs were only 0.3 and 0.4 lb. heavier than control line pigs at birth and at weaning, respectively, and they did not differ in their preweaning average daily gains. In the 35-day postweaning period, the select pigs grew 0.27 lb. per day faster than control pigs.

This study indicates that genetic selection for heavier 70-day weights in pigs would not be an effective means to increase preweaning pig weights or growth rates. However, it appears that purebred swine producers can help feeder pig producers get their feeder pigs to market more rapidly or at heavier weights by selecting for heavier 70-day weights. Furthermore, feeder pig producers can improve their profitability by more carefully considering postweaning performance information supplied by breeding stock suppliers.

WEIGHTS AND GAINS OF SELECT VS. CONTROL PIGS AFTER SIX YEARS OF SELECTION

Item	Select	Control
Trait		
Birth, lb.	3.7	3.4
Weaning, lb.	18.0	17.6
70-day wt., lb.	48.7	38.6
Average daily gains		
Preweaning, lb./day	.40	.40
Postweaning, lb./day	.87	.60

Kuhlers is Professor and Jungst is Research Associate of Animal and Dairy Sciences.

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