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The nature of an efficient agriculture in the brown loam area of Mississippi

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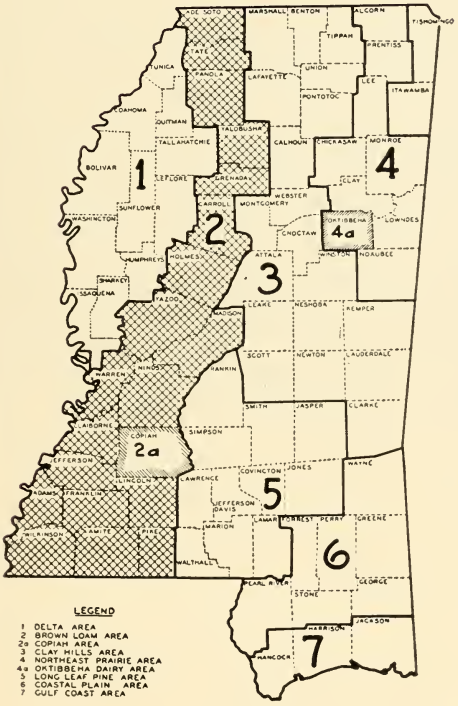

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ACKNOWLEDGMENTS

This is the first of a series of studies dealing with the nature of an efficient agriculture in different type-of-farming areas in Mississippi. The reader should understand that the changes suggested in the agricultural pattern of the Brown Loam area are based on preliminary estimations, and that they are subject to change as economic and social conditions differ from those assumed for this study.

All research personnel of the Experiment Station contributed to this report by making available basic information, either directly through consultation or indirectly through published reports.

Dr. Charles R. Sayre, Superintendent, Delta Branch Experiment Station, Stoneville, Mississippi, worked closely with the author in the preliminary analysis of the material presented in this study and in preparing the preliminary draft of the report.

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The Nature of an Efficient Agriculture in the Brown Loam Area of Mississippi

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An efficient agriculture is one in which management, labor, and capital are applied to land in proportions that take full economic advantage of the advancements in the tools and techniques of the times. These combinations of productive agents or factors are made by farmers in keeping with the limits imposed by nature at a particular location and the economic influences that the individual farmer cannot alter when acting alone. In an economy such as ours the land, labor, capital, and management used in an efficient agriculture would receive returns comparable to those which could be realized by the same quality of these factors of production if they were used in other industries.

American industry and agriculture in some regions have been able to meet world competition and at the same time maintain a high standard of living by taking advantage of technological advancements as they become available. People in the hill areas of Mississippi must follow suit if they are to have a high level of living comparable to that of other sections of the nation. Progress toward farm mechanization in the Brown Loam area has been encouraging. Other opportunities for increasing the efficiency of production are coming from research in genetics, soils, fertilizing methods, seed treatment techniques, insect and pest control, and farm management. Increased production efficiency, however, will mean very little unless there are contemporary improvements in the efficiency with which farm commodities are marketed and processed.

Efficient production on farms in the Brown Loam area will be possible only when the best-adapted farming systems are in operation in each major production situation in the area. From this realization stems the primary objective of the current study: it is to suggest desirable area adjustments and to appraise and evaluate them in terms of the efficient use of human and physical resources. A second objective is the determination of major obstacles to the attainment of desirable adjustments, and suggestions as to measures for dealing with them. A third objective is to review the additional research needed to provide an adequate foundation for such measures and for basic improvements in the future.

Assumptions

The level of national economic activity, the extent of employment opportunities outside of agriculture, and public policy and programs will influence both the nature of an efficient agriculture and the speed with which adjustments toward an efficient agriculture are made. These factors cannot be projected into the future with assurance of accuracy, and the assumptions regarding them in this study, it is emphasized, are not forecasts of future economic conditions and should not be taken as such. But assumptions must be made regarding them if analyses for the future are to be made.

The following framework of assumption, projected eight to ten years in the future, was used:

1. That general economic activity will continue at a high level with relatively full employment and a national income of around 160 billion dollars annually.
2. That the general price level will be stabilized at about the level existing in 1943, but that the prices of

agricultural products will be about 28 percent lower. See appendix tables 1D and 2 for the specific prices used in this study.

3. That competitive conditions (no production control) will prevail throughout the agricultural industry.

Method of Study

First, the resources, the present production and marketing situation, and the longtime trends were studied in detail in order to provide the basic knowledge so necessary to pointing the way toward an efficient agriculture.

Second, the various subject-matter specialists of the Experiment Station were asked to list improved practices for each crop and livestock enterprise and to estimate the extent to which crop yields and livestock production rates could be increased in eight to ten years.

Third, budgets were prepared for minimum-sized farm units.

Fourth, these budgets were used as a basis for arriving at preliminary estimations of the farming pattern that would prevail with an efficient agriculture.

Fifth, these preliminary estimations were presented to a committee of Experiment Station workers representing all subject-matter fields for study and revision. The final estimations as to the farming pattern that would prevail with an efficient agriculture were based on the recommendations of this committee.

Description of Area

The Brown Loam area comprises a relatively narrow belt extending the entire length of the State from north to south and running approximately parallel to the Yazoo-Mississippi Delta and the Mississippi River, which together form its western boundary. (See figure 1.) The breadth of the area is somewhat irregular, with the widest part at the southern extremity where it extends some 60 to 70 miles. A ten-inch range in annual rainfall—50 to 60 inches—and 40 days variation in growing season between the northern and southern ends have contributed to significant differences in farming opportunities. One example is the more serious damage from boll weevils in the southern counties.

The topography is quite rugged with steep hills and many small valleys. This is especially true in the bluff hills of the western side, where the deep layer of brown loam material is found. Because of the steep slopes here, the upland soils are subject to severe damage from erosion when cultivated. To the east, in the more level areas, the loessial material diminishes to only a few inches in depth and merges, in an irregular fashion, into the bordering coastal plain soils. Memphis, Grenada, and Lexington series make up most of the upland soils. They erode badly on many farms with continuous cropping and limited attention to water management. With past farming practices erosion has taken a great toll, and it is continuing to do so, especially in the northern portion of the area. The terrace soils in the area include Richland, Lintonia, Olivier, Calhoun, and Carroll series. The main bottom-land soils are Vicksburg. Most of the terrace and bottom-land soil types are desirable and can support intensive farming systems. In their original state these soils are fertile and quite productive. Much of the Brown Loam area has soils which support fast-growing stands of pine, and the bottom lands are favorable for hardwoods where timber practices are not abusive.

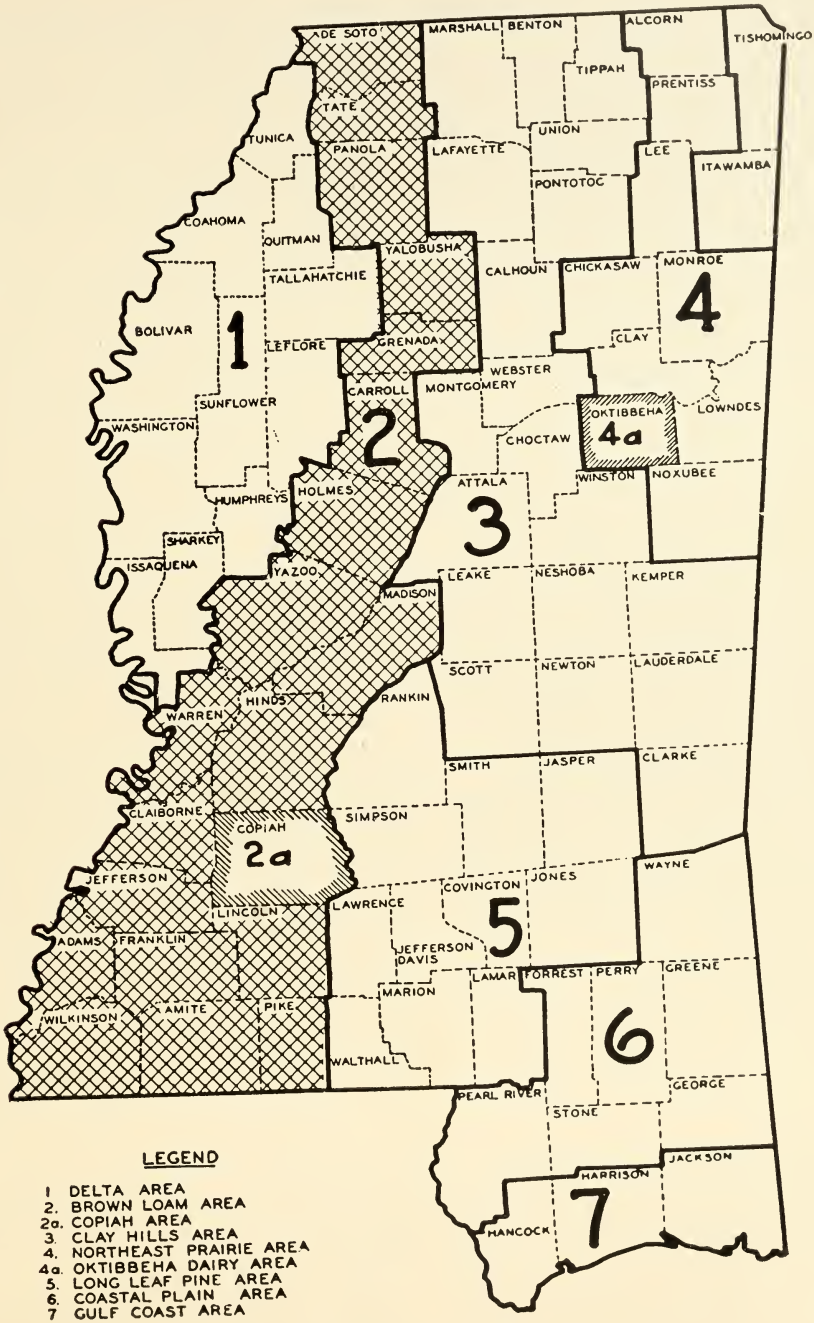

Figure 1. Types-of-farming areas in Mississippi.

PRESENT PRODUCTION AND MARKETING SITUATIONS

Cotton

The acreage of cotton grown in the Brown Loam area decreased 53 percent between 1899 and 1944 (table 1). In the 9 southern counties the decrease was 71 percent, in the 11 northern counties, 43 percent. The greater decrease in the southern counties was probably the result of a heavier boll weevil infestation, although the decay of the cotton plantation system and progressive soil erosion were probably contributing factors.

Cotton yields have increased materially since the inauguration of acreage control in 1934. Farmers in the Brown Loam area produced 13 percent more cotton on 31 percent less land per year for the 10-year period, 1935-44, as compared to the 5-year period, 1928-32 (table 2). The greater part of the increase in production occurred in the northern counties where yields are considerably higher. The yield of cotton averaged 286 pounds per acre in the northern counties during the 10-year period, 1935-44, as compared to 241 pounds in the southern counties.

Cotton is still the most important source of farm income in the Brown Loam area. In 1943, 47 percent of the gross farm income[1] in this area was derived from cotton; on a cash income basis 59 percent came from cotton (appendix table 1F). Since cotton occupies only one-fourth of the cropland, the relatively high returns per acre are apparent at once. This relatively high return per acre and the small size of the majority of farms explains why cotton is still the major cash enterprise on most farms in the Brown Loam area.[2]

Other Important Enterprises

The greater part of the acreage taken out of cotton production in the past 40 years has been planted to feed and forage crops, and the production of livestock and livestock products has increased materially.

Beef-cattle farms are becoming more important; but because of the large acreage required to provide a satisfactory income for the farm family, the number is not large at present. Dairying is increasing but not at a spectacular rate. Parts of the area are close enough to Memphis and New Orleans to sell fluid milk at these markets, in addition to urban centers within the area, such as Jackson and Vicksburg.

There are very few specialized livestock farms in the area. On most farms where livestock or livestock products are produced for sale, the livestock enterprise is usually carried on in addition to the cotton enterprise as a means of providing supplementary income by using resources, including labor, that would otherwise go to waste.

Mississippi's most important vegetable-producing section is located in the southern part of the Brown Loam area around Crystal Springs and Hazlehurst in Copiah County. Tomatoes, cabbage, green peas, snap and lima beans, and a few green peppers are all shipped out from these points in competition with the late spring crops from other parts of the South. The market outlet for vegetables produced in this area was relatively low in prewar years and the production of tomatoes, green peas, and snap beans was declining.[3]

In 1943 livestock and livestock products contributed approximately 35 percent of the gross income in Brown Loam area. The beef, dairy, poultry, and hog enterprises were of about equal importance in 1943 on the basis of cash receipts.

[1] Cash farm income plus the value of products used in the home.

[2] It is recognized that part of the land producing grain and hay for feeding livestock is used indirectly in producing cotton.

[3] Guin, Marvin, and Parvin, D. W., "An Economic Study of Truck Farming in Copiah County, Mississippi, 1938-40," Mississippi Experiment Station Bulletin 361, 1941.

Trucks crops, including sweetpotatoes and Irish potatoes, contributed the greater part of the eight percent of cash income from crops other than cotton. Although woods cover a large percentage of the acreage in farms, only 4.5 percent of cash income accruing to farmers in the Brown Loam area came from forestry products in 1943.

Families Dependent on Agriculture

This area has a high ratio of farm population to the farm-land resources. There were 72,100 farm families in the Brown Loam area in 1943, of whch 64,-100 could be classified as full-time farm families (appendix table 1G). The total farm population was 275,000, of which 244,500 were on full-time farms and 30,500 on part-time farms. These farms had 2,103,000 acres of cropland in 1943, which was an average of 7.6 acres per person on farms or approximately 30 acres per family of four. Land in farms not used for crops average 12 acres per person or 48 acres per family of four in 1943.

With present methods of farming, over half the farms in the area are too small for efficient operation and to provide the income necessary for a satisfactory level of living. In 1943, 57 percent of the farms contained less than 40 acres of cropland, and 74 percent had less than 60 acres of cropland (table 3). About 8,000 farmers in the area reported working more than 100 days off their own farms and, therefore, had this additional income. If all of these fell within the smaller size groups, 43 percent of the full-time farmers would have had less than 40 acres of cropland and 65 percent less than 60 acres of cropland. As will be shown later, 50 to 60 acres of cropland is the minimum for efficient operation by one family.

Size of Farms as Related to Systems of Farming

In general, the size of farm as measured by acres of cropland has little effect on the cropping pattern (table 4). Regardless of the acres of cropland in the farm, cotton accounts for about one-fourth of it, corn from one-third to two-fifths, hay from one-sixth to one-fifth, and the three crops together account for about four-fifths of all the cropland. As would be expected, the operators of the smaller farms used their cropland more intensively than occurred on the larger farms. On the smaller farms there were more livestock per 100 acres of cropland than on the larger farms. This is probably due to the keeping of livestock for home use by the larger number of farm families per 100 acres of cropland on the smaller farms. Also, the larger

Table 1. Cotton acreage harvested, Brown Loam area, Mississippi, 1899-1944

Area	1899	1909	1924	1929	1944
	thousands	thousands	thousands	thousands	thousands
Total Brown Loam	1,081	1,101	681	891	512
North 11 counties	713	781	536	660	407
South 9 counties	367	320	145	231	105

Source: U. S. Census.

Table 2. Trends in cotton acreage and production, Brown Loam area, Mississippi 1928-44

	1928-32 Average		1935-44 average		Percentage change	
	Acres	Production	Acres	Production	Acres	Production
	thousands	thousands	thousands	thousands	percent	percent
Total Brown Loam	913	320	629	362	—31	+13
North 11 counties	680	246	478	286	—30	+16
South 9 counties	233	74	151	76	—35	+ 2

Source: Office of the Agricultural Statistician.

land area per 100 acres of cropland on the smaller farms would be a contributing factor.

Most farmers having sufficient land to operate efficiently through the use of the best-adapted equipment and the best combination of enterprises, fail to do so. Instead, they continue to add croppers and their complement of half-row equipment when the acreage owned expands beyond the amount the farm family can handle with the usual complement of mule equipment and combination of enterprises. This results in the unform cropping pattern for all sizes of farms discussed in the preceding paragraph.

Tenancy

The proportion of farms operated by tenants in the Brown Loam area is higher than in the other hill areas, but lower than in the Delta. In 1945 the proportion of farms operated by tenants in the area was 65 percent. The land farmed by croppers in most cases, and by other tenants in some cases, is only a part of an operating unit; therefore, in terms of complete operating units, tenants farmed approximately 35 percent of the individual operating units. When operating units are broken down into single and multiple units of operation, 41 percent of the single units and 14 percent

Table 3. Number of farms, distribution by size groups, and percent of cropland by size groups, Brown Loam area, Mississippi, 1943.

Acres cropland	Number	Percent	Percent cropland
0- 19.9	8,008	24.3	14.7
20- 39.9	10,743	32.7	14.7
40- 59.9	5,650	17.2	13.4
60- 99.9	3,922	11.9	14.8
100-199.9	2,744	8.3	16.7
200-499.9	1,403	4.3	17.3
500-999.9	225	.7	9.3
1,000 and over	206	.6	13.8
Total	32,901	100.0	100.0

Source: Ten percent sample of PMA worksheets.

Table 4. Acres of crops and numbers of livestock per 100 acres of cropland, by size of farm, Brown Loam area, 1943.

Item	Size (acres of cropland)			
	100-199	40-99	15-29	Less than 15
	acres	acres	acres	acres
Total land	306	297	372	458
Cropland[1]	100	100	100	100
Cotton	24	25	25	29
Corn	38	34	43	38
Hay	18	20	18	12
Other crops	14	12	11	22
Total acres of crops	94	91	97	101
	number	number	number	number
Workstock	6	6	10	13
All cattle	29	36	47	36
Cows	9	12	7	18
All hogs	24	26	40	41
Hens	96	126	200	262
Chickens raised	160	325	463	573

Source: Sample PMA worksheets.

[1]Acres of crops will not add to 100 because idle cropland and double-cropping are not accounted for.

of the multiple units were operated by tenants.[4] In 1941, a study made in the southern part of the Brown Loam area showed that 49 percent of the cotton farms and 18 percent of the cotton-livestock farms were farmed by operating tenants.[5] This substantiates the old saying, "Cotton and tenant operation go together."

Farming Practices

Improved production practices have not been widely adopted in this area. In a study of 140 farms in the southern part of the Brown Loam area in 1942, it was found that about 50 percent of the cotton and 30 percent of the corn were fertilized; and that on the acres fertilized the average application was about half the amount recommended by Experiment Station agronomists.

The relation of feeds grown to the number of livestock kept on the farms studied indicated that the feed produced was far below the level necessary to secure good returns from livestock. The deficiency in home-grown grain ranged from six percent for cotton farms to 51 percent for cotton-dairy farms. For the cotton farms the need for hay was about two and a half to four times that produced; for the cotton-cattle farms the need was from three to six times that produced; and for the cotton-dairy farms the need was almost five times as great as production. In the cases of pasture, most farms had sufficient acreage, if properly utilized, to furnish ample grazing; however, in many cases, the pasture was in such an unimproved state that livestock did not have sufficient grazing.[6]

Tractor power and equipment have been substituted for mules and mule equipment to a greater extent in the Brown Loam area than in any other hill area except the Northeast Prairie. In 1945 there were 392 acres of cropland per tractor in the Brown Loam area, 30 acres more than in the Northeast Prairie and 152 acres more than was reported per tractor in the Delta.[7] In the spring of 1945 there were 4,456 tractors in the Brown Loam area, an increase of 122 percent over 1940.

The extent of the switch to tractors varied greatly. Four of the 20 counties in this area had almost 40 percent of the tractors. These four counties, Holmes, Madison, Yazoo, and Hinds, are located in the central part of the area and have a considerable acreage of relatively level land. Mules and mule equipment are still used by most operators of small farms and by share-croppers, and much of the cultivation is done with half-row equipment.

Surplus and Deficit Production

In 1943 the production of many farm commodities in this area was not sufficient to supply all the people, rural and urban, with adequate diets and to feed livestock at recommended levels (table 5). If all the milk, eggs, fats, grain, and hay produced in the Brown Loam area in 1943 had been consumed within the area, there would still have been deficiences of each of these commodities ranging from 12 percent for eggs to 62 percent for hay.

The seasonal production of such commodities as milk and eggs made these deficiencies more pronounced during certain months of the year. Available grazing was 20 percent below the recommended level. Production of sweetpotatoes, dry beans, peas, nuts, meat, and sirup in 1943 was in excess of food requirements for the total population of the area. Data as to spoilage and wast-

[4] U. S. Census, 1945.

[5] O'Leary, W. G., "Organization and Operation of Farms with Suggested Adjustments in the Brown Loam Area, Mississippi," Mississippi Experiment Station Bulletin 384, 1943, p. 14.

[6] Ibid., p. 15.

[7] U. S. Census, 1945.

age of farm commodities are not available; but it is highly probable that, such losses being taken into consideration, there were deficiencies instead of surpluses of some of these commodities. Data on total production of fruits and vegetables within the area are not available; however, it is generally agreed among agricultural workers that many farm families do not produce enough fruits and vegetables for their own use. In addition, the greater part of fruits and vegetables consumed by urban population during much of the year is shipped in from other states.

Marketing and Processing Facilities

The 288 cotton gins and 25 cotton warehouses operated in the Brown Loam area in 1942 have the capacity to handle a great deal more than present cotton production. This excess capacity means that many gins and some warehouses are operated at something less than their most efficient level. This results in the deterioration of facilities and services in many cases. The main problem as far as gin facilities are concerned seems to be the elimination of many substandard gins in order to allow the remaining gins enough volume to make it profitable to install and maintain modern drying, cleaning, and ginning equipment. There were 13 cotton oil mills in the Brown Loam area in 1942. They too can operate efficiently only when the volume is at reasonably high levels.

In 1944 there were 2 cheese plants, 3 creameries, 1 by-product plant, 4 milk-cooling stations and 7 cream-buying stations located in the Brown Loam area. In addition, fluid milk routes from Memphis extend into the northern part of the area. About one-half the counties were without milk assembling or pro-

Table 5. Production of farm commodities compared with requirements to supply people with adequate diets and to feed livestock at recommended levels. Brown Loam area, Mississippi, 1943

Commodity	Unit	Food and feed production and requirements for total population[1] and farm livestock		
		[2] Production available for feed and food	[3] Total requirements	Percent production is of requirement
		1000 units		percent
Milk or its equivalent[4]	lb.	326,000	389,985	84
Potatoes and sweetpotatoes[4]	lb.	102,570	85,953	119
Dry beans, peas, and nuts[4]	lb.	9,344	6,570	142
Eggs	doz.	12,009	13,683	88
Meat[5]	lb.	78,310	59,939	131
Fats, excluding butter[6]	lb.	20,348	24,364	84
Sirup	gal.	1,252	822	152
Grain[7]	lb.	641,032	651,938	98
Hay or its equivalent	ton	241	628	38
Grazing	AUM	4,281	5,340	80

[1]The estimated farm population was 275,000 and the estimated nonfarm population was 272,300 in 1943. Based on reports of the Bureau of Agricultural Economics and the Bureau of Census.

[2]Production available for food is total production minus the amount used for feed and seeds (eggs to hatch in case of poultry). Production of grain available for food and feed is total production minus the amount used for seed.

[3]Based on requirements given in tables 3 and 4 of the appendix.

[4]Production available for food and requirements for food only.

[5]Includes beef, mutton, poultry and pork (excluding lard, bacon, salt sides and fatback).

[6]Production of lard, bacon, salt sides and fatback, and requirements for all fats for food, excluding butter.

[7]Production available or feed and food, requirements for feed, and corn meal requirements for food.

cessing plants.[8] This means that present opportunities for profitable dairy production in these counties are limited to a few Grade A dairies producing for consumption in local towns.

Also, in those counties that do have milk assembling or processing plants, many farmers are not served by milk routes and must provide their own transportation if they are to sell dairy products. Transportation cost, including the time required to carry milk or cream to market, would be prohibitive for many farmers who are poorly situated with regard to dairy markets. Present milk routes could be extended and new ones started where present or potential production would justify them. Some farmers not on milk routes could sell cream to local cream buying stations or ship direct to creameries, although returns would be less favorable than from whole milk. Farmers selling cream should plan their livestock enterprises in a manner that would enable them to ultilize their skim milk efficiently.

Facilities for marketing livestock appear adequate. In 1943 there were 11 auction markets in the Brown Loam area and several others in adjacent counties. The greater part of the livestock produced in this area is sold through auction markets either by the producers or by local dealers or truck buyers, a number of whom operate in each county. In addition some producers ship livestock direct to terminal markets, such as Jackson, New Orleans, and Memphis or sell direct to local slaughterers or butchers. The cost of marketing livestock through auctions in this area is unduly high, especially for high-value animals. For example, the marketing charges for two animals selling for $100 and $200 each would be $5 or more and $10 or more, respectively, as compared to $1.35 at public terminal markets. Auction markets located in states adjoining Mississippi and in the nation as a whole assess lower charges than Mississippi auctions. Increased operating efficiency should allow these charges to be decreased in the Brown Loam area.[9]

Some trading centers offer adequate markets for poultry and eggs, while others do not, particularly during the late spring and early summer months when farm flocks are laying most.

There were five vegetable canning plants operating in the southern part of the Brown Loam area in 1942. Tomatoes are canned mainly from those left over after the fresh-market season. String beans, peppers, and a few other products are contracted for regularly. These plants serve as a balance for production in the area. They often experience difficulty in obtaining an adequate volume when fresh-market demand pushes prices to high levels.

The number of sawmills operating in the area is sufficient to handle timber production. However, the efficiency of operating the mills and of cutting timber could be increased materially in many cases. The present method of cutting clean, especially without leaving seed trees, should be discontinued. Manufacturing plants utilizing forestry products have not been developed generally; they could be operated profitably in many localities.

Marketing and processing facilities for other farm products have not been developed. If the production of farm commodities other than cotton, dairy products, livestock and timber were expanded significantly, additional marketing and processing facilities would be required.

[8] Parvin, D. W., "The Development of the Dairy Industry in Mississippi," Mississippi Experiment Station Bulletin Number 422, 1945, p. 15 and p. 30.

[9] Parvin, D. W., "Livestock Auctions in Mississippi," Mississippi Experiment Station Bulletin Number 400, 1944, pp. 56-59.

ALTERNATIVES TO COTTON WITH AN EFFICIENT AGRICULTURE

Few agricultural problems are more complex than those encountered in any systematic attempt to appraise the future effects of mechanization upon farm enterprise relationships in the Brown Loam area. Currently, technicians and farmers have widely varying opinions about mechanization, and there are wide gaps in the requisite basic information.

Under the conditions assumed for this study, cotton produced with a one-plow tractor and hoed and harvested by hand offers higher returns per acre, than where production is completely mechanized and the cotton is picked on a custom basis, or where mule power is used. Completely mechanized custom-picked cotton offers the lowest returns. High machinery cost, out-of-pocket expenditure for hiring picking by machine, quality loss for machine-picked cotton, and the loss from cotton left in the field when picking is done by machine are the main factors causing returns to be so low on completely mechanized custom-picked cotton (table 6).[10]

High yields are a fundamental requirement for complete mechanization on a profitable basis if picking is to be done on a custom basis; and hiring the picking on a custom basis would have to be practiced in most parts of the Brown Loam area, because of the large acreage necessary to provide 175 to 200 acres of land suitable for mechanized cotton production in the greater part of the area. Returns to land and management with complete mechanization and picking on a custom basis would not be favorable with production at less than 400 to 500 pounds of lint per acre (table 7).

With a yield of 300 pounds of lint per acre, the custom rate for picking cotton would have to decline to 25 cents per hundred pounds before complete mechanization with picking on a custom basis would offer returns to land and management equal to that obtained with partial mechanization.

In those cases where there are 150 to 200 acres of cotton on the same farm, with an average yield of 300 pounds of lint, it would be profitable for the operator to own a picker and completely mechanize. Under these conditions cotton produced mechanically offers returns that compare favorably with other crops. Therefore, it appears that the operator must have enough cotton to justify owning a picker himself, thus avoiding the necessity of paying someone else a sizeable profit for operating a picker, if he is to make money with average yields and prices from completely mechanized cotton production in the Brown Loam area. Between custom rate charges and individual ownership costs, are costs of partnership and cooperative arrangements for owning and operating a picker. Perhaps they could be developed in such a way that picking costs could be kept low.

Fully mechanized corn production, where the operator does not have enough corn to justify owning a picker, also gives less return to land, labor, and management per acre than partially mechanized corn production. Thus, for corn and cotton, it appears that family labor must be used in harvesting on family-sized farms if returns are to be kept at reasonable levels.

Because of erosion losses it would not be feasible to cross-cultivate many fields in the Brown Loam area. Therefore, the elimination of hoe labor for weed control might not be possible. Also, it would mean either planting to a stand

[10] Based on machines now in operation.

Table 6. Gross value minus specified costs per acre for important crops with varying degrees of mechanization, Brown Loam area, Mississippi[1]

	Cotton			Corn			Oats	Oats and
	Mechanized[2]	Partly mechanized[3]	Mule power[4]	Mechanized[5]	Partly mechanized[6]	Mule power[7]	mechanized[8]	lespedeza mechanized[9]
Gross value[9]	53.44	53.44	53.44	18.60	18.60	18.60	14.25	29.25
Production expense								
Fertilizer	4.74	4.74	4.74	1.28	1.28	1.28	1.28	2.30
Seed	1.00	1.00	1.00	.50	.50	.50	2.00	5.00
Man labor	5.34	17.23	19.44	2.01	3.15	4.69	.87	1.33
Tractor or mule power	8.87	8.87	12.93	5.19	5.68	8.33	2.25	3.14
Machinery	7.05[10]	3.80	1.69	2.22	2.44	1.09	.97	1.34
Harvesting custom	13.80	---	---	3.75	---	---	3.75	6.50
Transportation and storage	1.25	1.25	1.25	.50	.50	.50	.50	1.00
Other cotton cost	11.16[11]	3.60	3.60	---	---	---	---	---
Total	53.21	40.49	44.65	15.45	13.55	16.39	11.62	20.61
Returns to land and management	.23	12.95	8.79	3.15	5.05	2.21	2.63	8.64
Returns to land, labor and management	5.57	30.18	28.23	5.16	8.20	6.90	3.50	9.97
Returns per hour of labor[12]	.20	.33	.28	.49	.49	.28	.76	1.42

[1] Preliminary estimates.
[2] One-plow tractor; custom picked by machine; labor requirements include an allowance of 10 hours for hoeing.
[3] One-plow tractor; hoed and picked by hand; labor requirements include an allowance of 20 hours for hoeing.
[4] One-row equipment; labor requirements include an allowance of 20 hours for hoeing.
[5] One-plow tractor; custom picked by machine, corn hill dropped, no allowance made for hoeing.
[6] One-plow tractor; picked by hand; corn hill dropped, no allowance made for hoeing.
[7] One-row equipment, hill dropped, no allowance made for hoeing.
[8] One-plow tractor; custom harvested.
[9] Cotton, 300 lbs. of lint at 14.7 cents and 489 lbs. of seed at 1.9 cents; corn, 20 bu. at 92 cents; oats, 25 bu. at 57 cents; and lespedeza, 1 ton at $15.00.
[10] Includes $2.50 for fuel for flamer and $0.75 per acre for depreciation repairs and interest on flaming machine.
[11] Ginning and poison, $3.60; quality loss due to machine picking, $5.20; value of cotton left in field, $2.36.
[12] Exclusive of the labor performed by person doing custom harvesting.

Table 7. Preliminary estimates of returns per acre for cotton with different yield levels when machine picked on a custom basis, Brown Loam area, Mississippi.

Item	Pounds of lint per acre				
	500	400	300	200	100
Value of lint and seed[1]	$89.07	$71.25	$53.44	$35.63	$17.81
Costs:					
Preharvest[2]	33.32	30.16	27.00	23.84	21.37
Custom picking[3]	23.00	18.40	13.80	9.20	4.60
Ginning, transportation and storage	8.08	6.47	4.85	3.23	1.62
Value, quality loss[4]	8.67	6.93	5.20	3.47	1.73
Value, waste cotton[5]	3.93	3.15	2.36	1.57	.79
Total costs	77.00	65.11	53.21	41.31	30.11
Returns to land and management	12.07	6.14	.23	—5.68	—12.30
Returns to land, labor, and management	17.41	11.48	5.57	— .34	— 7.15

[1] Cotton at 14.7 cents per pound and cottonseed at $38.22 per ton.

[2] Includes cost for 8 cultivations, flame cultivators would be attached for 5 of them; fertilizer applied at the rate of 700, 500, 300, 100 and zero pounds per acre.

[3] A charge of $1.75 per cwt. of seed cotton.

[4] Estimated that losses from machine picking would average 1 grade.

[5] Assumed that 7 percent would be left in field compared with hand picking and that leavings would probably be 1 to 2 grades below average quality.

or the use of some kind of a mechanical chopper to avoid chopping by hand. It is doubtful if present models of mechanical choppers would work satisfactorily where the slope is appreciable.

Retention of hand-picking and hand-hoeing practices would still continue the very uneven pattern of seasonal labor requirements for cotton (table 8).[11] Even when hay and small grain crops are completely mechanized the conflict in the late summer and early fall between harvesting hay and seeding oats and harvesting cotton and corn becomes a seriously limiting factor. This plus the man labor needs for hoeing during May and June make it as easy for one family to balance its labor with a one-plow tractor as to do so with a two-plow tractor.

Cotton produced mechanically, except for picking and hoeing, offers returns per acre that are considerably higher than for other crops; however, corn, oats, and oats followed by lespedeza hay offer higher returns per hour worked (table 6). These comparisons tell only a part of the story, and they can easily be misleading. At best they show relationship only in a very rough fashion. It is not the purpose of the individual farm operator to maximize returns per acre worked or per hour worked, but to maximize returns to the farm as a unit. If available land, labor and capital are to be used efficiently, enterprises must be fitted together; and in an area such as the Brown Loam, advantage must be taken of opportunities to supplement and to complement crop production with livestock enterprises if farming systems are to be successful.

Cotton should continue to be the major cash crop in most of the area. The production of crops with higher per-acre returns would be limited by market demands to a relatively small acreage. Family-size farms, with a normal family labor supply, would find it profitable to produce all of the cotton that the family could chop and pick by hand. On some farms, particularly those with a short labor supply, relatively high yields, and level topography, cotton production could be completely mechanized profitably, with the possible exception of one hoeing.

[11] Experimentation in chemical weed control was just beginning when this study was inaugurated. Therefore, it was not taken into consideration in this study.

Table 8. Labor and power requirements per acre, one-plow tractor, Brown Loam area, Mississippi[1]

Crop		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
		hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.	hrs.
Cotton[2]	M[7]	.4	.5	1.9	3.3	11.6	11.7	5.7	5.6	22.5	17.5	10.0		90.7
	T	.4	.5	1.9	2.3	3.6	3.7	2.7	.3	1.1	.9	.7		18.1
Corn[3]	M	.4	.5	1.2	2.9	3.3	1.3				3.5	3.5		16.6
	T	.4	.5	1.2	2.9	3.3	1.3				1.0	1.0		11.6
Oats[4]	M			.5			2.4		2.3	1.0				6.2
	T			.5			2.4		2.3	1.0				6.2
Lespedeza hay (after oats)[5]	M			.5					4.3	2.2				7.0
	T			.5					1.9	1.0				3.4
Soybeans or cowpeas for hay[6]	M				1.0	3.4			6.2	3.0				13.6
	T				1.0	3.4			2.5	1.3				8.2

[1] Preliminary. Based upon publications of the U.S.D.A., Experiment Station reports, and estimates of technicians working on this study.

[2] Yield 300 pounds lint. Includes an allowance of 20 hours for hoeing; time required for harvesting calculated on the basis of one man picking 150 pounds of seed cotton per ten-hour day.

[3] Yield 20 bushels. Hill-dropped, no allowance made for hoeing. Harvested by hand.

[4] Yield 25 bushels; completely mechanized.

[5] Yield 1 ton; stationary type baler.

[6] Yield 1.5 tons; stationary type baler.

[7] M, man hours; T, tractor hours.

Fresh vegetables, sweetpotatoes, and small fruit could replace part or all of the cotton acreage on some farms in the vegetable subarea, particularly small farms with at least a normal supply of family labor. The expanded acreage of these crops, limited as indicated above, should be confined generally to present production areas, where adequate market facilities are either available or could be expanded.

Production of soybeans for beans, particularly in the upper Brown Loam area, would be profitable on fertile bottom land too wet for cotton and on gently rolling upland where production could be completely mechanized and relatively high yields obtained.

The competitive position of peanuts would probably be unfavorable, not only because of the low net returns per acre, but also because of the soil-depleting nature of the peanut crop and the dislike of farmers growing cotton for harvesting the peanut crop.

Small grains and hay provide low returns in terms of cash income per acre. However, they fit well into a balanced farming system; provide needed feed for livestock, distribute labor more uniformly, provide cover that is badly needed for a large percentage of the land, and give a higher return per hour of labor than other crops. Small grain may be double-cropped with lespedeza, or other appropriate hay crops.

Dairying does not produce quite as high net returns per hour of labor as cotton, but it provides work during the non-crop season and makes possible a system of land use that has a larger percentage of land in close-growing and sod crops than would be feasible under a specialized cash crop system of farming. Beef cattle, likewise, fit well into a balanced system of land use. In contrast with dairying, beef production provides a relatively low return per acre, and is, therefore, not as well adapted to small farms as is dairying.

The production of hogs and poultry generally would be limited largely by the amount of grain produced on the farms above the needs of forage-consuming animals. Hog and poultry also provide work during the non-crop season; and the work, particularly on poultry, may be done largely by women and children.

BEST-ADAPTED FARMING SYSTEMS WITH AN EFFICIENT AGRICULTURE

The usual operating unit in the Brown Loam area, with an efficient agriculture, should contain from about 100 to 200 acres of open land of which about one-third to one-half should be open permanent pasture. A farm of this size could be operated profitably by one family having approximately 1.5 man equivalents, if partly mechanized.[1 2] Cotton, feed crops, dairy cattle, beef cattle, hogs, and poultry should form the nucleus of the farming systems if resources are used so as to maximize farm income per farm family.

The best-adapted farming systems for the bulk of the area, insofar as can be ascertained at present, are:

	Percent of land in farms
Dairy-cotton (party mechanized)	40
Livestock-cotton (partly mechanized)	20
General (partly mechanized)	15
Cotton-beef (completely mechanized)	15
Other	10

[1 2] Partial mechanization as used here refers to complete mechanization for major crops except for harvesting corn and cotton, and hoeing cotton.

The dairy-cotton farms would tend to be concentrated in the northern and southern portions of the area where city markets are available, either within or outside the state, as well as outlets for milk for processing purposes. Other production situations where good outlets for milk already exist, or could be profitably developed, make up the balance of the land area suited to the dairy-cotton system of farming.

The livestock-cotton farms are adapted to production situations where acreages suited to pasture and close-growing crops are relatively large as compared to the amount of land suited to row crops. Also, this system of farming would often be developed in those parts of the area where markets for dairy products are not available or could not be developed profitably. Beef, pork, and cotton would be important sources of income.

The general farms would be scattered throughout the area, and for cash income the majority would depend on cotton and two or more livestock enterprises. This system of farming would develop in those parts of the area where the acreage suited to row crops is relatively higher than for cotton-dairy or livestock-cotton systems of farming. Enough cattle would be kept to utilize the available pasture and forage crops. If a market for dairy products were available, dairy cows would be kept; otherwise, beef cattle would be grown. In addition to cotton and dairy or beef cattle, hogs and poultry would be important enterprises. The latter two would be of relatively more importance if beef cattle were kept instead of dairy cows, because more grain would be available for them.

The fully mechanized cotton-beef cattle units would be located in those parts of the area where relatively large acreages of level land can be found in continuous tracts. Cotton would be the main crop, with a little grain and hay. Beef cattle would be kept to utilize the grazing provided by farms of this size. Generally, they would be multiple-family units.

The farming systems grouped together under "others" include truck, poultry, and woodland units; also, part-time and part-retirement farms. The truck farms are the main group falling in this category. They would be small in size, use relatively large amounts of family labor, and be located primarily in the Copiah County area. The woodland farms would develop in those areas where the rugged terrain makes the greater part of the land unsuited to crops and pastures. Part-time and poultry farms would be concentrated around the cities and towns. Neither the part-time or the part-retirement farms would produce much for the market.[1 3]

Dairy-Cotton Farms

The minimum-sized efficient dairy-cotton units in the area would have approximately 120 acres of open land, of which 65 acres would be used for rotation cropland and 58 acres for open permanent pasture. The total acreage would vary, depending on the amount of land suited only for woods, but would average about 180 acres. Based on normal value the total investment would amount to about $10,000, of which almost 50 percent would be working capital (machinery, livestock, and cash to operate farm). (See table 9.)

Cotton and corn would be harvested by hand, and hoe labor would be used

[1 3]It is emphasized that the size and combination of enterprises shown for the three systems of farming that follow are preliminary estimations. They are based on the yields and prices assumed for this study and shown in appendix tables 1C, 1D, and 2. The minimum size and best combination of enterprises for each of these three systems of farming will probably change to some extent as actual yields and prices differ from those assumed for this study.

along with sweep-type tractor cultivation for weed control. Flame cultivators would not be used. One family with a single-row tractor and no workstock would be able to operate this farm without hiring additional help. Tractors would have a road gear and be rubber mounted to meet hauling and odd-job needs. Tractor equipment that could be utilized to advantage is as follows: stalk cutter, breaking plow, middlebuster, disc harrow, section harrow, planter-distributor, grain drill and attachments, cultivator, mower, rake, combine, trailer, and hammer mill. It would be cheaper to hire hay baled on a custom basis than to own a baler.

The suggested system calls for 10 acres of cotton, which is about the amount an average family can harvest. It would seem to be a wise policy for the farmer who follows this system to produce all the cotton his family can harvest. The farmer and his family get a greater return per acre of cotton than for any other crop and no small part of this income is from the labor of the family in chopping and picking. If the use of family labor is cut off by the use of mechanical equipment and no other profitable use is made of it, net income suffers. Therefore, the most profitable course seems to be to grow as much cotton as the family can handle during peak seasons and use the balance of the land for supplementary crop and livestock enterprises.

Feed crops, and 2 acres of miscellaneous truck and garden crops, would utilize the balance of the cropland. Sixteen acres of corn and 24 acres of oats would supply the grain requirements. The oats would be grazed by the dairy cattle from about December 1 to March 1; 18 acres would be followed by lespedeza for hay; and 6 acres would be planted to sudan grass or some other suitable crop to be utilized as a temporary summer pasture. Twelve acres of second-year lespedeza would furnish the balance of the hay needed. One acre of lespedeza would be saved for seed.

The dairy herd would consist of 20 good grade cows. To maintain this herd in good condition, 4 cows would be sold each year and 4 heifers brought into production. To improve the herd, artificial insemination would be practiced. The net cost of artificial insemination is not great when the cost of keeping a good bull is taken into consideration. The cows would be milked by machine in order to keep labor requirements within the limits of the family labor force. One thousand pounds of grain, 500 pounds of cottonseed meal and 2 tons of hay would be fed per cow. Grazing would be furnished the year round, although the cows would be allowed to graze only 3 to 4 hours per day from December 1 to March 1 when the oats were being utilized. The 6 acres of temporary summer pasture would provide grazing in the summer when permanent pastures ordinarily dry up. Taking cows off the permanent pasture during this period allows the grasses to come back, and when the cattle are returned to the permanent pasture fairly adequate grazing is obtained up to the time the cattle are turned on oats. With this feeding program, production would average about 4,250 pounds per cow.

The rest of the livestock program would consist of small poultry and hog enterprises. One sow would be kept; two litters of about 6 pigs each would be farrowed and fed out to about 200 pounds per head. Twenty-five hens would be kept for egg production for home use and enough chickens raised to provide the family with poultry meat and to furnish replacements.

The labor supply for the average farm family can be outlined in specified terms only when some assumptions are made concerning the amount of work women

and children would do. In this study, it is assumed that during peak seasons children would furnish .5 man equivalent when out of school and .2 man equivalent when in school. The operator's wife, it is assumed, would contribute .25 man equivalent during the rush seasons. These factors plus full-time work for the farm operator provide an approximation of the labor available for crops, when multiplied by the estimates of the days when weather and soil conditions permit work in the field. Field work, including the time spent on the pasture and miscellaneous truck crops, would require an input of about 1800 hours—73 percent of the time available for it. The dairy enterprise, fitted into the business so as to utilize feed produced and to provide productive work throughout the year, would require an additional 1,750 hours. About 400 hours would be spent in taking care of the hogs and poultry and in the grinding and preparation of feed for all of the livestock. Labor expended on woodlands would amount to about 160 hours; for management and improvement, 100 hours; and for har-

Table 9. Farm organization, minimum-sized efficient farm units, with comparisons, Brown Loam area, Mississippi.

	Minimum-sized efficient units			Typical farm units of similar size, 1943		
	Dairy-cotton	Livestock-cotton	General	Dairy-cotton	Livestock-cotton	General
Land use:	acres	acres	acres	acres	acres	acres
Cropland	65	90	56	70	104	54
Open permanent pasture	58	108	36	50	90	38
Woods and waste	50	92	43	53	96	43
Farmstead, roads, etc.	7	10	5	7	10	5
Total	180	300	140	180	300	140
Crops:						
Cotton	10	10	10	18	25	15
Corn	16	20	20	25	45	22
Oats, grain and grazing	24	30	14	---	---	---
Oats, grazing only	---	25	---	---	---	---
Lespedeza hay after oats	(18)	(43)	(10)	---	---	---
Lespedeza hay, 2nd year	12	---	10	14[1]	15[1]	5[1]
Clover, seed	1	3	---	---	---	---
Temporary summer pasture	(6)	(12)	(4)	---	---	---
Winter legumes	(9)	(10)	(10)	(12)	(16)	(6)
Miscellaneous truck	2	2	2	2	3	3
Idle	---	---	---	11	16	9
Livestock:	number	number	number	number	number	number
Workstock	---	---	---	4	6	3
Milk cows	20	2	12	12	---	---
Beef cows	---	30	---	---	20[2]	6[2]
Pigs raised	12	48	12	10	16	10
Hens	25	25	250	50	50	35
Chickens raised	75	75	750	100	100	100
Investment:	dollars	dollars	dollars	dollars	dollars	dollars
Land	3000	4500	2500	3000	4500	2500
Building and fences[3]	2250	2200	2200	1750	2000	1300
Machinery[3]	1500	1300	1050	400	450	350
Livestock	2450	3050	1750	1500	2040	900
Operating capital	500	800	400	600	600	250
Total	9700	11850	7900	7250	9590	5300

[1] About 60 percent soybeans and about 40 percent clover.

[2] Enough milk produced for home use.

[3] Inventory values shown at one-half of new cost.

vesting timber for the market, 60 hours. Total hours worked would be about 4,100.

Under the conditions assumed for this study,[14] this system of farming would give cash receipts of about $3,400, of which about three-fourths would come from the main enterprise, dairying. Cotton would be the next most important source of income. After deduction of cash expenses, the net cash income would amount to about $1550. Family labor earnings would amount to about $1100, and returns per hour of family labor approximately 27 cents (table 10).

In order to measure the gains that could be made by efficient organization and operation, the 1943 organization and income on a typical dairy-cotton farm of the same size as the proposed unit is given in tables 9 and 10. Compared to the proposed system, this farm had 80 percent more land in cotton and 56 percent more land in corn, but only 46 percent as much land in hay, and no oats. As to the livestock organization, the farm as operated in 1943 had only 60 percent as many dairy cows and about the same number of hogs and hens. The operator's family and one cropper family constituted the labor force. The operator and his family would work slightly fewer hours under the proposed system than practiced in 1943, but would receive a much higher return per hour. When income and expenses were calculated on the basis of normal prices, this system of farming as practiced in 1943 gave family labor earnings of $690, about one-half the returns under the proposed system.

Livestock-Cotton

The minimum-sized efficient livestock-cotton units in the area would have about 200 acres of open land, of which 90 acres would be devoted to crops and 108 acres to open permanent pasture. The total acreage would vary, depending on the amount of land suited for woods only, but would average approximately 300 acres. Based on normal values, total investment would amount to about $12,000, of which about 45 percent would be working capital (table 9).

Cultivating and harvesting methods, other farm practices, power used, and the family labor force would be the same as those outlined for the dairy-cotton farm; tractor equipment would be the same except that a hammer mill would not be needed. A limited amount of labor would have to be hired in August and September to help in the hay harvest.

This system of farming would have 10 acres of cotton, for the same reasons as outlined for the cotton-dairy system. The rest of the cropland would be used for feed crops, except two acres for miscellaneous truck and garden. Twenty acres of corn and 30 acres of oats would provide grain. An additional 25 acres of oats would be used for grazing only. Lespedeza for hay would be planted after 43 acres of oats, and a crop for temporary summer pasture after the other 12 acres. Seed would be saved from 3 acres of clover in order to keep down seed cost.

The beef herd would consist of 30 good grade beef-type cows. To maintain the herd in good condition, 6 cows would be sold each year and 6 heifers brought into production. A good beef-type bull would be kept. Calves would be dropped in early spring and would be carried through the summer and fall on milk and grass. Average management would give an 80 percent calf crop. About December 1 the calves would be placed on the 25 acres of oats; one-half ton of hay per calf would be stacked on the oat field as supplementary roughage. The calves would be removed from the oats pasture about June 1 and sold at weights approximating 650 pounds each. One

[14] See appendix tables 1C, 1D, and 2 for yield and prices used in this analysis.

Table 10. Income summary[1], minimum-sized efficient farm units, with comparisons, Brown Loam area, 1943.

Item	Minimum-sized efficient units			Typical farm units of similar size, 1943		
	Dairy-cotton	Livestock-cotton	General	Dairy-cotton	Livestock-cotton	General
	dollars	dollars	dollars	dollars	dollars	dollars
Cash receipts:						
Cotton	532	532	532	870	1211	736
Dairy enterprise	2495	----	1480	1075	----	----
Beef enterprise	----	1708	----	----	480	180
Hog enterprise	264	924	220	88	220	88
Poultry enterprise	25	25	1134	114	114	88
Forestry products	69	128	59	40	74	34
Total	3385	3317	3425	2187	2099	1126
Cash expenses:						
Fertilizer[2]	283	450	217	80	104	60
Feed	218	89	668	382	166	135
Seed	59	82	81	71	85	45
Hired labor	----	32	----	211[3]	430[3]	176[3]
Custom work[4]	105	----	94	----	----	----
Ginning	39	39	39	54	77	44
Tractor fuel and oil	177	212	159	----	----	----
Marketing charges[5]	270	130	162	116	35	13
Taxes and insurance	120	160	100	75	100	50
Repairs[6]	280	255	232	142	160	103
Breeding fees	102	16	62	----	----	----
Auto expenses	100	100	100	100	100	100
Miscellaneous	78	85	164	75	70	58
Total	1831	1650	2078	1306	1327	784
Net cash income	1554	1667	1347	881	772	342
Value of farm products used by family	386	386	386	337	337	337
Depreciation	356	325	275	176	217	137
Net farm income[7]	1584	1728	1458	1042	892	542
Interest on investment	485	593	395	362	480	250
Family labor earnings[8]	1099	1135	1063	680	412	292
Hours of family labor used	4100	3600	4400	4290	3220	2265
Returns per hour	0.27	0.32	0.25	0.16	0.13	0.13

[1]All income and expense calculations based on normal prices as given in table 1D and 2 in the appendix.

[2]In the calculation of fertilizer expenses it was assumed that the estimated yield levvel was consistent with fertilization of crops at 50 percent of the recommended level and permanent pastures at 25 percent of the recommended level. See appendix table 5 for recommended rates.

[3]Cash cost of cropper labor.

[5]Hay baling and combining oats.

[5]Milk hauling and auction charges.

[6]Buildings, equipment, and fences.

[7]Net cash income plus the value of farm products used by the family minus depreciation.

[8]Net farm income minus interest on investment.

ton of hay would be stacked per head of mature beef cattle. Grazing would be furnished the year round, although grazing for the mature animals would be limited to 3 or 4 hours per day from December 1 to March 1 when the 30 acres of oats being grown for grain would be pastured.

The hog enterprise would consist of 4 brood sows. Each sow would produce two litters of about 6 pigs each, and the pigs would be fed out to weigh about 200 pounds each. Two acres of oats and two acres of the temporary summer pasture would be fenced off and grazed by the hogs. With this grazing program, 425 pounds of grain and 25 pounds of protein by-products would produce one hundred pounds of pork.

Two grade dairy cows would be kept for milk production for home use. The calves produced would be handled in the same manner as the beef calves. Twenty-five hens would be kept for egg production for home use, and enough chickens raised to provide replacements for hens and to furnish the family poultry meat.

This system of farming would give cash receipts of about $3,300, of which approximately 50 percent would come from the beef enterprise, 28 percent from the hog enterprise, and about 16 percent from the cotton enterprise. Poultry and forestry products would contribute the remainder. Family labor earnings would amount to approximately $1100. Total hours of work would be about 3,600 hours; returns per hour of labor would approximate 32 cents (table 10).

The organization and income on a typical 300-acre cotton and livestock farm for 1943 are given in tables 9 and 10. Compared to the proposed system, this farm had 15 acres more cotton, 25 acres more corn, and 28 acres less hay; the typical livestock-cotton farm as operated in 1943 had no oats and 16 acres of idle cropland, as compared to 55 acres of oats and no idle cropland for the proposed system. As for the livestock organization, the farm as operated in 1943 has about two-thirds as many cows, about one-third as many pigs, and about the same amount of poultry. The operator's family and two cropper families constituted the labor force. It would be necessary for the operator and his family to work about 10 percent more under the proposed system than under the system practiced in 1943, but returns would be almost tripled. When incomes and expenses are calculated on the basis of normal prices, the system of farming as practiced in 1943 shows family labor earnings of about $400 as compared to about $1100 under the proposed system.

General Farm

The minimum-sized efficient general farm in the area as outlined here would have about 92 acres of open land, of which 56 acres would be devoted to crops and 36 acres to open permanent pasture. The total acreage would vary, depending on the amount of land suited for woods only, but would average about 140 acres. Total investment would amount to about $7500, of which approximately 40 percent would be working capital (table 9).

Farm practices, power used, and the family labor force would be the same as those outlined for the cotton-dairy farm; tractor equipment used would be the same except that a grain drill and combine would not be owned. It is cheaper, on farms of this size, to hire the work done by these machines on a custom basis than to own the machines.

Ten acres of cotton, 20 acres of corn, 14 acres of oats for grain and grazing, 10 acres of clover hay following oats, 4 acres of temporary summer pasture following oats, 10 acres of second-year clover, and 2 acres of miscellaneous crops would make up the cropping pattern.

Dairy, poultry and hog enterprises would contribute to the farm income.

The dairy herd would consist of 12 good grade cows and they would be cared for in the same manner as the cows on the dairy-cotton farm. With this size herd, it would be more economical to milk by hand because the family labor would be available.

One sow would be kept and 2 litters of 6 pigs each would be farrowed and fed out to 200 pounds per head.

The poultry enterprise would be fairly large on this farm. A 250 all-pullet flock would be kept for egg production and 750 baby chicks raised to provide for pullet replacements, home use, and sale. With average management, the mortality rate for baby chicks should not exceed 10 percent; culling of non-layers and proper management should keep the mortality rate in the laying flock down to 10 percent. The laying flock would average about 200 birds for the year. The laying flock would be replaced each year, because production per pullet is generally 20 to 25 percent above the production of hens. About two acres of permanent pasture would furnish adequate grazing for summer rearing of pullets. Hens would be fed about 40 pounds of grain and 40 pounds of laying mash. With this feeding program, total egg production would amount to about 3,000 dozen.

This system of farming would give cash receipts of about $3,400 (table 10). Approximately 43 percent of this total would come from the dairy enterprise, 33 percent from the poultry enterprise, and 16 percent from the cotton enterprise. Pork and forestry products would contribute the remainder. Family labor earnings would amount to approximately $1100. With a total of about 440 hours worked, returns per hour of labor would approximate 24 cents.

In areas where a profitable market for dairy products was not available, the dairy herd would be replaced with a beef herd of about the same size. The poultry and hog enterprises would be increased in size in order to utilize the grain that would be made available when the dairy cows were replaced by beef cows. This system of farming would require from 15 to 25 percent less labor than where dairy cows were kept and the net returns would be from 10 to 20 percent lower.

For comparative purposes, the 1943 organization and income on a typical general farm of the same size as the proposed farm is given in tables 9 and 10. The typical general farm as organized in 1943 had about 50 percent more land in cotton and slightly more land in corn, but only about one-fourth as much land in hay, and no oats. The farm as operated in 1943 had 6 beef or general type cows, as compared to 12 dairy cows in the proposed system when a dairy market is available, or 12 beef cows when a dairy market is not available. This system of farming as practiced in 1943 had about 200 less hens and about the same number of hogs as the proposed system. The operator's family and one additional family constituted the 1943 labor force. The operator's family would have to work almost twice as much under the proposed system as in 1943, but returns would be about three and one-half times as high. Based on normal prices, the operator's family labor earnings were approximately $300 in 1943, as compared to about $1,100 under the proposed system.

PRODUCTION PATTERN WITH AN EFFICIENT AGRICULTURE

With an efficient agriculture, there would be a considerable shift from row crops to close-growing crops and hay crops (appendix table 1A). As compared to 1943, total cropland would decrease to some extent, and there would be an increase in the acreage devoted to permanent pasture. The acreage of row crops would decrease 21 percent, and the acreage of small grain and hay crops would increase 245 percent. At the same time, the total acreage devoted to crops would decrease 7 percent, and the acreage of open permanent pasture would increase 8 percent. This rather striking shift in land use would serve not only to conserve soil resources, but also to give a better distribution of labor requirements throughout the year.

The total acreage planted to cotton would increase slightly (3 percent), because cotton gives a higher return per acre than alternative crops. A larger increase was not suggested, because a larger acreage of cotton would not fit into balanced systems of farming, due to peak labor requirements when cotton picking machines and flame cultivators are not used. The acreage of corn would decrease 35 percent. Substituting small grain and hay crops for corn and for a portion of the crops of lesser importance would improve the seasonal labor distribution, the balance between grain and hay crops, and the seasonal distribution of grazing. If seeded at the proper rate and at the proper time, and properly fertilized, the oat crop would furnish about three months of winter grazing without material damage to the grain yield. All feed produced would be fed within the area.

A 55-percent increase in milk cow numbers would be desirable and could be attained (appendix table 1B). Milk processing facilities are adequate to take care of this increase. Higher levels of milk production in fall and winter months could be attained and would add to the efficiency of both production and processing. Beef cow numbers would increase even more—72 percent. Hog numbers would increase about one-fifth, and chicken numbers would be maintained at about the 1943 level, although a decrease in the number of farm families would mean that more pork and poultry products would go through market channels. Between three-fourths and four-fifths of the workstock would be replaced by tractors, which would provide more efficient power and at the same time make available additional land for productive livestock.

IMPLICATIONS OF SUGGESTED ADJUSTMENTS

With an efficient production pattern, the total population on farms in the Brown Loam area would need to be reduced about 45 percent as compared to 1943 (appendix table 1G). In 1943, there were 64,100 full-time farm families in the area. With the most efficient minimum-sized units, about 26,000 full-time farm families would be needed. This would mean that 38,000, or 60 percent of the full-time farm families in 1943, would need to look to some other source for the major part of their income. It is suggested that about 2,500 of those who live close to towns might remain on their small holdings and supplement their farm income by work off the farm. However, this would still leave about 35,000 farm families who would need to find nonfarm work, either

within or outside the area. It would be desirable for a large proportion of these families to have rural residence within the area, produce all or a portion of their food needs, and work full-time at nonfarm work.

Even with the assumed price of farm products 28 percent below the level existing in 1943, gross farm income would be 3 percent higher with an efficient agriculture than in 1943. The decrease in the total farm population of 45 percent with an efficient agriculture would result in the gross farm income per capita increasing 86 percent. If only the full-time farm population is considered, the per capita gross farm income would increase 129 percent.

With an efficient agriculture, there would be considerable changes in the volume of products sold (appendix table 1E). As compared to 1943, the volume of cotton sold would decrease 5 percent;[15] but the volume of milk sold would show an increase of 376 percent; beef, an increase of 103 percent; pork, an increase of 61 percent; and eggs, an increase of 97 percent. The volume of poultry meat and peanuts sold would decrease, and the volume of sweetpotatoes and Irish potatoes sold would increase. The volume of corn produced and used for feed would decrease 7 percent, the volume of oats produced and used for feed would increase 768 percent, and the volume of hay produced and used for feed would increase 256 percent. The volume of sweetpotatoes fed would remain at about the same level. Livestock and livestock products accounted for only 35 percent of the gross farm income in 1943; but with the pattern outlined above for an efficient agriculture, livestock and livestock products would contribute 58 percent of the total (appendix table 1F). The relative contribution of cotton would decrease from 47 percent to 28 percent.

In general, the marketing and processing facilities available would be sufficient to handle the increased volume which an efficient agriculture would bring forth; however, many improvements could be made that would increase the efficiency of marketing and processing farm products in this area.

[15] 1943 was a very favorable year for cotton; the average yield for the area was 334 pounds, 59 pounds above normal and 34 pounds above the average assumed for this study.

OBSTACLES TO FUTURE DEVELOPMENT OF AN EFFICIENT AGRICULTURE

Small size of farms and surplus farm population. The majority of farms are too small to take advantage of modern machinery and farming techniques. In addition, the surplus farm population slows down the shift to more efficient methods on farms that have adequate size.

Low managerial performance of the majority of farm operators. Most farm operators fail to make use of the best methods of crop and livestock production or to utilize fully the land and other resources they have. This is substantiated by the low crop yields and livestock production rates, the idle and waste land, and the relatively small number of days worked per man on the majority of farms.

Inadequate and inefficient marketing and processing facilities and services. Inadequate marketing facilities for farm commodities other than cotton have prohibited in some cases, and slowed down in others, the development of more efficient systems of farming. In addition,

the inefficient operation of many of the present marketing and processing facilities have lowered prices to farmers.

A program designed to accomplish the following objectives will aid in overcoming these obstacles:

1. Provide off-farm employment opportunities for the surplus farm population by:
   a. Encouraging and facilitating industrialization and the development of trade and service industries in the area.
   b. Providing industrial and commercial education and training programs for rural areas, particularly for young people at about the time they are ready to enter the employment group, and providing a placement agency of sufficient coverage to bring workers and jobs together either within or outside of the area.
2. Provide the credit facilities necessary to consolidate land into efficient-sized units, to combine enterprises into efficient farming systems, and to use the best farm practices. The credit should have a variable repayment schedule which should be tied to the price of the major farm commodity or commodities, and the payments should be in keeping with the level of earnings of the farms while they undergo reorganization and expansion to efficient size and productivity.
3. Provide the educational facilities and services necessary to reach all farmers and prospective farmers in order to teach and train them as to the importance and profitability of having an adequate-sized business, of combining enterprises into an efficient system of farming, and of using the best farm practices.
4. Provide the facilities, services, and educational program necessary to get and keep rural people in good health. There is no doubt that there are many cases in which the low managerial performance or output per worker in the result of poor health.
5. Provide the research program necessary to determine:
   a. The best practices and groups of practices under given physical conditions and prevailing economic conditions of costs and prices.
   b. What and how much of the different enterprises and resources should be available for suitable sizes of farms for the most important systems of farming in different type-of-farming areas.
   c. The most efficient marketing and processing facilities and the volume needed for efficient operation.

APPENDIX

Table 1. An efficient agriculture, Brown Loam area, Mississippi.

A. Suggested land use compared with 1943.

Use of farm land	Report acreage for 1943	Suggested for an efficient agriculture	
		Acreage	Percentage of 1943
	1,000 acres		percent
Corn, all	768	500	65
Sorghums and sugarcane for sirup	14	10	71
Soybeans for beans	27	9	33
Cowpeas for peas	26	16	62
Peanuts picked and threshed	11	6	55
Cotton, all	580	600	103
Irish potatoes	10	8	80
Sweetpotatoes	23	19	83
All truck crops for processing	2	2	100
All truck crops for fresh market	17	20	119
Oats	50	300	600
Hay, all tame, total	189	527	279
Seeds, hay and cover crops, all	10	35	350
Rotation (cropland) pasture, summer	50	100	200
Rotation (cropland) pasture, winter	25	300	1,200
Idle cropland	340	79	23
Total cropland	2,103	1,960	93
Open permanent pasture	1,520	1,660	109
Woodland pasture	1,000	700	70
Other land in farms	767	1,070	140
Total land in farms	5,400	5,400	100
Winter cover crops, legumes	227	225	99

B. Number of livestock compared with 1943.

Class of livestock	Reported number for 1943	Suggested for an efficient agriculture	
		Number	Percentage of 1943
	1,000 units		percent
On farms January 1			
Horses, mules, and colts	128	30	23
Cattle and calves, all	489	690	141
Cows kept for milk, 2 years and over	161	250	155
Other cows, 2 years and over	102	175	172
Sheep and lambs, all	11	22	200
Ewes, 1 year old and over	7	14	200
Hens and pullets	1,905	1,900	100
During year:			
fall	43	35	82
Sows farrowing: spring	43	35	82
Calves raised, total	195	352	181
Lambs saved, total	4	8	200
Chickens raised	4,454	4,500	101
Commercial broiler production	871	900	103

C. Estimated crop yields and grazing capacity and estimated livestock production rates compared with 1943

Item	Unit	Average crop yields and production rates in 1943	Attainable with improved practices	
			Where applied	Average for the area
Crops:				
Corn, all	bu.	14.5	28	20
Soybeans for beans	bu.	10.5	15	10
Cowpeas for peas	bu.	5.7	11	6
Peanuts threshed	lb.	435	800	500
All cotton	lb.	334	375	300
Irish potatoes	bu.	58	130	100
Sweetpotatoes	bu.	81	160	110
Oats for grain	bu.	22.4	35	25
Wheat	bu.	---	---	---
Barley	bu.	---	---	---
Hay, all tame	ton	1.01	2.1	1.3
Rotation pasture	AUM*	1.8	4.1	2.5
Permanent pasture	AUM	2.0	5.3	3.0
Woodland pasture	AUM	---	.5	.5
Livestock products:				
Pigs saved per sow: spring	no.	5.5	6.5	6.0
Pigs saved per sow: fall	no.	5.6	6.6	6.1
Av. weight of all calves raised	lb.	248	350	325
Av. weight of beef calves raised	lb.	350	500	450
Av. milk production, all milk cows	lb.	2384	4500	3100
Av. milk production, commercial herd	lb.	3500	5000	4250
Av. weight of lambs raised	lb.	64	100	80
Wool per head shorn	lb.	3.4	6.5	5
Eggs per hen (av. during year)	doz.	6.5	15	10.5
Av. weight of chickens raised	lb.	3.2	3.5	3.0
Av. weight of commercial broilers	lb.	2.6	3.0	3.0

*Animal Unit Months.

D. Estimated prices of farm products received by farmers compared with 1943.

Item		Prices	
		Received in 1943	Estimated for an efficient agriculture
Crops:		dollars	dollars
Corn	bu.	1.45	.93
Soybeans for beans	bu.	2.44	1.61
Cowpeas for peas	bu.	3.37	2.25
Peanuts	lb.	.07	.04
Cotton	lb.	.20	.14
Irish potatoes	bu.	1.57	.88
Sweetpotatoes	bu.	1.90	1.14
Oats	bu.	.85	.57
All hay	ton	19.56	15.00
Livestock and livestock products:			
Milk	cwt.	3.40	3.21
Eggs	doz.	.34	.25
Chickens	lb.	.25	.20
Broilers	lb.	.28	.23
Pork	cwt.	12.54	9.90
Beef and veal	cwt.	11.02	9.58
Sheep and lambs	cwt.	7.93	8.00
Wool	lb.	.45	.34

E. Estimated quantities of selected commodities for sale and farm feeding compared with 1943.

Item	Unit	Quantities sold and fed		
		Actual in 1943	An efficient agriculture	
			Estimates	Percentage of 1943
Products sold:		1,000 units		percent
Cotton	bale	388	360	95
Peanuts	lb.	1833	400	22
Irish potatoes	bu.	241	637	264
Sweetpotatoes	bu.	460	1202	264
Milk	cwt.	1540	7326	476
Eggs	doz.	8340	16435	197
Chickens	lb.	10345	8830	85
Pork	cwt.	374	602	161
Beef and veal	cwt.	692	1407	203
Mutton and lamb	cwt.	2	11	550
Amount for feed:				
Corn	bu.	10398	9668	93
Oats	bu.	743	6450	868
Barley	bu.	-----	-----	-----
Sweetpotatoes	bu.	462	460	99.6
All tame hay	ton	185	658	356

F. Estimated gross income from crops and livestock including value of sales and home use products compared with 1943.

Item	Gross income in 1943		Gross income for an efficient agriculture		
	Actual amount	Percentage of total	Estimates	Percentage	
				Of total	Of 1943
	1,000 dollars	percent	1,000 dollars	percent	percent
Crops:					
Cotton and cottonseed	45,056	47	28,148	28	62
All other crops: Sold	6,495	7	4,648	5	72
Home use	4,241	4	1,259	1	30
Livestock and livestock products:					
Sold	21,794	23	49,121	50	225
Home use	11,624	12	7,653	8	66
Woodland products:					
Sold	3,456	4	6,209	6	180
Home use	3,222	3	1,878	2	58
Total	95,888	100	98,916	100	103

G. Estimated farm population and gross income compared with 1943.

Item	Unit	Actual for 1943	An efficient agriculture	
			Estimates	Percentage of 1943
Farm population:				percent
Total	Number	275,000	152,460	55
Full-time families	Number	244,500	108,360	44
Part-time families	Number	30,500	44,100	145
Gross farm income:				
Total	1,000 dollars	95,888	98,911	103
Full-time families	1,000 dollars	90,233	91,690	102
Part-time families	1,000 dollars	5,655	7,221	128
Gross income per capita:				
Farm population	dollars	349	649	186
Full-time families	dollars	369	1,846	229
Land used for crops:				
Total	1,000 acres	1,763	1,881	107
Per capita; farm population	acres	6.41	12.34	193
Full-time family population	acres	7.21	17.36	241
Cotton acreage:				
Total	1,000 acres	580	600	103
Per capita; farm population	acres	2.11	3.94	187
Full-time family population	acres	2.37	5.54	234
Farm families:				
Total	number	72,100	36,300	50
Full-time	number	64,100	25,800	40
Part-time	number	8,000	10,500	131

Source: Reports of the Bureau of Agricultural Economics, United States Department of Agriculture and estimations of specialists of the Mississippi Experiment Station.

Table 2. Prices used in calculating farm expenses[1]

Item	Unit	Normal price	Item	Unit	Normal price
		dollar			dollar
Ammonium nitrate (32.%)	cwt.	2.55	Lespedeza seed	lb.	.15
Phosphate, 20%	cwt.	1.02	Alfalfa seed	lb.	.45
Potash, 50%	cwt.	1.97	Hairy vetch seed	lb.	.16
6-8-4	cwt.	1.50	Austrian pea seed	lb.	.07
6-8-8	cwt.	1.66	Cottonseed	bu.	3.00
5-10-5	cwt.	1.50	Corn, hybrid seed	gal.	1.00
0-14-7	cwt.	1.00	Oat, seed	bu.	1.00
Basic slag	cwt.	.43			
Lime	ton	3.40	Ginning	bale	5.50
			Poison	cwt.	8.00
Cottonseed meal	cwt.	1.90			
Dairy feed, 16%	cwt.	2.35	Fuel, oil and grease for		
Laying mash	cwt.	2.90	1-row tractor	hour	.21
Scratch feed	cwt.	2.45	Total operating cost for		
Tankage	cwt.	3.50	1-row tractor	hour	.49
Alfalfa hay	ton	23.00	Cost of mules	hour	.23
Clover hay	ton	21.00	Mule equipment	hour	.03
Soybean or pea hay	ton	19.00	Tractor equipment	hour	.21
Grass hay	ton	17.00	Man labor	hour	.19

	Percent new cost		Percent new cost
Repairs:		Depreciation	10.0
Tractor	5.0	Tractor equipment	7.5
Tractor equipment	5.0	Mule equipment	5.0
Mule equipment	5.0	Mules	12.0
		Buildings	2.5
Buildings	3.0	Truck	15.0
Truck	10.0		

[1] Prices consistent with the assumed level of prices received by farmers; they are based on 1943 prices and are about 25 percent of the 1935-39 average.

Table 3. Minimum food requirements per capita of farm and nonfarm population for Mississippi.[1]

Commodity	Unit	Farm	Nonfarm
Milk or its equivalent[2]	pound	725	700
Potatoes and sweetpotatoes	pound	167	147
Dry beans, peas, and nuts	pound	13	11
Tomatoes and citrus fruits	pound	100	100
Leafy green and yellow vegetables	pound	155	159
Other vegetables and fruits	pound	206	198
Eggs	dozen	25	25
Pork,[3] beef, mutton, and poultry	pound	113	106
Other meat[4]	pound	22	21
Corn for meal[5]	pound	112	56
Other cereals	pound	105	122
Fats, excluding butter	pound	48	41
Sirup	gallon	2	1
Other sweets	pound	39	43

[1]Source of data: Cochran, Williard, 'High Level Food Consumption in the United States," Miscellaneous Publication 581, United States Department of Agriculture. The National requirements as set up in the above publication were adjusted slightly in order to make allowances for the food habits of the people of Mississippi.

[2]Fluid whole milk and equivalent quantities (approximate protein solid basis) of evaporated dried milk, ice cream, cheese, and skim milk products; and including an allowance of 30 percent of the milk required to produce the 13 pounds and 10 pounds of butter allowed per capita of farm and nonfarm population. It was assumed that 70 percent of the milk from which butter is made could be utilized as buttermilk and other skim milk products for human consumption.

[3]Excluding lard, bacon, salt sides and fatback.

[4]Fish and game.

[5]This amount of corn would yield 100 pounds and 50 pounds of meal, respectively.

Table 4. Recommended[1] livestock feeding rates, Mississippi.

Livestock	Kinds of feed			
	Grain	Commercial by-products	Hay or its equivalent	Grazing[2]
	pounds	pounds	pounds	A.U.M.[2]
Mules, 1,000-pound size[4]	2100	-	1.0	8.2
Milk cows	1000	500	1.0	10.5
Beef cows	---	---	1.0	10.5
Other cattle carried over	---	---	.4	4.5
Calves raised[5]	---	---	---	2.6
Ewes	30	---	.1	1.6
Lambs	15	---	---	.8
Hogs, cwt. net production	375	35	---	.31
Hens and pullets	60	20	---	---
Chickens raised	16	5	---	.64[6]
Commercial broiler production	9	3	---	---
Turkeys raised	75	5	---	Range

Source: Specialists, Mississippi Experiment Station.

[1] What appears to be the most profitable rates consistent with average management and normal price and weather conditions.

[2] It was estimated that adequate grazing could be provided about 10.5 months out of the year under normal weather conditions.

[3] An animal unit month of grazing is the grazing required to satisfactorily carry a mature cow for one month.

[4] A 1,200-pound delta-type mule would require 2,520 pounds of grain, 1.2 tons of hay and 9.8 A.U.M. of grazing. A 900-pound hill-type mule would require 1,890 pounds of grain, .9 tons of hay and 7.4 A.U.M. of grazing.

[5] Excluding veal calves and dairy calves destroyed or sold at birth.

[6] Per 100 head.

Table 5. Fertilizer recommendations for the hill areas of Mississippi.

Crop	Kind and amount of fertilizer recommended
Cotton (upland soils)	600-1200 pounds 6-8-4 or 600-900 pounds 5-10-5 plus 16-30 pounds nitrogen.
Cotton (valley soils)	600-1200 pounds 4-8-8 or 500-1000 pounds 6-8-8, 30-40 pounds nitrogen only on deep black upland and bottom soils of Northeast and Central prairie soils.
Corn	30-40 pounds nitrogen for stands of one plant for 36 inches in row. 90-100 pounds nitrogen for stands of one plant per 16 inches in row.
Small grains	30-40 pounds nitrogen
Soybeans	20 to 40 pounds phosphate (P_2O_5)
Cowpeas	20 to 40 pounds phosphate (P_2O_5)
Lespedeza	20 to 40 pounds phosphate (P_2O_5)
Sorghum	400 pounds 6-8-4
Peanuts	20 pounds phosphate (P_2O_5) plus 25 pounds potash (K_2O) or 200 pounds 0-14-7, plus 500 pounds dolomitic limestone. In either case add 8 pounds nitrogen (N) on very poor soil.
Alfalfa	Lime to pH 6.5 to 7.0, 100 pounds phosphate (P_2O_5), 150 pounds potash (K_2O), 20 pounds borax.
Irish potatoes	1000 pounds 6-8-4 plus 32 pounds nitrogen
Sweetpotatoes	1000 pounds 4-8-8 plus 32 pounds nitrogen
Tomatoes	1200 pounds 5-10-5 plus 32 pounds nitrogen
Cabbage	1000 pounds 6-8-4 plus 32 pounds nitrogen
Beans and peas (truck)	1000 pounds 5-10-5 plus 16 pounds nitrogen
Cucumbers (processing)	1000 pounds 4-8-8 plus 32 pounds nitrogen
Pastures, permanent—	
Established sods	40 to 60 pounds phosphate (P_2O_5) annually, and 500 to 1000 pounds lime (depending on texture of soil) every 5 years; or 500 pounds basic slag annually; add 50 pounds potash (K_2O) every 3 years on sandy soils.
New seedings	100 pounds phosphate (P_2O_5); plus 100 pounds potash (K_2O) if needed; lime to pH of 6.5 to 7.0.
Pastures, temporary—	
Legume crops	60 pounds phosphate (P_2O_5) and 25 pounds potash (K_2O) or 400 pounds 0-14-7 at planting.
Grass or small grain crops	30-60 pounds nitrogen at planting, or 2 weeks before crop is to be grazed.
Winter legumes	40-60 pounds phosphate (P_2O_5), plus lime if soil test indicates it is needed; or 500 pounds basic slag.
Grapes	600 pounds 6-8-8 per acre
Strawberries	800 pounds 6-8-8 per acre
Dewberries	800 pounds 6-8-8 per acre
Raspberries	800 pounds 6-8-8 per acre
Peaches and plums	4 to 8 pounds 6-8-8 per bearing tree
Apples	4 to 12 pounds 6-8-8 per bearing tree
Pears	4 to 8 pounds 4-8-8 for mature bearing trees only
Pecans	1 to 2 pounds 6-8-8 for 1- to 2-year old trees 8 to 10 pounds 6-8-8 for 5-year old trees 40 to 60 pounds 6-8-8 for older bearing trees.

Phosphate materials: Superphosphate—18 or 20 percent phosphate (P_2O_5) and basic slag—10-12 percent phosphate.

Nitrogen materials: Nitrate of soda 16 percent nitrogen (N), sulphate of ammonia 20 percent nitrogen, cyanamid, granular, 20 percent nitrogen, pulverized 21 percent nitrogen, uramon 42 percent nitrogen, ammonium nitrate 32.5 percent nitrogen, anhydrous ammonia 82 per cent nitrogen, and aqua ammonia 20 to 25 percent nitrogen.

Potash materials: Muriate of potash 50 or 60 percent potash (K_2O), and manure salts 22 to 30 percent potash.

Source: Coleman, Russell, "Fertilizer Recommendations for 1948," Mississippi Farm Research, January, 1948.