HIGHLIGHTS

of agricultural research

VOL. 19, NO. 3/FALL 1972

Agricultural Experiment Station
AUBURN UNIVERSITY

NEW STATION DIRECTOR APPOINTED

R. D. Rouse Promoted to Top Post in School of Agriculture-Agricultural Experiment Station on Retirement of E. V. Smith

R. D. ROUSE

DR. ROY DENNIS ROUSE, newly appointed Dean and Director, School of Agriculture and Agricultural Experiment Station, brings to his new position a wealth of experience in teaching, research, and administration.

Having served as Associate Director and Assistant Dean for the past six years he is thoroughly familiar with the administrative duties of the new post. Dr. Rouse joined the Auburn University faculty as an assistant professor and soil chemist in 1949. He taught graduate and undergraduate courses in soil chemistry and soil fertility for 15 years prior to his administrative duties which began in 1966. For several years he headed the Soil Testing Laboratory where he developed procedures for certification of Commercial Soil Testing Laboratories, and working with the State Board of Agriculture and Industries in getting this program initiated it was possible to get passage of a new Alabama fertilizer law.

Dr. Rouse is a native of Andersonville, Georgia. He attended Georgia Southwestern College and received the Bachelor of Science and Masters degrees from the University of Georgia. He received the Ph.D. degree from Purdue University, majoring in soil chemistry and plant physiology.

Dr. Rouse now serves as a member of the Graduate Faculty and for six years he was a member of the Graduate Council, policy making group for the Graduate School. He has served as a major professor and on graduate committees for numerous students working toward M.S. and Ph.D. degrees.

He has been significantly involved in work with department heads and superintendents of the 10 substations, ornamental field station and four experiment fields to develop a more effective and efficient research program in keeping with the role and mission of the Alabama Agricultural Experiment Station System.

In 1970, Dr. Rouse was elected by the Association of Southern Agricultural Experiment Station Directors to serve an unexpired term on the Committee of Nine, and in 1971 was appointed to a full three-year term by the Secretary of Agriculture. The Committee of Nine is a statutory committee of USDA that recommends cooperative regional research projects for approval by the Secretary of Agriculture. He holds membership in numerous professional and honorary organizations.

In making the announcement Auburn University President Harry M. Philpott said, "We are pleased to have a man with Dr. Rouse's experience and training to assume this important position. He is well-known throughout the State, is held in high esteem by his colleagues, and his appointment will give continuity to our diverse agricultural programs.

"Under Dr. Rouse's leadership, Auburn will continue as a leader of agriculture and of the fast developing agribusiness in Alabama. As dean and director, he will be in an important position to develop new programs and ideas in an area of the University which has such a heavy responsibility to the State and region."

may we introduce . . .

Dr. Ralph R. Harris, senior author of the articles on pages 3 and 9. Dr. Harris is Associate Professor in the Department of Animal and Dairy Sciences with major responsibility for research on forage systems for growing-finishing beef steers. The Winfield, Ala. native received his B.S. and M.S. degrees from Auburn and his Ph.D. from Texas A&M. His major area of study for his graduate work was in animal nutrition. In addition to his research in forage utilization, Dr. Harris also teaches courses in animal nutrition.

Dr. Harris has authored or co-authored numerous articles and publications on forage production and utilization and has been one of the leaders in the push to expand cool season grazing as an economic tool of Southern beef producers.

He is a member of Sigma Xi, Alpha Zeta, and Gamma Sigma Delta. Dr. Harris first joined the Auburn staff as a Graduate Assistant in 1951. Following completion of his Ph.D., he was appointed Assistant Professor. In 1963 he was made Associate Professor.

HIGHLIGHTS of Agricultural Research

FALL 1972 VOL. 19, NO. 3

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ON THE COVER. Stocker calves grazing small grain-clover pasture at the Gulf Coast Substation, Fairhope.

Small Grain — Clover Grazing for Stocker Calves

R. R. HARRIS
Dept. of Animal and Dairy Sciences

H. F. YATES and N. R. McDANIEL
Gulf Coast Substation

OATS OR RYE interseeded with ryegrass and clover provided excellent grazing for stocker calves at the Gulf Coast Substation.

During a recent 3-year study (1968-70) those crops supported gains of 1.80 lb. daily for a 184-day period when pastures were stocked at 1.22 steers per acre. Calves from this grazing produced Good and Choice carcasses when slaughtered following an 86-day fattening period. Feeding corn silage and supplement followed by a comparable fattening period was a good alternative method of producing slaughter cattle of similar grades.

The land area was summer fallowed to conserve moisture and control weeds. In early September, a complete fertilizer was broadcast in amounts sufficient to supply per acre about 25 lb. of N, 35 lb. of P, and 60 lb. of K. Fertilizer was incorporated by disking. By mid-September, approximately 100 lb. of oats or rye, 15 lb. of ryegrass, and 7 lb. of clover seed per acre were planted using a grain drill. Crimson clover was used during 1968 and 1969; Yuchi arrowleaf clover was planted during 1970. Grazing began Nov. 9 and ended May 12.

Stocker steers of mixed beef breeding and weighing about 490 lb. grazed test pastures without interruption and did not receive supplemental feed during the 184-day grazing season. They gained an average of 331 lb. per steer or 1.80 lb. daily from November to May. Comparable calves full-fed corn silage supplemented with about 2 lb. of corn and 1.5 lb. of soybean meal gained 262 lb. per head or 1.50 lb. daily during this same period.

At the end of the small grain-clover grazing season, a portion of the cattle that had been grazed were sold individually through a livestock auction market. Twenty-seven of the 33 steers sold in this manner (82%) were purchased as feeder cattle with the remainder going to slaughter. Steers with an average weight of 817 lb. at end of grazing shrunk 6.4% based on weight off grazing and sale weight at auction. The remainder of the grazed cattle were finished in drylot on a blended fattening mixture. During the 86-day drylot fattening, these cattle gained 2.20 lb. daily and had Good or Choice carcasses at slaughter, see table.

During the fattening period, cattle that were fed silage and supplement during the initial 175 days gained similarly to those fed following grazing. Gains for the combined grazing and fattening periods favored the grazed group by about 50 lb. per animal. The feed cost for the 528 lb. of post-weaning gain for the grazed cattle averaged $17.70 per cwt. compared to $20.24 for the 482 lb. of gain on the silage-fed cattle.

In this experiment, an average of 404 lb. of beef gain per acre was produced on the oats (rye)-clover pasture. At the end of such grazing, steers were well-suited for finishing to produce 1,000 lb. Good-Choice slaughter cattle. The combination growing-finishing system resulted in more beef per brood cow than the typical system of selling the weaned calf. In addition, the post-weaning gain of approximately 500 lb. was produced at an economical feed cost.

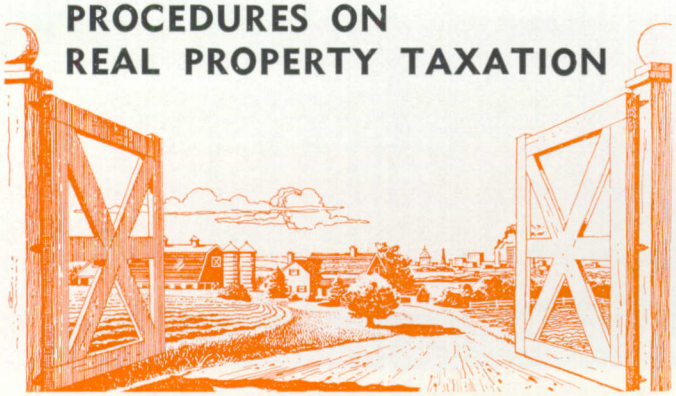
PERFORMANCE OF STEERS ON SILAGE OR GRAZING
GULF COAST SUBSTATION, 1968-70

Item	Corn silage + supplement; blended fattening mixture	Grazed small grain-clover; blended fattening mixture
Growth phase		
Days	175	184
ADG, lb.	1.50	1.80
Drylot finishing		
Days	96	86
ADG, lb.	2.29	2.20
Feed/cwt. gain, lb.[1]	901	991
Carcass grades, no.		
USDA Choice	18	13
USDA Good	10	17
Growth-finish combined		
Feed $/cwt. gain[2]	20.24	17.70

[1] Blended mixture consisted of 69% ground shelled corn, 20% grass hay, 10% SBM, .5% salt, .5% dicalcium phosphate.
[2] Silage charged @ $8.39/T, pasture @ $43.87/acre, blended fattening mixture @ $58.98/T.

implications of

ALTERNATIVE ASSESSMENT PROCEDURES ON REAL PROPERTY TAXATION



HOWARD A. CLONTS, JR.
Department of Agricultural Economics and Rural Sociology

PROPERTY TAX receipts in rural Alabama rose 51% during the past 10 years. Basically, these increases were caused by sharp rises in the cost of public programs supported by property taxes, increasing populations, and demands for more and better public services. Paradoxically, more and better quality public services associated with increases in land value resulted in even higher assessments, which further increased taxes.

The assessment procedure represents a common area of misunderstanding in real property taxation issues. A surprisingly large number of individuals interpret an assessment rate of 20% to mean their property taxes will amount to 20% of property value. Actually, the estimated market value of real property is multiplied by the assessment rate (20% in the example used) to arrive at the assessed value. Tax is paid on this calculated value. For example, an acre of land estimated to have a market value of $500 when assessed at 20% has an assessed value of $100. If the local tax rate is 25 mills ($25 tax per $1,000 assessed value), the actual property tax will be $2.50 per acre – not $100 as often believed.

Alternative Assessment Procedures

Several variations of assessment methods are practiced, but there are three basic plans: preferential assessment, deferred taxation, and restrictive agreements. Collectively, these variations are referred to as "differential assessment."

Differential assessment forms were established for several reasons:

- Farmers caught in a cost-price squeeze realized property values had risen above levels supportable by farm incomes, and these higher land values meant higher property taxes.
- Urbanites concerned with loss of open spaces and deterioration in environmental quality realized that higher taxes caused more rapid land development.
- Other people were concerned simply because their property taxes were increasing.
- Pressures for relief from these areas caused state and local tax officials to look for remedies. Generally they turned to differential taxation.

PREFERENTIAL ASSESSMENT in its simplest form provides that land be assessed on the basis of its value for a particular use. Market values representing potential new uses are not considered. For example, an acre of land having an estimated market value of $500 may be worth only $200 for agricultural uses. Under preferential assessment, the 20% assessment rate and 25-mill tax rate are applied against the $200 value. Actual taxes paid per acre would be $1. There may be several variations to this procedure, but the basic concept remains unchanged.

DEFERRED TAXATION allows land to be assessed according to its fair market value. However, tax payments reflecting the difference in actual and potential use-value may be postponed until a change to that use actually occurs. Generally, the tax difference is retroactive only for the year of a land-use change and 2 years immediately preceding. Land sales may coincide with the land-use change, but are not necessary.

RESTRICTIVE AGREEMENTS allow a community or state more flexibility in land-use planning than preferential or deferred tax plans. A land-use restriction agreement must be applied for by an individual landowner. If the state's review indicates that the land is suitable for the intended use and promotes the overall development plan of the state, the application is approved and tax assessments adjusted accordingly. Once an agreement is reached, the right to change from the intended use is forfeited for a minimum time – commonly 10 years.

Alabama's Situation

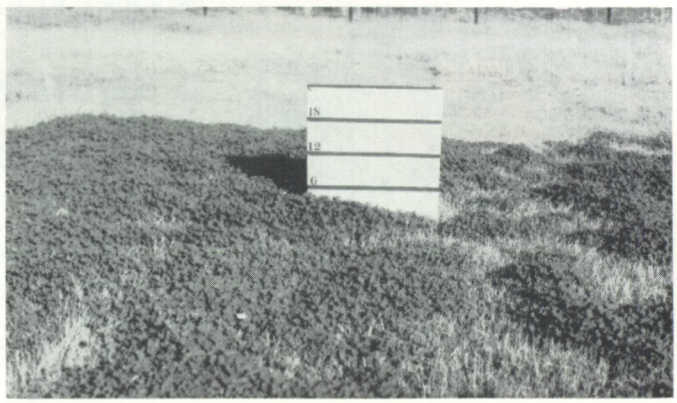
On May 30, 1972, Alabama voters approved a constitutional amendment establishing differential assessment of real property. It specifies that all agricultural and residential property be assessed at 15%, commercial and other business property at 25%, and holdings of public utilities at 30% of full fair market value. The law is a form of preferential assessment to afford different treatment of land in specific uses. However, no use-value provisions are included.

A comparison of taxes due under alternative assessment procedures is given in the table. Implications of alternative assessment procedures are obviously significant in this comparison of agricultural use-value of $1,000 and potential use-value for other purposes of $10,000. The normal differential plans are much more favorable to one land use, agriculture in this case, than the new Alabama plan or an alternative plan calling for a flat 30% assessment rate that was offered but rejected. The real problem in administering the new Alabama law will be determination of "full fair market value." In any event, however, it is clear that property taxes are directly influenced by the assessment procedure.

COMPARISON OF TAXES DUE UNDER ALTERNATIVE ASSESSMENT PROCEDURES, ASSUMING POTENTIAL PROPERTY VALUE OF $10,000, AGRICULTURAL USE-VALUE OF $1,000, AND EFFECTIVE TAX RATE OF 25 MILLS

Assessment alternative	Agriculture[1]	Land use commercial	All others
Differential, 20%	$ 5.00	$50.00	$50.00
Alabama, 15-25-30%	37.50	62.50	75.00
Alabama proposed, 30%	75.00	75.00	75.00

[1] The 15% rate in Alabama also applies to residential property.



This early March scene shows somewhat more forage from seeding rate of 10 lb. (left) than 5 lb. per acre (right) on Coastal sod.

Easy Establishment of Yuchi on Coastal Bermuda Sod

C. S. HOVELAND and R. F. McCORMICK, JR.
Department of Agronomy and Soils
E. L. MAYTON, *Piedmont Substation*

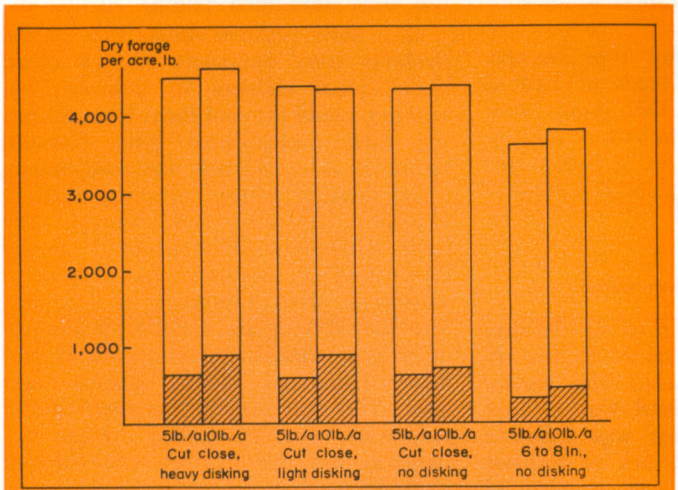
HARD WORK doesn't always pay! For example, planting Yuchi arrowleaf clover in Coastal bermudagrass sod the "easy way" is as good as using harder methods.

Results over 3 years at the Piedmont Substation showed that broadcasting Yuchi seed on closely mowed Coastal sod gave clover yields similar to disking before planting. Disking the sod was actually harmful, since it encouraged weed growth in summer.

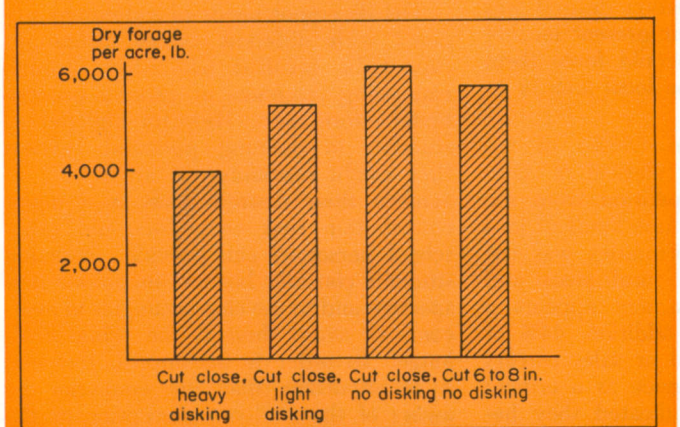
Experiments were established on Coastal bermuda sod during October in each of 3 years. Four main treatments were used:

- Grass cut close and heavy disking with large tractor double-disk.
- Grass cut close and light cutting of sod with disk.
- Grass cut close and no disking.
- Grass left 6 to 8 in. tall and no disking.

Treatments were imposed on new grass areas each autumn as well as on the old areas. Seeding rates of 5 and 10 lb. per acre of inoculated scarified Yuchi arrowleaf were used with each of the sod treatments. Diazinon insecticide was applied to control striped field crickets. Two to three harvests of clover were made starting in March and ending in mid-May. Coastal bermuda sod was fertilized with 50 lb. per acre N in May and again in July.



Effect of sod treatment and seeding rate on Yuchi arrowleaf clover forage yield. Hatched area of bar represents forage produced by mid-March; entire bar is total annual yield.



How sod treatment at clover planting time affects forage yield of Coastal bermuda is shown by these comparisons.

In 2 of the 3 years, autumn drought delayed clover germination until late November. By late January, however, clover covered 50 to 100% of the ground in each year. Sufficient clover was available for grazing by early March, as shown by the photo.

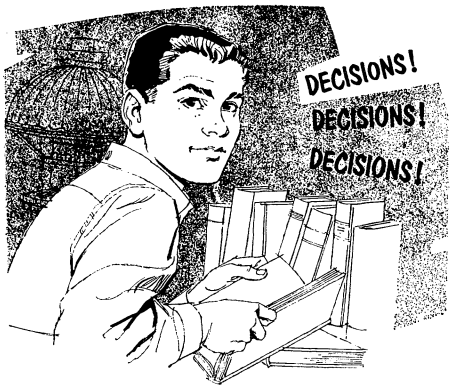
Increasing seeding rate had no effect on total yield of clover forage. In only 1 of the 3 years did the 10-lb. rate result in more clover by mid-March. Thus, it appears that a rate of 5 lb. per acre of scarified seed is adequate.

Disking the sod at planting did not improve either early forage or total clover yield. Total clover yields averaged more than 4,000 lb. per acre. Leaving a grass stubble of 6 to 8 in. delayed spring forage and reduced total yield in 2 of the 3 years. Clover stands also were poorer with tall grass stubble.

Coastal bermuda yield after clover was about 6,000 lb. per acre when the sod was not disked, compared with 4,000 lb. after heavy disking. Clover plus grass with 100 lb. N per acre yielded a total of about 10,000 lb. dry forage per acre. Since Coastal yields little forage before late May at the Piedmont location, planting clover in the sod adds about 2 months additional production. Heavy disking not only reduced the weed-free bermudagrass yield by 2,000 lb. per acre, but also increased the number of weeds in the sod.

Repeating the same treatments a second year on the same plots resulted in similar clover yields. However, Coastal stands and yields were reduced under heavy disking.

Yuchi arrowleaf clover can be successfully grown in Coastal bermuda sod without tillage if the grass is grazed closely or mowed and removed before seeding. Heavy disking can be expected to increase weeds and reduce grass yields.



OBSTACLES of YOUTH in REACHING ADULT GOALS

J. E. DUNKELBERGER
A. B. PRATT
H. V. CULPEPPER
Department of Agricultural Economics and Rural Sociology

CONSIDERABLE CONCERN is being shown for "career education" in the Alabama public school system. The prime goal is to prepare students for a successful work life by increasing their options for occupational choice.

Today traditional school programs aimed at providing occupational information are being challenged. More specialized kinds of career assistance are being demanded which center around the types of barriers students visualize to their career attainment.

What kinds of occupational career goals are desired by high school students? What barriers do students identify as preventing the achievement of their desired occupational goals?

Data pertaining to these questions were obtained from twelfth grade students attending a sample of 18 high schools in both rural and urban areas of northeastern Alabama. Questionnaires were administered to 1,200 seniors in 1972. Students were asked to indicate their occupational goals in terms of the kinds of jobs they would most like to have and to indicate any barriers that would make it difficult for them to achieve these goals.

Occupational Goals

More than 2/5 or 43% desired careers of a professional type. The most commonly mentioned professions were in the health and education areas. An additional 7% aspired to glamor occupations usually assigned to the professional category. These included such occupations as stewardess, professional athlete, model, and astronaut.

Clerical and sales occupations which attracted a disproportionate number of girls were a far distant second as a career choice. Sixteen per cent of the students were oriented to such occupations. The majority identified a secretarial career as their goal. The predominantly male occupations of craftsman and foreman represented the career goal of 12% of the students. The most commonly mentioned skill (4%) was that of mechanic. Semi-skilled jobs such as machine operator and truck driver or service jobs as fireman and policeman were desired by 12% of the students.

Manager or proprietor type occupations were the career goals of 10% of these youths. Among this group were 3% who desired either to own or manage a farm. The desire to be self-employed was indicated by only a small portion of the youths interviewed.

Barriers to Career Goals

Students responded to six barriers often identified as obstacles to the attainment of career goals. The barrier most commonly perceived was lack of experience (29%). This was followed closely by the barriers lack of training or education and the large number of people desiring this kind of work who compete for the available jobs. Also, some students revealed an awareness that the kind of occupation desired was not to be found in their present locality (16%) and that this would force them either to move from the local area or to seek another career.

More than one-third (36%) of the young people desiring clerical or sales careers indicated competition from too many persons seeking these kinds of jobs for the available opportunities was the major barrier. Within rural areas and small towns this assessment appears a most realistic one. In addition, 44% of the aspirants to clerical or sales careers saw the lack of experience as a critical barrier. About 20% indicated they believed there was a shortage of such jobs in the area and that they lacked the education and training to achieve their career goals. These young people were the most pessimistic about their potential for career success.

Youth desiring skilled and semi-skilled occupations also expressed considerable pessimism about their chances to attain the blue collar jobs they desired. Here lack of experience was seen as the most pressing concern with education and special training ranking second.

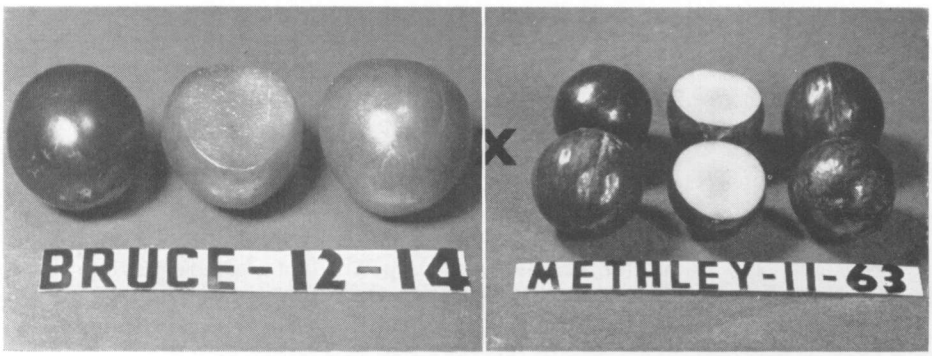
A lack of education was mentioned most often with too much competition for the available jobs and lack of experience also seen as barriers by more than 20% of those desiring professional careers.

Young people desiring to enter careers as proprietors or managers generally visualized the fewest barriers to their goal achievement. This is explained by the fact that many of these young people have identified their career goals with family businesses such as farming and small companies where they have a sense of security about their potential for initial entry into their chosen occupation.

In a more positive sense, 17% of the students were optimistic enough about their career chances to indicate that nothing would prevent them from achieving their occupational goal. Greatest optimism or confidence was seen among those desiring careers as proprietors or managers (including farm owners). The least confidence was observed among those desiring careers in the clerical or sales area. It is interesting to note that less than 20% of the students desiring to enter professional careers appeared confident that they would achieve their goal. This may account for much of the indecision observed among college students as they change from one course of study to another and to new career goals.

Implication

The divergent needs of individual students with different career aspirations cannot be satisfied effectively through counseling programs of general occupational information. Help for high school students in defining potential barriers they might encounter in attempting to achieve their desired goals is a major contribution that counselors and other school personnel can provide. Assisting students consider barriers in proper perspective and to develop strategies to overcome or avoid these is the prime challenge. In order to accomplish this end it is important that the counselor be aware of the students perception of the barriers to his career goal and work with small groups of students who share similar perceptions of goal barriers.



The Crimson variety was selected from a cross of Bruce X Methley.

CRIMSON and PURPLE, TWO DISEASE RESISTANT PLUMS

JOE NORTON, *Department of Horticulture*

CRIMSON AND PURPLE are two new plum varieties developed by the Auburn University Agricultural Experiment Station for growing in central and northern Alabama. The varieties have proved capable of making good yields of high quality fruit where bacterial spot, bacterial canker, black knot, ring spot, and green mottle are problems.

The new varieties have high resistance to these diseases. In addition, Crimson has moderate resistance to brown rot. Such resistance is particularly important in the Southeast where prevalence of these diseases and susceptibility of commercial varieties have discouraged plum production.

Resistance to one or more of the common fungal, bacterial, and viral diseases was present in the parents of the new varieties; however, neither parent possessed resistance to all of them.

From Resistant Parents

Crimson was selected from a cross of Bruce X Methley. It inherited resistance to bacterial and fungal diseases from Bruce. These characters are combined with the resistance to viral diseases and high quality fruit of Methley.

Purple was developed from a cross of Methley X Ozark Premier. It received resistance to bacterial and fungal diseases from Ozark Premier and additional resistance from a combination of genes from both parents. Resistance to viral diseases was secured from Methley and good fruit quality was inherited from both Methley and Ozark Premier.

TABLE 2. MARKETABLE PLUM FRUIT AT 35° F STORAGE

Cultivar	Weeks of storage				
	3	6	9	12	14
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Bruce	20	5	0	0	0
Crimson	100	90	65	30	15
Methley	95	70	20	0	0
Ozark Premier	90	65	15	0	0
Purple	100	85	55	25	8
Santa Rosa	100	80	45	20	5

Trees of Crimson and Purple are vigorous and disease-free. Growth habit of Crimson is spreading with medium green foliage. Purple trees are erect with dark green leaves.

Fruit Quality Good

Fruit of Crimson are crimson red externally and internally. Color develops about 3 weeks before fruit are mature. The fruit are firm at maturity. Fruit quality is excellent as shown in Table 1. Fruit size is 1½ to 1¾" in diameter. The flesh clings to the pit. Purple fruit are dark red externally at maturity. Internal fruit color is cream. Color develops about 3 weeks before maturity. Fruit quality is good. Fruit size is 1¾" in diameter. The fruit are semicling.

Both Crimson and Purple may be stored for 3 weeks or more to extend the marketing period. The firmness of the fruit makes them suitable for handling in storage, packing, and shipping to local and distant markets.

Grown under the numbers Bruce 12-14 (Crimson) and Methley 11-63 (Purple), the two varieties have been in trials at several locations of Auburn's Experiment Station System and in other Southern States. They compare favorably with other varieties in yield and quality. Thus, they should help fill the need for commercially acceptable varieties of good quality for production in the South.

Trees of Crimson and Purple should be available for planting in the winter of 1973-74.

TABLE 3. DISEASE RESISTANCE OF PLUM VARIETIES

Variety	Disease index[1]						
	Bacterial spot	Bacterial canker	Black knot	Ring spot	Green mottle	Brown rot	Av.
Bruce	0	0	0	5	5	4	2.3
Crimson	0	0	0	0	0	1	0.2
Methley	3	5	5	0	0	3	2.7
Ozark Premier	0	1	1	3	3	3	1.6
Purple	0	0	0	0	0	3	0.5

[1] Disease Index: 0 = No injury to 5 = Severe injury.

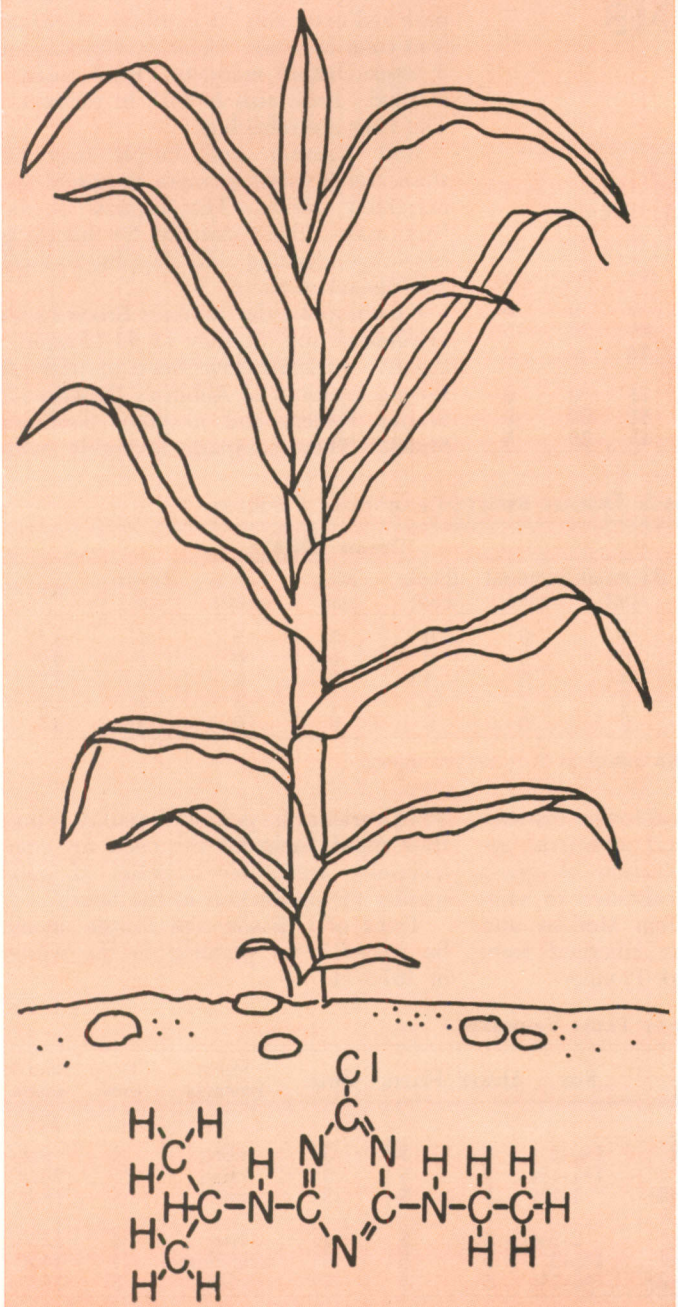
TABLE 1. CHARACTERISTICS OF PLUM VARIETIES

Variety	Bloom date	Harvest date	Fruit set[1]	Flesh color	Skin color	Size	Shape[1]	Flavor[1]	Firm[1]	Stone freeness	Texture[1]	Soluble solids
												Pct.
Bruce	3/20	6/29	5	orange to red	orange to red	1¾-2	5	3	3	cling	3	9.4
Crimson	3/22	7/15	5	crimson red	crimson red	1½-1¾	5	5	5	cling	5	16.3
Methley	3/22	6/10	5	dark red	dark red to purple	1-1¼	5	5	3	cling	5	18.5
Ozark Premier	3/20	7/10	5	cream	red to purple	2-2¼	5	5	4	free	5	15.7
Purple	3/24	7/20	5	cream	dark red to purple	1¾-2	5	5	5	semi cling	4	14.8
Santa Rosa	3/24	7/5	4	red	dark red to purple	¼-1½	5	5	5	cling	5	16.7

[1] Rating Index: 5 = Excellent, 4 = Good, 3 = Fair, 2 = Poor, and 1 = Very Poor.

WHAT HAPPENS to ATRAZINE in the SOIL?

A. E. HILTBOLD and G. A. BUCHANAN
Dept. of Agronomy and Soils



ATRAZINE is currently the most widely used herbicide for weed control in corn. It controls many grass and broadleaf weeds with a wide margin of safety to corn.

The activity of atrazine in soil usually persists about 4 to 8 weeks. Occasionally, persistence of atrazine is a problem in the North and Midwest. Preemergence applications to corn may carry over to injure following crops such as small grain, soybeans, or sugar beets. Label restrictions on the use of atrazine in corn specify that treated areas are not to be planted to crops other than corn or sorghum until the following year.

Field Studies

Persistence of atrazine in Alabama soils has been investigated in field experiments at the Wiregrass, Sand Mountain, and Tennessee Valley substations since 1962. When applied preemergence at normal rates to corn, atrazine has not persisted in the soil to injure small grains planted in the fall. Peanuts, soybeans, or cotton following corn treated with atrazine the previous year have shown no effects of the herbicide. There is no evidence of atrazine accumulation in soil with application every year in continuous corn. These long-term results are an interesting contrast to reports of atrazine persistence in other regions and raise questions as to the fate of atrazine in Alabama soils.

Leaching and inactivation of atrazine in three field soils were measured during the spring and summer of 1966. Rainfall moved small amounts of atrazine as deep as 3 to 5 in. into the soil. Inactivation of atrazine occurred so rapidly, however, that the effects of leaching were erased by October. Atrazine activity was reduced by ½ each 30-36 days in the warm, moist soil. At this rate, 3 lb. of atrazine applied preemergence in mid-April would be reduced to such a low level by mid-September that it would be harmless to sensitive fall crops such as oats or wheat.

Laboratory Tests

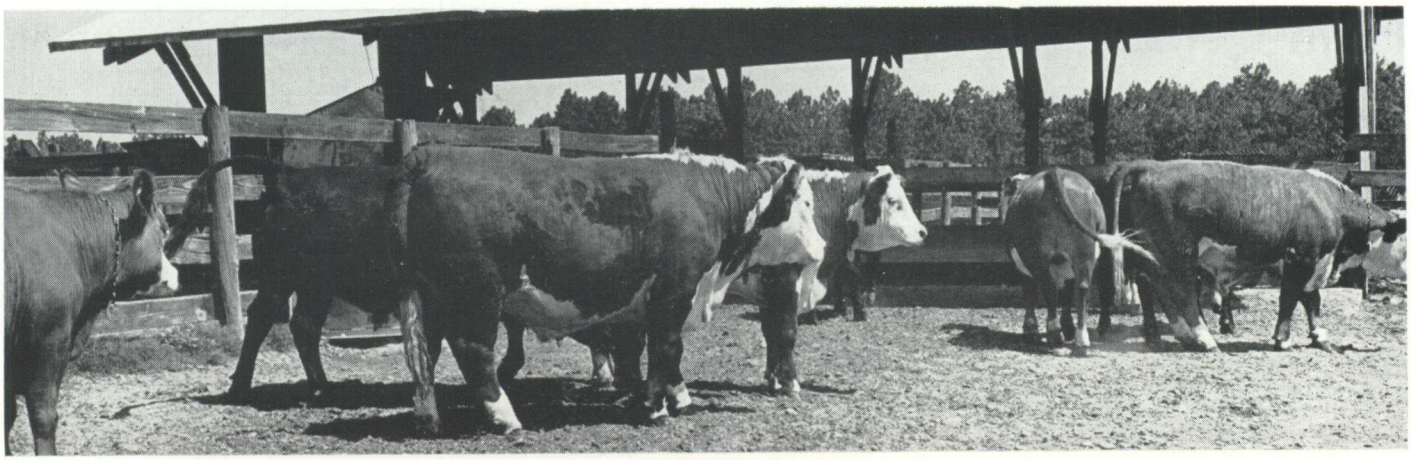
Laboratory experiments conducted to determine the means by which atrazine loses activity in soil showed that the primary loss process was hydrolysis. In this reaction, atrazine loses a chlorine atom upon which its activity depends. Hydrolysis was associated with microbial growth in soil. Stimulating microbiological activity by adding organic matter or increasing temperature resulted in more rapid loss of atrazine. Soil microorganisms not only accomplish the initial attack on atrazine but also carry out the ultimate breakdown of the herbicide.

The initial hydrolysis and loss of phytotoxicity was also found to occur independently of microbial growth by chemical reaction of atrazine with soil organic matter and clay. In 6 soils studied, about ½ to ⅔ of the inactivation was attributable to this non-biological reaction.

Effect of Soil pH

The soil factor most influential in determining the rate of atrazine hydrolysis was soil pH. At pH 5 the rate of hydrolysis was 1.6 to 2.0 times greater than at pH 7. This may have practical value in that maintenance of a favorable pH for maximum crop production may also enhance the persistence of atrazine to provide a longer period of weed control.

Conditions which appear to be responsible for the relatively low persistence of atrazine in Alabama soils are (1) generally acid soil reaction (below pH 6), (2) high soil temperature following application, and (3) high rainfall during the growing season.



CORN SILAGE + SUPPLEMENT Good Growing Ration for Beef Steers

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H. F. YATES and N. R. McDANIEL, *Gulf Coast Substation*

PROPERLY SUPPLEMENTED CORN SILAGE is a good ration for growing stocker steers. Satisfactory corn silage yield and quality combined with good steer performance in recent-year tests at the Gulf Coast Substation, Fairhope, indicate potential for the feeding system.

Silage yields averaged 12.2 tons per acre during 1968-70. Quality determinations showed the silage to be 35% dry matter (at ensiling) and to contain 39% grain (dry matter basis).

Soybean meal (44%) and Auburn-65 protein supplements were compared when fed with corn silage. (Auburn-65 is a urea-cottonseed meal base dry supplement with protein equivalent of 65%.) Steer calves of mixed beef breeding were confined to drylot and full-fed corn silage with a limited amount of corn and protein supplement for an average of 175 days. This period is identified as the growth phase.

At the end of the growth phase all calves went to the feedlot for finishing. They were full-fed a blended fattening mixture (69% ground shelled corn, 20% grass hay, 10% cottonseed meal, 0.5% salt, and 0.5% dicalcium phosphate) until they reached slaughter finish.

STEER PERFORMANCE DURING GROWING-FINISHING STUDY, GULF COAST SUBSTATION, 1968-70

	Silage with corn + soybean meal	Silage with corn + Auburn-65[1]
Growth phase		
Steers per treatment	28	29
Days fed silage + supplement	175	175
Initial weight, lb.	486	494
Weight at end silage feeding, lb.	751	731
Average daily gain, lb.	1.51	1.35
Daily feed/steer, lb.:		
Corn, ground shelled	2.2	2.2
Soybean meal (44%)	1.5	—
Auburn-65	—	1.0
Silage	28.7	28.7
Feed cost/cwt. gain, dollars[2]	14.87	16.29
Fattening phase		
Average daily gain, lb.	2.30	2.55
Blended mixture/cwt. gain, lb.	893	845
USDA carcass grades:		
No. Choice	18	18
No. Good	10	11

[1] Urea-containing dry supplement, 65% protein equivalent.
[2] Costs per ton: silage, $8.39; soybean meal, $85.33; Auburn-65, $85.00; corn, $54.80.

Calves that received soybean meal gained at an average rate of 1.51 lb. daily during the 175-day growth period. Those getting Auburn-65 supplement grew slower, having average daily gain of 1.35 lb. (These rates of gain did not differ significantly.)

Calves being fed the different protein supplements ate essentially the same total quantities of corn and silage. However, feed requirements were lower in the group on soybean meal supplement: 146 vs. 167 lb. of corn and 1,925 vs. 2,187 lb. of silage per cwt. gain. This difference in feed efficiency and the similarity between prices for the protein supplements resulted in lower feed cost per cwt. of gain for the soybean meal-fed group, $14.87 vs. $16.29.

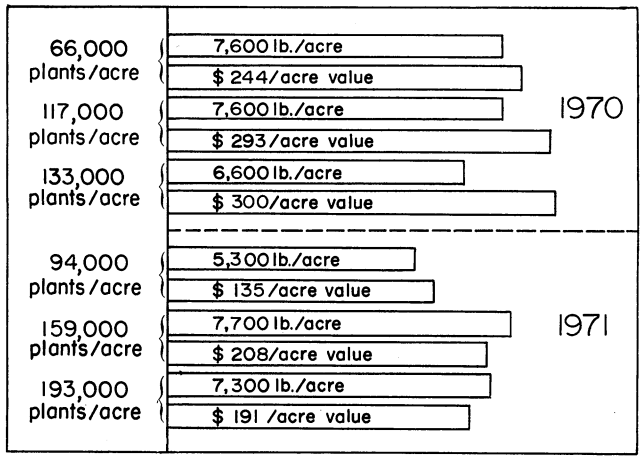
The advantage shifted in the feedlot, with steers that had been fed Auburn-65 gaining faster. Their average daily gain during the 98-day fattening period was 2.55 lb. as compared with 2.30 lb. for those coming off the soybean meal supplemented silage. Thus, at the end of the 273-day combined growing-finishing period, total gain per steer was similar for the two groups (490 and 482 lb. for soybean meal and Auburn-65 supplemented feed). Feed costs for total gain were $20.38 and $20.70 per cwt., respectively.

Carcasses from all cattle were either Good or Choice and were quite desirable generally. There were no important differences related to treatments.

In this Gulf Coast Substation study, stocker calves full-fed corn silage and 2.2 lb. of corn daily gained about 10% slower when fed a urea-containing protein supplement instead of soybean meal. Rates of gain reversed during a subsequent finishing period, resulting in combined growing-finishing gains being almost the same for the two groups of cattle.

High Density Plantings Give Higher Production of Cucumbers, Southern Peas

O. L. CHAMBLISS and J. L. TURNER, *Dept. of Horticulture*



Yield and dollar value of Southern Cross cucumber grown at high density for machine harvest.

MACHINE HARVEST of most vegetable crops is based on a once-over, destructive harvest principle. Therefore, all effort is aimed at concentrating maturity and increasing per acre yield at the single harvest. Most plant breeding programs are aimed at developing plants adapted to once-over machine harvest.

High Density Plantings Tried

A more immediate attempt at increasing yields in once-over harvest is to grow more plants per acre. In Auburn studies, high density plantings have been tried to increase once-over harvest yield of pickling cucumbers and southern peas.

Because of its growth characteristic called "crown fruit dominant," the pickling cucumber is most unadapted to once-over harvesting. This characteristic means that when the first crown fruit is set and begins to enlarge it inhibits growth of other fruit on the plant. With 20,000 plants per acre in previous studies, yields of desirable size cucumbers were low in proportion to over-size fruits. This appeared to be caused by each plant producing only one fruit. Thus, high plant populations are needed for high yield.

High density populations varying from about 60,000 to almost 200,000 plants per acre were obtained by planting on beds with 2, 3, and 4 rows on 6-ft. centers. Plants were thinned to 7 per foot of row. Southern Cross variety was planted both years. Once-over harvesting was done when over-size and cull fruits totaled about 10%.

Cucumber Yields Increased

Increasing plant populations upped yield. Highest yields each year were valued at $200 to $300 per acre – not poor for one-time harvest. Normal plant densities (around 20,000 per acre) harvested by hand 10 or 12 times gross around $500 per acre or less. With labor involved in making 10 or more hand harvests, getting half as much gross value from the once-over harvest makes the high-density plantings look good. Success of once-over harvest requires that 90 to 95% of fruit be in grades 1, 2, and 3.

Disadvantages Found Also

High density plantings don't solve all problems, however. Disadvantages include higher seed cost (especially with hybrid varieties), increased need for fertilizer and moisture, and need for intensified pest control.

Southern peas grown for processing can be successfully harvested by machine in conventional 36- to 42-in. rows. However, high density plantings offer potential yield increases, especially when harvested with the green pea combine. This potential improvement was investigated with plant populations ranging from 30,000 per acre in 36-in. rows (2-row plot) to 90,000 in a 4-row plot. A small plant type cream pea breeding line was compared with the larger Mississippi Silver. Plots were harvested once-over when approximately 25% of pods were dry.

Response of Peas Differed

In general, yields were increased by increasing plant density. However, increasing plant population past the currently used 20,000 to 30,000 per acre appears to offer only slight yield response. It was noted that smaller plants designed for mechanized harvest were consistently more responsive than larger plant types. In one case, Mississippi Silver yield dropped with increased population density (28,000 plants per acre made 600 lb. more than 42,000 when grown in 2-row plots). When approximately the same population was grown in 3-row plots, yield increased.

Thicker planting of Ala. 9-2-4 gave increased yield, except for the 3-row plot with 61,000 plants per acre. It did not produce more than the 3-row plot with 42,000 plants per acre. Even though Ala. 9-2-4 was more responsive to increased plant density, its highest yielding plot produced 700 lb. less than the lowest yielding plot of Mississippi Silver. This is a varietal difference, and it is common for brown skin crowders like Mississippi Silver to outyield cream type varieties.

These results indicate that high density planting has potential for increasing yield of some vegetable crops. However, increased plant populations may be of little benefit unless varieties and cultural practices are adapted to competitive conditions under which the plants are grown.

YIELDS OF TWO SOUTHERN PEA VARIETIES GROWN AT HIGH DENSITIES FOR MACHINE HARVEST

Plants per acre	Per acre yield	
	Mississippi Silver	Ala. 9-2-4
	Lb.	*Lb.*
2 rows 36-in. apart		
28,000 plants	5,500	----
42,000 plants	4,900	----
30,000 plants	----	3,300
40,000 plants	----	3,800
3 rows 18-in. apart		
41,000 plants	5,300	----
58,000 plants	5,800	----
42,000 plants	----	4,000
61,000 plants	----	4,000
3 rows 12-in. apart		
40,000 plants	5,300	----
57,000 plants	5,400	----
42,000 plants	----	3,400
57,000 plants	----	3,800
4 rows 12-in. apart		
58,000 plants	5,500	----
74,000 plants	5,400	----
56,000 plants	----	4,000
89,000 plants	----	4,200

Costs and Returns of Producing Peanuts in the Wiregrass

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FARMERS in Henry, Houston, and Geneva counties were interviewed to determine the costs and returns of peanut production. The three counties used had about half the total peanut acreage in the State in 1970. Three beats, representative of the county's better peanut producers, were chosen in each county for the sample.

Both costs of inputs and returns data were collected on each variety of peanuts planted by a producer. The number of varieties planted usually varied from one to three. All data collected were based on the 1970 crop.

The most common peanut varieties planted in the Wiregrass Area of Alabama in 1970 were Florunner, Florigiant, Early Runner, and Virginia Bunch 67. For analysis purposes, data on Early Runner and Virginia Bunch 67 were combined and the name Early Runner was used when referring to these varieties. Cultural practices and seed cost of these varieties are similar and both are marketed as runner type peanuts.

Costs were determined by the price reported paid and quantity of inputs that producers used. Average material cost per acre varied among the varieties. This averaged $9.11 higher for Florigiant than Florunner and $7.10 higher than the Early Runner, primarily because of higher seed cost. Material cost averaged $69.03 per acre for all farms, Table 1.

The material cost of $69.03 per acre accounted for 65% of average variable cost. Average variable machinery cost was $11.04 per acre for all farms, with land preparation and harvesting making up 64% of this total. Custom work for all farms averaged $27.91 per acre and accounted for 25% of average variable cost. Average variable cost for producing peanuts amounted to $112.30 per acre for all farms.

TABLE 1. AVERAGE VARIABLE COSTS FOR PRODUCING PEANUTS, 114 PEANUT FARMS, WIREGRASS AREA OF ALABAMA, 1970

Item	Variable cost per acre
	Dollars
Material cost	
Seed	30.15
Fertilizer	16.98
Lime	2.71
Herbicide	9.15
Fungicide	10.04
Total material cost	69.03
Machinery cost	
Land preparation	3.50
Planting	.88
Cultivating	1.64
Application of fert. and fung.	1.41
Harvesting	3.61
Total machinery cost	11.04
Variable costs	
Custom drying	13.06
Custom hire[1]	14.85
Interest on operating capital	4.32
Total variable cost	112.30

[1] Includes custom combining, digging, hauling, and application of herbicide and fungicide.

TABLE 2. AVERAGE COSTS AND RETURNS FOR PRODUCING PEANUTS, 114 PEANUT FARMS, WIREGRASS AREA OF ALABAMA, 1970

Item	Average costs and returns per acre
	Dollars
Gross returns	289.30
Total variable cost	112.30
Fixed machinery cost	10.32
Land cost[1]	22.60
Labor cost	11.46
All costs	156.68
Returns to land, labor, and management	166.68
Returns to land and management	155.22
Returns to labor and management	144.08
Returns to management	132.62

[1] Charged at average cash rent paid.

With average yield of 2,204 lb. per acre, the 114 peanut producers in the study had an average gross return of $289.30 per acre, Table 2. Net return to land, labor, and management averaged $166.68 per acre. This figure does not include a charge for land or labor. Land was charged at the average cash rent of $22.60 per acre and labor at $1.60 per hour for an average of 7.16 hours. Thus, total labor charge was $11.46 per acre. Land and labor charges raised average total cost of production to $156.68 per acre, leaving a net return to management of $132.62 per acre.

Data were divided into cost groups based on average total costs of production, excluding a charge for land and labor. These groups were designated as low, medium, and high. Analysis of cost groups revealed that increases in average total cost of production were accompanied by increases in average yield per acre, gross returns, and net returns.

Material cost for the high cost group was $79.15 per acre, as compared with $58.38 per acre for the low cost group. Average variable machinery cost for the low and high cost groups was $10.56 and $11.48 per acre, respectively. Adding custom work to average variable and fixed machinery cost brought average total machinery cost per acre for the three groups to the following:

Item	*Cost by cost groups*		
	Low	*Medium*	*High*
Variable machinery cost	$10.56	$11.06	$11.48
Custom work	17.53	26.49	36.41
Fixed machinery cost	9.41	9.69	11.74
Total	$37.50	$47.24	$59.63

Average yield per acre ranged from 1,840 lb. for the low cost group to 2,600 lb. for the high cost group, Table 3. When a charge for land and labor was included, expenses of production ranged from $133.04 per acre for the low cost group to $178.88 for the high group. Even though the high cost group had the highest production cost, their net return to land, labor, and management averaged $203.16 per acre, higher than for either of the other two groups. Much of the variation in return noted among these three cost groups resulted from differences in yield per acre.

TABLE 3. AVERAGE COSTS AND RETURNS FOR PEANUT PRODUCER GROUPS BY COSTS OF PRODUCTION, 114 PEANUT FARMS, WIREGRASS AREA OF ALABAMA, 1970

Item	Costs and returns/acre by cost groups		
	Low	Medium	High
	Dollars	*Dollars*	*Dollars*
Gross returns	234.93	283.69	347.02
Total variable cost	89.93	110.09	132.12
Fixed machinery cost	9.41	9.69	11.74
Land cost	22.60	22.60	22.60
Labor cost	11.10	10.90	12.42
All costs	133.04	153.28	178.88
Returns to land, labor, and management	135.59	163.91	203.16
Returns to land and management	124.49	153.01	190.74
Returns to labor and management	112.99	141.31	180.56
Returns to management	101.89	130.41	168.14
Number of farms	38	38	38
Av. acreage of peanuts/farm	95.50	128.10	77.70
Av. yield/acre, lb.	1,840	2,171	2,600

Turkey Virus Controls Chicken Cancer

JOYCE STEPHENS and E. C. MORA
Dept. of Poultry Science

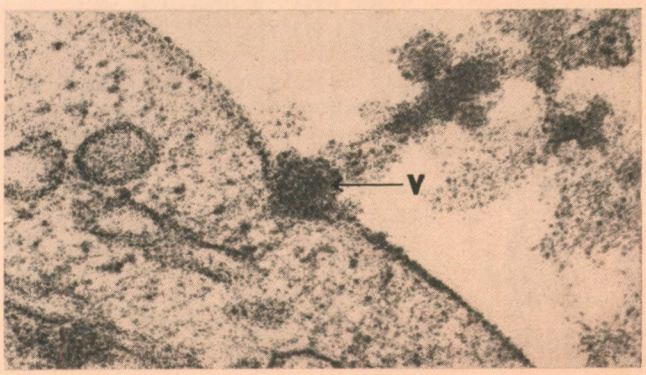

FIG. 1. Virus (V) penetrating a cell. Virus is naked and measures 96 nm in diameter. 79,800X.

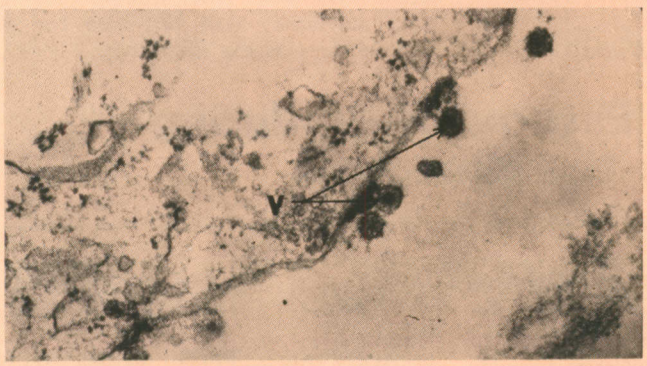

FIG. 2. Extracellular viruses (V) closely associated with an intact cytoplasmic membrane. Viruses are naked, have dense cores, and measure 96 nm in diameter. 39,900X.

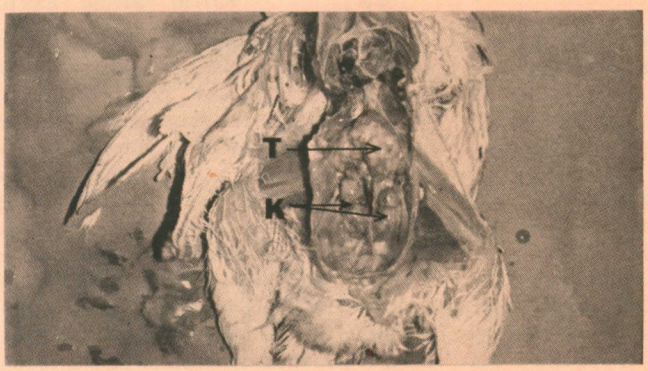

FIG. 3. Chicken infected with Marek's disease herpesvirus. There are several tumors (T) on the liver and the kidneys (K) are enlarged.

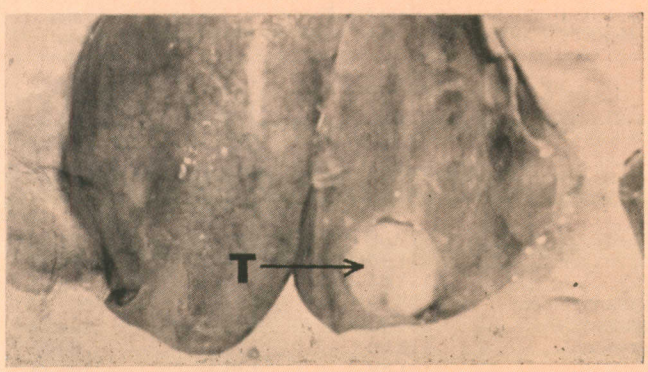

FIG. 4. Liver from a chicken infected with Marek's disease herpesvirus. A large tumor (T) produced by the virus is seen protruding through the liver.

MAREK'S DISEASE HERPESVIRUS causes malignant tumors in chickens and is of great economic importance to commercial poultrymen. Another herpesvirus of significant importance has been isolated from turkeys. Laboratory and field data indicate that this herpesvirus of the turkey (HVT) will protect chickens from the development of tumors.

Although the mechanism of protection is not understood, it is known that HVT does not prevent the replication of the carcinogenic Marek's disease virus. HVT has been shown to be nonpathogenic to chickens, and it is not transmitted by contact in chickens. The use of HVT in chickens is the first demonstration of an effective biological control of cancer. The understanding of the mechanism of action of such a control could have far-reaching implications in the study of tumor development.

Growth and replication of HVT were studied at Auburn with the aid of an electron microscope. A strain of HVT was grown in chick embryo fibroblast cell cultures, and the cells were processed for electron microscopic study after viral replication was apparent. The study revealed that the virus entered cells by penetrating the cytoplasmic membrane and that replication and maturation took place within the nucleus. Small particles found in some cell nuclei were thought to represent part of the replication process of the virus.

Degenerative effects in the cells produced during viral replication ranged from alteration of cellular organelles to lysis of the cells. Indications of infection were margination of the nuclear chromatin, the presence of nuclear and cytoplasmic virions, destruction of mitochondria, loss of rough and smooth endoplasmic reticulum, and polykaryocytosis. In many cells karyolysis and ultimately cell lysis resulted in the disintegration of the cells.

Both naked (incomplete) and enveloped (complete) viruses were formed. Envelopment was observed both in the nucleus and in the cytoplasm and occurred as the viruses penetrated or budded out of vacuoles. Enveloped viruses were present only within intact cells. Function and infectivity associated with the enveloped viruses were not determined.

The naked viruses were observed in cells of varying degrees of degeneration. Where lysis of the cells occurred, the naked viruses were released into the extracellular fluid. The naked viruses were observed penetrating the cytoplasmic membrane of intact cells and were, therefore, determined to be functionally infective viruses. This evidence of infectivity indicates that *in vitro* HVT may be classified as group A virus, i.e., one which produces and releases many infectious viral particles into the extracellular fluid.

Further study of the anti-tumor action of HVT will hopefully lead to a fuller understanding of cancer prevention in chickens, and this in turn could lead to a system of cancer control in humans and animals.

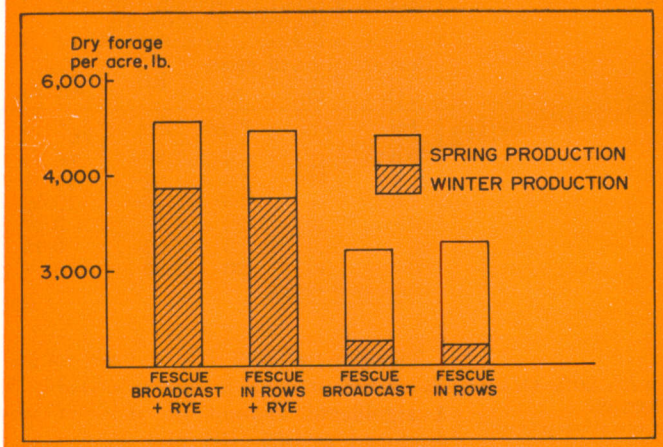

FIG. 1. Winter and total forage production in establishment year was increased by planting rye with tall fescue.

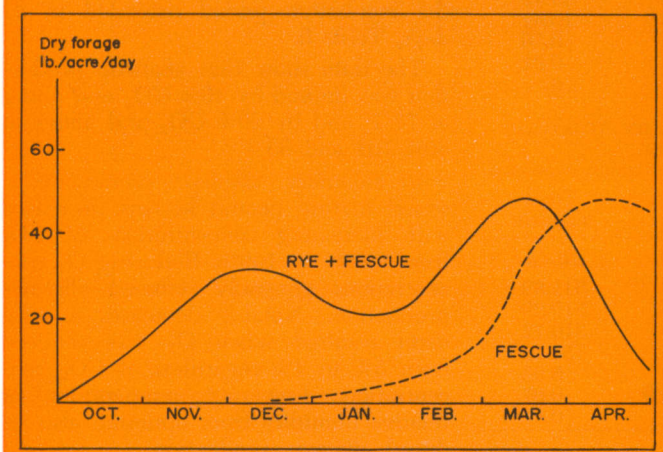

FIG. 2. This comparison of seasonal production of fescue-rye and fescue alone shows earlier grazing when rye is included.

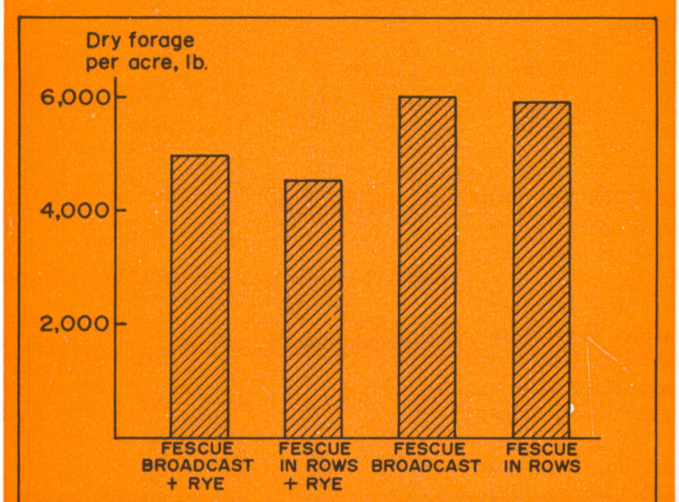

FIG. 3. Second-year yields of tall fescue are reduced slightly when rye is grown with fescue the previous year.

Seeding Rye with Fescue Increases First-Year Forage

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Department of Agronomy and Soils

PLANTING RYE WITH FESCUE helps overcome the problem of low establishment-year production of land seeded to tall fescue. Rye furnishes winter forage, as well as increasing total production for the year.

Results of a 3-year experiment at the Plant Breeding Unit, Tallassee, show value of fall planting of rye with tall fescue. The combination doubled first-year total production, but of more importance is the finding that it furnished six times the winter forage of fescue seeded alone.

Experiments were established during September in each of 3 years on prepared land. Kentucky 31 tall fescue was seeded at 10 lb. per acre broadcast or in 6-in. rows. Other fescue plots planted similarly had 60 lb. per acre Wrens Abruzzi rye seeded in 12-in. rows. Nitrogen was applied in autumn and winter, totaling 160 lb. N per acre.

Six to eight harvests were made, starting in October or November and ending in late April. Summer growth of fescue was cut and discarded in September. Second-year yields of tall fescue were measured on each establishment experiment.

As shown by Figure 1, total annual forage yields were doubled during the first year by planting rye with tall fescue. Production by early March was increased even more. Broadcasting and row planting of tall fescue seed alone resulted in similar yields.

Autumn and winter production of rye was substantial. How the rye furnished forage in the season when tall fescue was making little or no growth is illustrated by Figure 2. Rye production during winter and spring would be sufficient forage for one cow per acre. Although rye in the mixture delayed growth of tall fescue, stands of fescue were excellent by April.

An important question is what effect establishment-year rye has on stands and growth of tall fescue the succeeding year. Stand estimates made the second autumn showed little difference between fescue planted alone or in combination with rye. Forage yields were about 20% less the second year on fescue established with rye than without rye, Figure 3.

Grazing of rye-fescue the establishment year would likely cause trampling injury to tall fescue plants. This possibly could affect second-year yields more than in these experiments where the forage was clipped. Failure to graze the rye would also be detrimental to successful establishment of tall fescue. With good grazing management, however, the much higher production obtained during the establishment year should make this seeding mixture worthwhile. This extra first-year production should help offset the cost of establishing fescue pastures.

Atmospheric Gases and Aflatoxin Production in Peanuts

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A COMMON seed-storage fungus, *Aspergillus flavus* Link ex Fries received only routine attention until 1960 when aflatoxin, a carcinogen produced by this fungus, was found in peanut meal. Since that time, the factors affecting growth and aflatoxin production by *A. flavus* in peanuts, corn, soybeans, and other agricultural commodities have been widely investigated. The influence of temperature and relative humidity on mold growth and aflatoxin production in peanuts was reported in the Spring 1969 issue of *Highlights*. The effect of various levels of carbon dioxide (CO_2), oxygen (O_2), and nitrogen (N_2) in combination with several temperatures and relative humidities (RH) on aflatoxin production and fungal growth has also been investigated and is reviewed here.

Studies with atmospheric gases involved sound, mature kernels of Early Runner peanuts that had been surface-disinfected with 1% sodium hypochlorite for 2 min. Inoculated peanuts were placed in 1.25 l. culture flasks (150-200 g. of peanuts/flask) and gas mixtures of specified composition and controlled RH passed through the culture vessels (150-200 ml./min.) for 2 weeks. The culture vessels were partially submerged in a controlled-temperature water bath to maintain a uniform temperature.

The effect of various levels of CO_2 containing 20% O_2 on production of aflatoxin at 86°F and 99% RH is shown in Table 1. Aflatoxin decreased with increasing concentration of CO_2 from the 0.03% found in air to 100%. The effect of decreasing O_2 on production of aflatoxin at 86°F is shown in Table 2. Significant decreases in aflatoxin occurred when O_2 was decreased to 10% and 5%. A larger decrease in aflatoxin occurred with reduction from 5% to 1% O_2 and from 1% to 0.1% O_2.

The effect of CO_2 and O_2 on production of aflatoxin at a temperature of 59°F for 42 days is shown in Table 3. Aflatoxin formation was reduced at 20% CO_2 and dropped sharply in combination with a reduction of O_2 from 20% to 5%. No aflatoxin or fungus growth occurred at concentrations of 40%, 60%, or 80% CO_2 in combination with 5% O_2.

The relationship of RH and temperature to the effect of carbon dioxide on aflatoxin production has also been investigated. In this study decreases in RH reduced aflatoxin production when peanuts were stored at 77°F in both air and 60% CO_2, Table 4. The combination of 92% RH and 60% CO_2 at 77°F limited aflatoxin formation to a trace (10 μg/kg.), whereas none formed at 86% RH.

TABLE 1. EFFECT OF CO_2 WITH 20% O_2 ON AFLATOXIN PRODUCTION

Concentration of gases			Total aflatoxin
CO_2	O_2	N_2	
Pct.	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79 (air)	299.38
20	20	60	74.55
40	20	40	35.42
60	20	20	19.82
80	20	0	0.10
100	0	0	0.01
Untreated check			0

TABLE 2. EFFECT OF O_2 ON AFLATOXIN PRODUCTION

Concentration of gases			Total aflatoxin
CO_2	O_2	N_2	
Pct.	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79	511.89
0	15	85	519.29
0	10	90	316.12
0	5	95	154.12
0	1	99	5.93
0	0.1	99.9	0.07
Untreated check			0

TABLE 3. EFFECT OF MIXTURES OF CO_2 AND O_2 ON AFLATOXIN PRODUCTION

Concentration of gases			Total aflatoxin
CO_2	O_2	N_2	
Pct.	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79 (air)	120.32
20	20	60	13.13
20	5	75	0.75
40	5	55	0
60	5	35	0.01
80	5	15	0
Untreated check			

TABLE 4. EFFECT OF RH AND 60% CO_2 ON AFLATOXIN PRODUCTION

Concentration of gases			RH	Total aflatoxin
CO_2	O_2	N_2		
Pct.	*Pct.*	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79 (air)	99	206.33
0.03	21	79	92	111.94
0.03	21	79	86	72.08
60	20	20	99	0.24
60	20	20	92	0.01
60	20	20	86	0
Untreated check				

The effect of 40% CO_2 and several levels of RH at 77°F is shown in Table 5. A significant amount of aflatoxin was produced at 92% RH and 77°F under 40% CO_2 during the 14-day incubation period. No aflatoxin was produced at 86% RH. At a reduced temperature of 63°F, total aflatoxin was minimal at 20% CO_2 and 92 and 86% RH even though the incubation period extended to 42 days, Table 6.

The data show that aflatoxin production was limited by 40% CO_2 and above at 77°F and by 20% CO_2 and above at 86% RH and 63°F.

In summary, aflatoxin production in sound mature peanut kernels decreased with increasing concentrations of CO_2 from 0.03% to 100%. Reducing O_2 concentrations generally reduced aflatoxin production. Notable decreases in aflatoxin resulted when O_2 was reduced from 5% to 1% regardless of CO_2 concentration. Lowering temperature or relative humidity from optimum also reduced aflatoxin production.

TABLE 5. EFFECT OF RH AND 40% CO_2 ON AFLATOXIN PRODUCTION

Concentration of gases			RH	Total aflatoxin
CO_2	O_2	N_2		
Pct.	*Pct.*	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79 (air)	99	196.59
0.03	21	79	92	37.37
0.03	21	79	86	11.75
40	20	40	99	3.82
40	20	40	92	0.28
40	20	40	86	0
Untreated check				

TABLE 6. EFFECT OF RH AND 20% CO_2 ON AFLATOXIN PRODUCTION

Concentration of gases			RH	Total aflatoxin
CO_2	O_2	N_2		
Pct.	*Pct.*	*Pct.*	*Pct.*	*μg./g.*
0.03	21	79 (air)	99	57.05
0.03	21	79	92	2.45
0.03	21	79	86	0.21
20	20	60	99	0.17
20	20	60	92	0
20	20	60	86	0.01
Untreated check				0

Income and Food Expenditures Affect Milk Purchase Decisions

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RECENT RESEARCH by Auburn University showed a close relationship existed between annual income and the amounts spent for food and for dairy products by Alabama urban families, regardless of race.

Previous studies indicated that white and Negro families constituted separate universes in milk product use. In a 1968 survey, income of Negro families was less than ½ that of white families. Negro families spent about ⅔ as much for food per person, but the same proportion of the food dollar for dairy products.

The table shows that the average white family spent 17% of the annual income for food; the average Negro family, 22%. About ½ of the Negro families had incomes under $4,500, of which ⅓ or more was spent for food. In both races, an increase in income was related to larger expenditures for food but a decreasing percentage of food costs to income. An increase in per capita weekly food costs was also related to greater dairy product expenditures, particularly in white families.

Use of sweetmilk, cheese, and total milk equivalent increased with income to $8,000 in white families, but this relationship was not apparent in Negro families. High consumers of dairy products in 1954, 1958, and 1968 surveys were consistently white families of small size, especially those with high annual and per capita incomes, high per capita meal costs, and homemakers with 12 or more years of education.

The 27 dairy products were reduced to five classifications on the basis of their calcium equivalent to 1 qt. of fresh whole milk. Sweetmilk equivalent included all whole milk types, chocolate milk, and skim milk. All forms of fresh and cured cheeses were placed together. Evaporated milk, condensed milk, and infant formulas were the canned milk group. Dry milk forms and frozen desserts were other classifications.

Requirements for milk equivalent in a moderate cost plan developed by the USDA provided a standard for recommended amounts, adjusted to sex and age of the members in each family in the survey and the percentage of total meals eaten at home. Total milk equivalent used divided by the recommended amount provided a measure of the degree to which dairy products use fitted the nutritional requirements of the family.

Division of sweetmilk equivalent by total milk equivalent supplied a sweetmilk ratio that measured the proportion of fresh fluid milk in the total milk equivalent used by a particular demographic class. In all surveys, sweetmilk equivalent accounted for nearly 3/5 of the milk equivalent used in white families, and slightly over ⅓ in the Negro families. Buttermilk, canned milk, and dry milk equivalent made up the greater proportion of the milk equivalent used in Negro families, with ice cream equivalent showing little relationship to race.

One-half of the white and ¾ of the Negro families were using less than nutritionally optimum amounts of milk equivalent. However, few classifications of white families showed groups much below the optimum limits, while the converse was true of Negro families. High users of milk equivalent in Negro families used larger amounts of manufactured products rather than fresh milk forms.

In white families, with an increase in per capita weekly food costs, the percentage of milk equivalent used of recommended amounts and per capita milk cost regularly increased, but the percentage of food bill spent for dairy products declined. In Negro families there was a similar but less pronounced relationship.

In many respects, per capita meal costs or weekly food costs were a good measure of the use of milk products. When food expenditures were large enough to provide both an adequate and a nutritious diet, milk products were an important part of the family food supply.

PER CAPITA USE OF MILK EQUIVALENT AND FOOD COST PER WEEK, BY ANNUAL FAMILY INCOME, 801 WHITE AND 124 NEGRO FAMILIES, THREE ALABAMA CITIES, SPRING 1968

Annual family income	Family		Per capita expenditure			Per capita milk equivalent				Sweetmilk ratio
	Distribution	Size	Food cost of income		Milk cost	Sweetmilk	All cheese	Used	Pct. of rec.	
Dol.	*Pct.*	*No.*	*Dol.*	*Pct.*	*Dol.*	*Qt.*	*Qt.*	*Qt.*	*Pct.*	*Pct.*
White families										
Less than 1,500	1	2.5	6.20	81	0.74	0.9	0.5	2.5	67	36
1,500-2,999	2	2.6	7.12	38	.98	1.9	.3	3.6	92	53
3,000-4,499	7	3.2	6.15	19	.99	1.9	.4	3.4	89	56
4,500-5,999	9	3.7	6.64	24	1.03	1.9	.5	3.4	85	56
6,000-7,999	15	3.7	6.90	19	1.11	2.2	.6	4.0	101	55
8,000-9,999	16	3.6	8.12	17	1.17	2.5	.7	4.1	99	61
10,000-12,999	22	4.0	8.11	16	1.26	2.5	.7	4.1	99	61
13,000 and over	28	3.9	8.82	12	1.35	2.5	.9	4.4	108	57
Average	----	3.8	7.74	17	1.17	2.4	0.7	4.0	98	56
Negro families										
Less than 1,500	12	3.9	3.16	64	0.69	0.8	0.3	2.4	54	34
1,500-2,999	24	3.6	4.40	33	.54	.5	.3	2.0	46	27
3,000-4,499	30	3.3	5.04	23	.74	1.0	.6	3.0	70	34
4,500-5,999	15	4.8	4.65	21	.60	1.0	.2	2.1	49	50
6,000-7,999	9	4.4	5.16	17	.71	.9	.4	2.4	60	38
8,000-9,999	8	4.4	5.64	14	.82	1.3	.4	3.0	73	43
10,000-12,999	2	3.5	8.86	15	.90	1.6	.2	2.7	116	59
13,000 and over	0	----	----	0	----	----	----	----	0	0
Average		3.9	4.69	22	0.67	1.0	0.4	2.5	59	36

FARM PRODUCTION EXPENSES

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ALABAMA FARMERS have large expenditures each year for production items. These expenditures represent costs to farmers but income to the seller. Some changes in farm expenditures in the past few years may point to significant developments for the future.

In 1970 Alabama farmers spent $608.4 million for production items compared with $379.1 million in 1960. If a similar trend prevails during the next decade, Alabama farmers will spend almost a billion dollars to produce feed, food, and fiber in 1980.

Not all inputs used in farm production are purchased. Family labor, a part of the feed and livestock, as well as the real estate contribution are examples of non-purchased items that go into production. In the U.S., purchased inputs came to less than half of total expenditures in 1940. However, in 1969, they were three-fourths of the total.

With larger producing units, production expenses are concentrated among these farms. In 1960, farms with annual product sales of $40,000 or more accounted for 3% of all farms and 36% of total expenses. In 1968, such farms were 6% of all farms and had 53% of total U.S. farm expenses.

Census Comparisons

The 1969 Alabama Census of Agriculture shows that purchases of livestock and poultry registered the greatest percentage increase from 1964 to 1969 for items reported. Alabama farmers spent $91.9 million in this category in 1969 compared with $53.4 million in 1964.

The second greatest percentage increase was feed costs, the leading single item in both years. The Census reported $212.7 million for feed on 47,391 farms in 1969. This was an average of almost $4,500 per farm reporting.

Other items showing major increases were contract labor, machine hire, and custom work. The amount spent for these increased from $11.8 million to $17.0 million, although fewer farmers reported this item of expense in 1969.

Other items showing increases were seeds, bulbs, plants and trees; gasoline and other petroleum fuel and oil; hired farm labor; and commercial fertilizer. Total expenditures for these items were as follows:

	1964 (mil. dol.)	*1969 (mil. dol.)*
Seeds, bulbs, plants and trees	11.1	15.1
Gasoline and other petroleum fuel and oil	24.1	27.8
Hired farm labor	39.0	44.5
Commercial fertilizer	46.6	52.3

Even though total number of Alabama farmers declined rather drastically a greater number of farmers in 1969 reported expenditures for feed and purchases of livestock and poultry than in 1964.

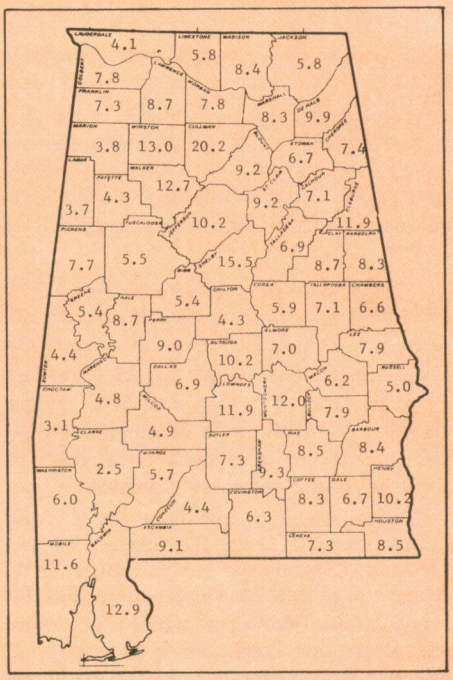
County Data

Cullman was the leading county in 1969 in total expenditures for feed and for livestock and poultry. The amount spent for feed was closely associated with the concentration of poultry production in north central Alabama. In central and southern Alabama counties, feed expenditures were typically only $1 to $3 million in 1969. Livestock and poultry expenditures in 1969 by counties had a similar pattern to that for feed.

Total expenditures per farm by counties averaged $8,263 (see map). They varied from over 20 thousand in Cullman to 2.5 thousand in Clarke.

Significance

Expenditures by farmers mean that income and employment opportunities are created throughout the economy. Most input purchases for agricultural production are made locally or within the State. Increases in sales of livestock poultry, and crops as a result of greater use of inputs and expenditures mean that an additional amount of personal income in the form of wages and salaries, proprietor income, and rental income is created. Recent research shows that $1 increase in sales of farm products creates additional personal income of from $2.49 to $2.75 in Alabama. Thus changes in farm expenditures make a difference, not only to farmers but to many other Alabamians.



Total expenditures per farm by counties in thousand dollars, 1969. The average was $8,263.

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