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A General Appraisal of the Livestock Industry in the Southeastern States

By

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A General Appraisal of the Livestock Industry in the Southeastern States*

FOR MORE than ten years farmers in the Southeastern States have been urged to produce more livestock and livestock products. Agricultural leaders have advocated this shift to enable farmers to maintain and, if possible, increase their incomes. Shifts in farming practices were made necessary (1) by the decline in the demand for American cotton which has resulted in restrictions on the amount of land planted in cotton and (2) by the desirability of conserving and utilizing soil and human resources more efficiently. The production of livestock and livestock products offers a method of meeting the above conditions simultaneously because feeding animals offers a means of marketing large amounts of soil conserving cover crops grown on land previously planted in cotton. This has been one of the principal objectives of Agricultural Adjustment programs in the Southeastern States since 1933.

Enough time has elapsed since the inauguration of these programs to evaluate their effectiveness on the production of livestock products. Such an evaluation is especially desirable at a time when agricultural policy in the nation is undergoing a rapid change from limited to expanded production goals.

The livestock industry, the same as any other industry, is based upon converting raw materials into products of higher value. Raw materials in the livestock industry are feedstuffs and the products of higher value are beef, pork, eggs, milk, etc. The animals are merely factories which accomplish this conversion and the farmers are factory superintendents whose job it is to make an adequate supply of raw materials available in the proportions that will produce livestock products as profitably as possible.

A great deal has been written about the size and possibilities of developing various phases of the livestock industry in the South. Since all of the different types of livestock enterprises are dependent upon feedstuffs, competition for feedstuffs exists between various livestock enterprises. That is to say, an expansion in the dairy industry would utilize feedstuffs that might otherwise have been used to produce beef cattle. Thus, the fundamental factor underlying the development of livestock enterprises in the South is the amount of feedstuffs available.

Information on the size, location, and potentialities of the Southeastern livestock industry is important from the standpoint of formulating agricultural policy. Farm programs can be

*This bulletin reports a portion of the research on a project entitled "The Marketing and Processing of Livestock and Livestock Products" being conducted by the Alabama Agricultural Experiment Station and jointly supported by the Station and the Tennessee Valley Authority. The tedious and accurate work of Mr. E. E. Mansfield and Mrs. Grace Butler in calculating and assembling these data deserves recognition here.

successful only if resources are available to accomplish the desired goals. Information of this type is also useful for the intelligent development of more efficient marketing facilities. Since marketing facilities can be efficiently used only if a marketable volume of products is available, the volume and location of production are of fundamental importance.

The first section of this bulletin is devoted to a presentation of the trends in the production of feedstuffs and of livestock products from 1924 through 1939. This is followed by a discussion of factors pertaining to the location of the livestock industry. In the third and final section, the possibilities of further expanding the livestock industry are considered.

TRENDS FROM 1924 THROUGH 1939

Amount of Feedstuffs Produced.—An estimate of the total amount of feedstuffs available for livestock production in the region is important in order to determine whether or not there is a sufficient amount of livestock on farms to efficiently utilize these feedstuffs. Since feedstuffs are not perfect substitutes for each other, no single measure of the volume of feedstuffs is entirely satisfactory. For analytical purposes all feedstuffs have been converted to feed units.* One feed unit represents the amount of total digestible nutrients available in one bushel of corn. In Figure 1 the index of feedstuffs production for the 16-year period 1924-1939 is shown for the United States, and the ten Southeastern States collectively and individually.

The supply of feedstuffs fluctuates much more violently than the amount of livestock on farms. This can result in either one of two conditions, i.e., (1) that livestock are better fed in some years than in others, or (2) that farmers carry a supply of feedstuffs from year to year in order to be able to feed their livestock adequate rations in years when the production of feedstuffs is low.

The first condition exists on many more farms than the second. It was not until the inauguration of the "ever normal granary" program in 1933 that an appreciable number of farmers maintained feedstuffs reserves to insure uninterrupted production of livestock and livestock products during years of low crop yields. This program has been effective in the Middle Western States where the storage of these commodities does not present the difficulties it does in the Southeastern States. Furthermore, without the financial assistance provided grain belt farmers, many farmers do not find it practical to carry feedstuffs over for any extended period of time. These conditions, coupled with the observations of agricultural workers in several Southern States, leave little doubt that Southern farmers are more dependent upon current production for their feedstuffs supply than grain belt farmers.

*The techniques used in constructing the indexes, ratios, and distributions presented in this bulletin are described in the Appendix on page 27.

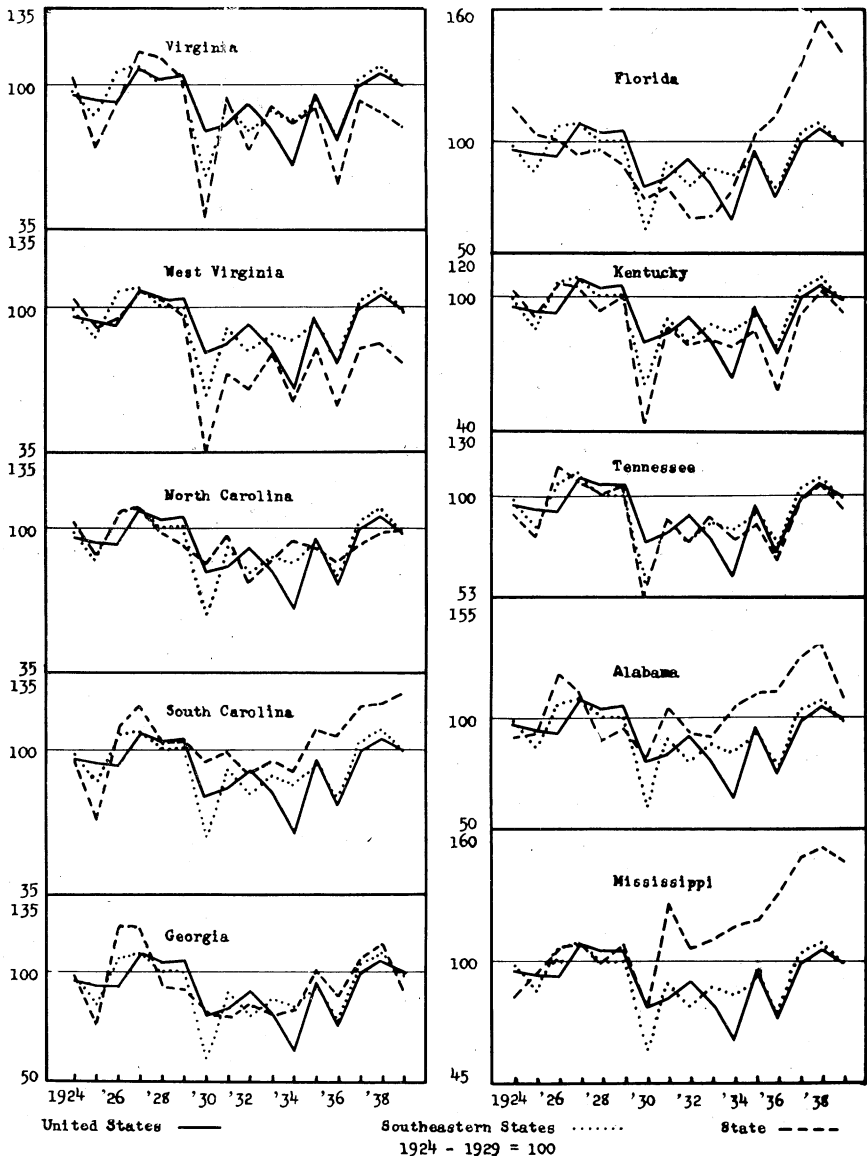


FIGURE 1.—Index of production of all feedstuffs from 1924 to 1939, inclusive, in the United States and ten Southeastern States collectively and individually.

Major deviations from the national trend are most evident in states in which cotton is a major crop and in Florida.

Major increases in the production of feedstuffs appear in the states which have experienced the greatest curtailment of cotton acreage during the past eight years. These increases are the result of farmers shifting enterprises, shifting away from an intensive one-cash-crop system to a more extensive type of farming which represents a conservation of soil when the feedstuffs are produced in the form of cover crops.

To obtain more detailed information on the nature of this shift to the production of feedstuffs, the total amount of feedstuffs has been broken down into three classes: concentrates, harvested forage, and pasture forage. This breakdown is particularly useful because these classes of feedstuffs are recognized as the basis of efficient feeding rations. Concentrates include corn, small grains, peanuts, etc.; harvested forage includes hays of various types and silage; and pasture forage includes the feedstuffs obtainable from pastures, either permanent or temporary.

The trend in the production of each of these classes of feedstuffs in the United States, the ten Southeastern States, as a whole, and each of these states individually is shown in Figures 2, 3, and 4. Again the greatest shifts are most noticeable in the states which have, in the past, produced the largest amounts of cotton. However, material increases in the production of concentrates are particularly evident only in South Carolina, Alabama, and Mississippi. In the region as a whole the production of this class of feedstuffs increased more rapidly than in the country as a whole, but in the most northerly states in the region — Kentucky, West Virginia, Virginia, and Tennessee — concentrates production either followed the United States trend closely or fell below it. Since concentrates are almost essential for finishing meat animals, the trend in their production is an indication of the changes in possible marketings of quality slaughter animals.

Production trends in harvested forage follow somewhat the same pattern, but deviation from the national trend in the region as a whole is especially noticeable. The trend in the production of this class of feedstuffs is materially above the national trend. Most of this difference is due to the changes in South Carolina, Mississippi, Georgia, and Alabama. The remainder of the states, with the exception of West Virginia, maintained production somewhat above that maintained in the United States as a whole.

Pasture forage production showed little change in the region as a whole but in Alabama, Mississippi, and Florida very material increases were recorded. This shift is especially important because the amount of pasture available for grazing in these states has been relatively low in the past.

Amount of Livestock Products Produced.—The output of the livestock industry in terms of food products may best be measured by the volume of products produced. There are six general types of products, i.e., beef and veal, pork, lamb and mutton, milk, eggs, and poultry. The volume of each of these commodi-

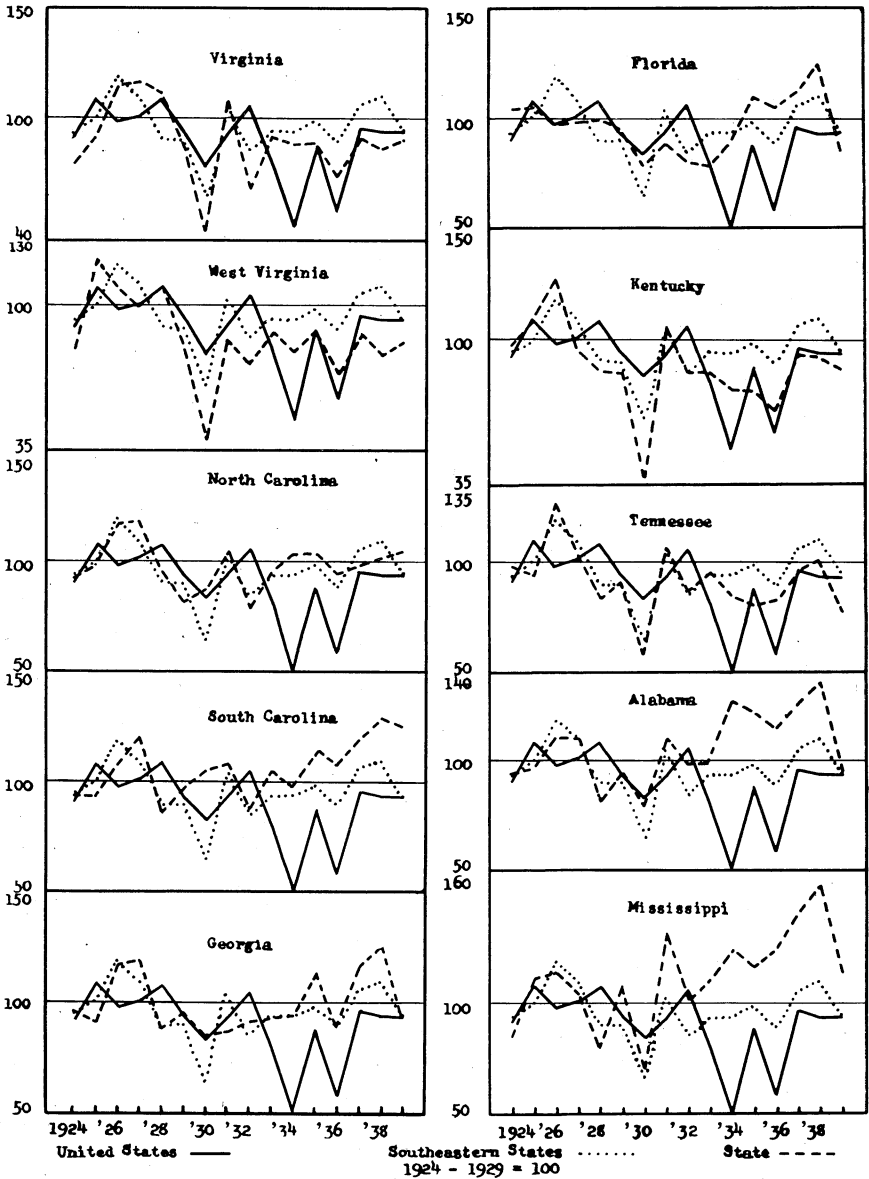


FIGURE 2.—Index of production of concentrate feedstuffs from 1924 to 1939, inclusive, in the United States and ten Southeastern States collectively and individually.

Farmers in most of the states located in the Coastal Plains have increased their production of concentrate feedstuffs.

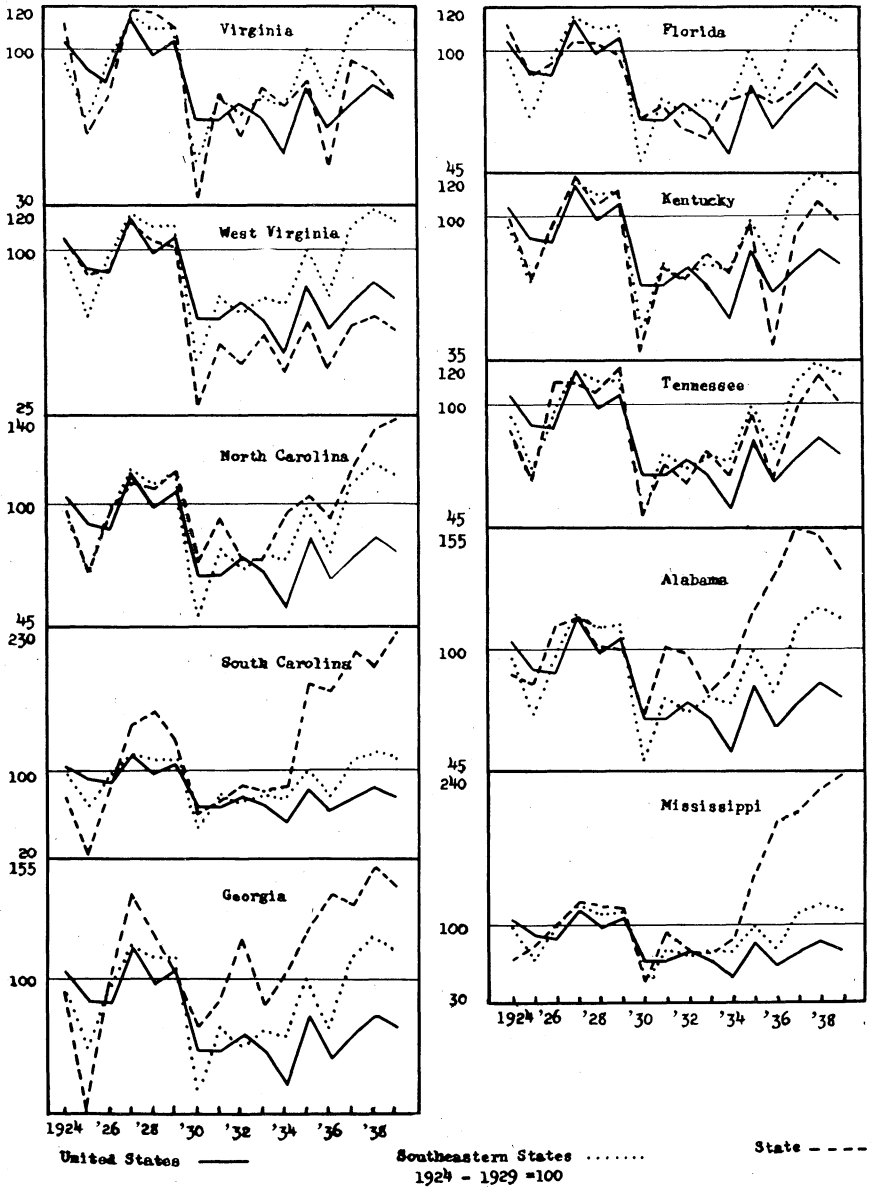


FIGURE 3.—Index of production of harvested forage feedstuffs from 1924 to 1939, inclusive, in the United States and ten Southeastern States collectively and individually.

In Mississippi and South Carolina the amount of harvested forage feedstuffs produced has more than doubled since 1934.

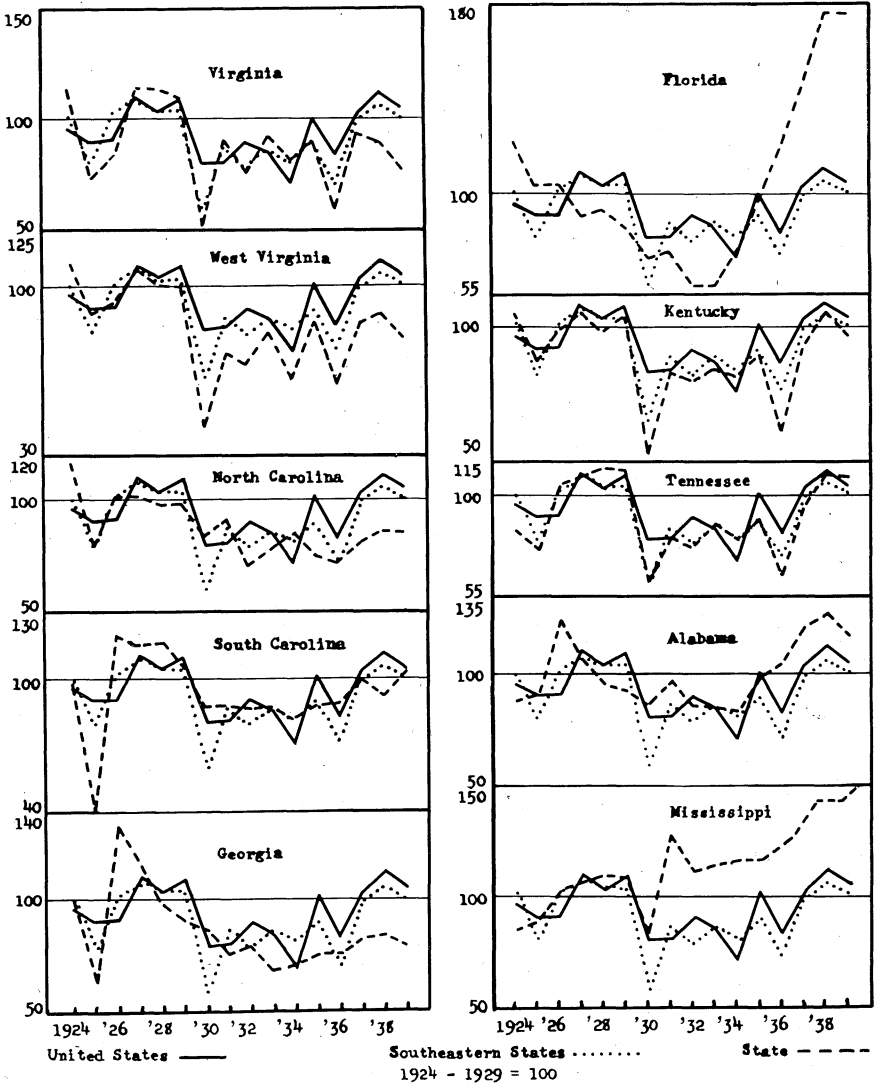


FIGURE 4.—Index of production of pasture forage feedstuffs from 1924 to 1939, inclusive, in the United States and ten Southeastern States collectively and individually.

Mississippi and Florida lead the Southeastern States in increasing the amount of pasture forage available for feeding livestock.

ties is a satisfactory measure of production only when compared with the production of the same commodity over a period of time. Volumes of production of different commodities are not comparable because of differences in their chemical composition. However, converting the volume of each commodity to its dry weight equivalent offers a more satisfactory basis for comparing volumes of production of the different commodities. The indexes of production of livestock products shown in Figure 5 were constructed by using the dry weight equivalents of the annual production of the six commodities listed above. These indexes clearly show that the production of livestock products has steadily increased both in the United States and in each of the Southeastern States during the period studied.

The rate of increase in the production of livestock products is considerably greater than the rate of increase of the production of feedstuffs. Part of this increase is due to the decrease in the number of work stock and subsequent increase in the number of productive animals. Thirty-one per cent of all animals on farms in the Southeastern States were work stock in 1924. This percentage had decreased to 24 by 1940. To the extent that the rate of increase in the production of livestock products exceeds the rate of increase and changes in composition of livestock populations, an increase in efficiency of utilizing feedstuffs is indicated. This can largely be attributed to the use of better feeding and breeding practices.

Number of Livestock on Farms.—While livestock populations are not an accurate measure of the production of livestock products they are useful as a measure of the capacity of the livestock industry. It is possible to maintain any given livestock population by supplying just enough feedstuffs to keep the animals alive and reproducing and, at the same time, produce no usable livestock products at all.

Populations of various classes of livestock cannot be satisfactorily combined to give a measure of the capacity of the industry because of variations in the amount of feedstuffs consumed and in the rate of production of livestock products between the various classes of animals. To overcome this difficulty the populations of the various classes of livestock, including work stock, have been converted to animal units. One animal unit represents the feed-consuming ability of an average cow or heifer two years old and over.

The trend in the amount of livestock on farms in the United States, and in the ten Southeastern States collectively and individually, is shown in Figure 6. There was about the same amount of livestock on farms in the United States as a whole in 1940 as the average amount in the years 1924-29 inclusive. The trend in amount of livestock on farms in the Southeastern States followed the national trend until 1934. In this year the severe droughts in the Middle Western States sharply reduced livestock numbers in the nation as a whole but they did not sig-

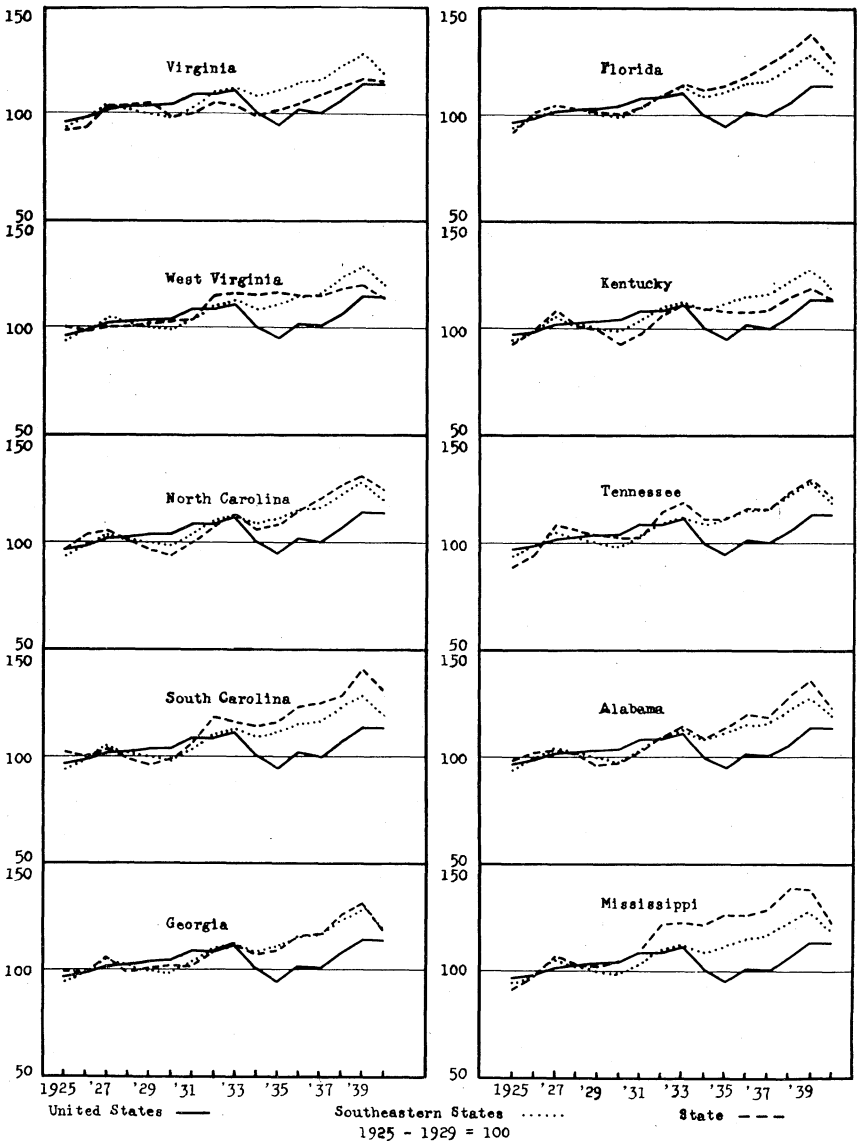


FIGURE 5.—Composite index of production of major classes of livestock products as estimated from dry weight equivalents from 1925 to 1940, inclusive, in the United States and ten Southeastern States collectively and individually.

The production of livestock products has increased more rapidly in the Southeastern States than in the United States, as a whole, with the largest increases appearing in Coastal Plain States.

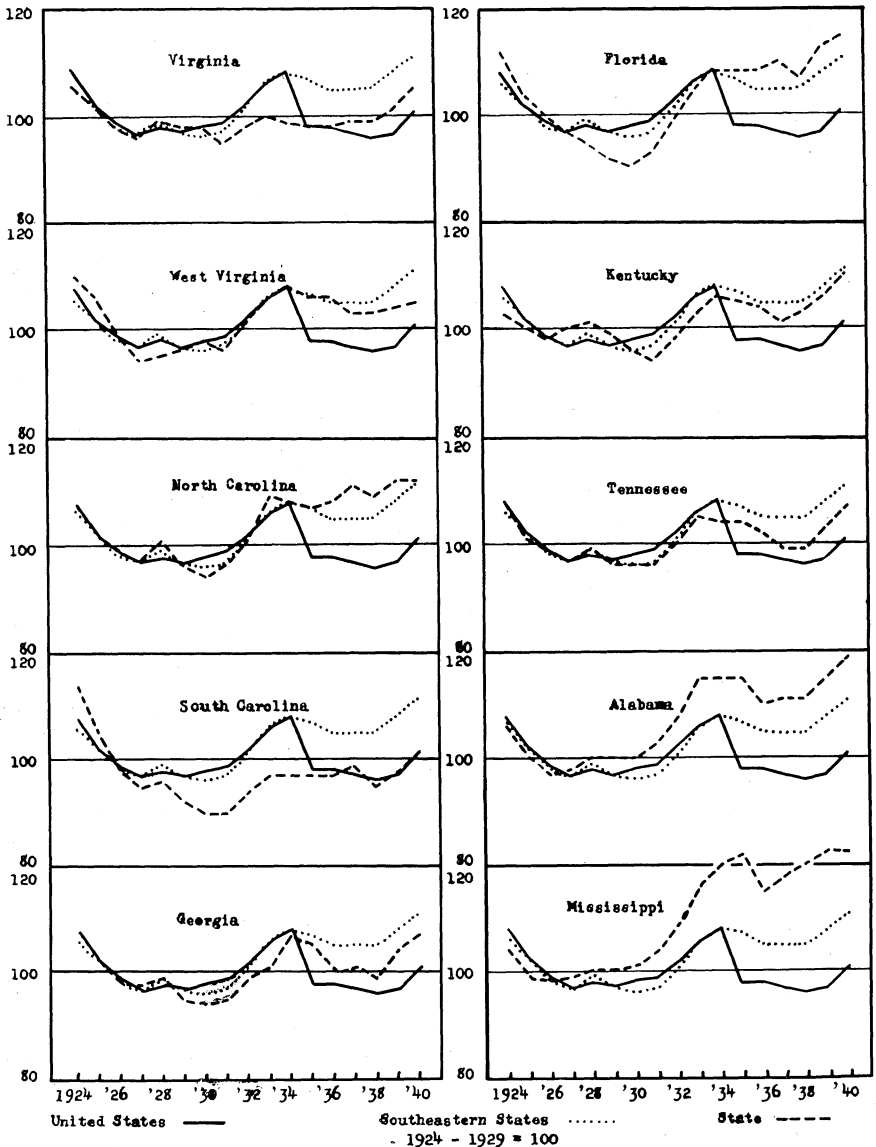


FIGURE 6.—Index of amount of livestock on farms from 1924 to 1940, inclusive, in the United States and ten Southeastern States collectively and individually.

There are about 10 per cent more animals on farms in the Southeastern States than the average from 1924 to 1929. Fourteen and eight-tenths per cent of all the animal units on farms in the nation in 1940 were in these states compared to 13.5 per cent during the 1924-29 base period.

nificantly affect the number of animals on farms in the Southeastern States. Since 1934 the Southeastern farmers have maintained about 7 to 10 per cent more livestock than they did during the 1924-29 base period.

Following the trends in the production of feedstuffs, Florida and the cotton producing states, especially Mississippi, Alabama, and North Carolina, have increased the capacity of their livestock industry more rapidly than the other states. South Carolina did not increase the capacity of the industry materially, but reference to Figure 6, showing the increase in the production of livestock products, indicates that South Carolina farmers have increased the efficiency of converting feedstuffs to livestock more rapidly than any other state.

LOCATION OF LIVESTOCK ENTERPRISES

Livestock enterprises are not distributed uniformly throughout the Southeastern States. The amount of livestock on farms per square mile in each county is shown in Figure 7. The relatively high concentration of livestock enterprises in the Kentucky Bluegrass Area, the Central Basin of Tennessee, the Shenandoah Valley, the Highland Bluegrass Area of Virginia and adjoining Tennessee River Valley, and the Black Belt of Alabama and Mississippi are in distinct contrast to the low concentration of livestock in the Appalachian Mountains and the Coastal Plains.

The locational pattern of the livestock industry follows the locational pattern of production of feedstuffs. In Figure 8 the amount of feedstuffs produced measured in feed units per square mile by counties is plotted. Comparing Figure 7 with Figure 8 shows the close correlation between these two factors.

The truth of the statement that livestock are produced at or near the place where feedstuffs are produced can be more firmly established empirically by comparing the location of the swine population as shown in Figure 9 with the location of the production of concentrate feedstuffs as shown in Figure 10. The principal type of feedstuffs used for feeding swine is concentrates and the correlation is high. Likewise a comparison of the cattle population shown in Figure 11 with the location of harvested and pasture forage production shown in Figures 12 and 13 demonstrates the influence of basic types of feedstuffs on the location of livestock enterprises.

Livestock will be produced near the source of supply of the major part of the feedstuffs as long as the cost of transporting the feedstuffs necessary to produce a given volume of livestock or livestock products is higher than the cost of shipping the live animals. For example, south Georgia or Alabama farmers will not buy corn from Chicago to feed hogs because it costs about \$2.04 to ship enough corn from Chicago to Moultrie, Georgia, to produce 100 pounds of pork while it costs but 66 cents to ship 100 pounds of live hogs from Moultrie to Chicago. South Geor-

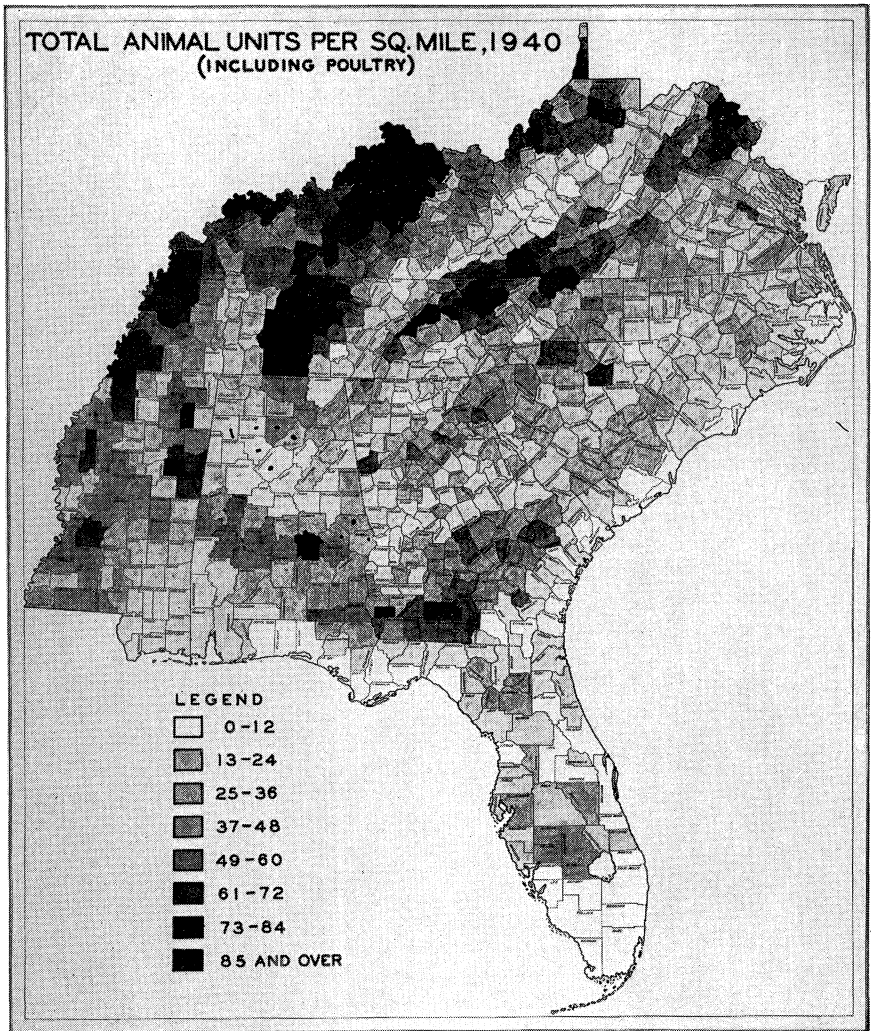


FIGURE 7.—Number of animal units on farms per square mile by counties, January 1, 1940.

Large numbers of animals are found in the areas where feedstuffs are most plentiful (See Figure 8).

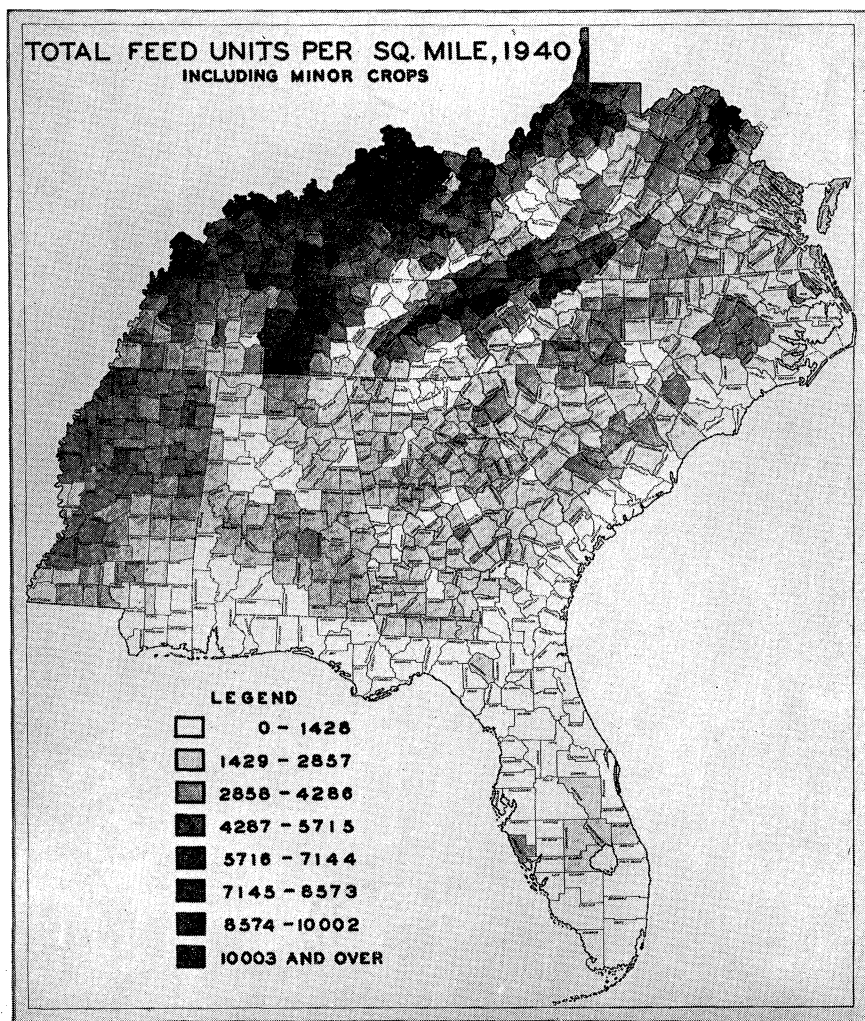


FIGURE 8.—Number of feed units produced per square mile by counties in 1939.

The amount of feedstuffs produced is closely related to the fertility of the land.

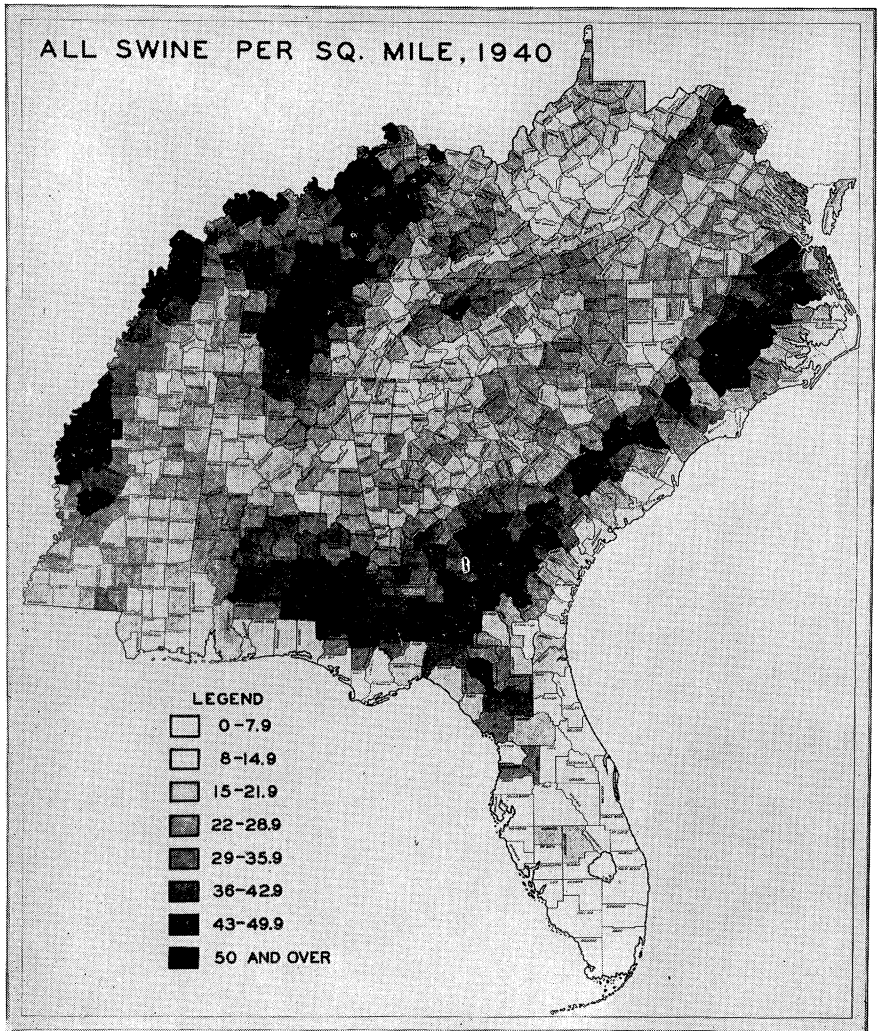


FIGURE 9.—Number of swine on farms per square mile by counties, January 1, 1940.

Swine, which consume concentrates as the major type of feedstuffs, are located where concentrate production is greatest (see Figure 10).

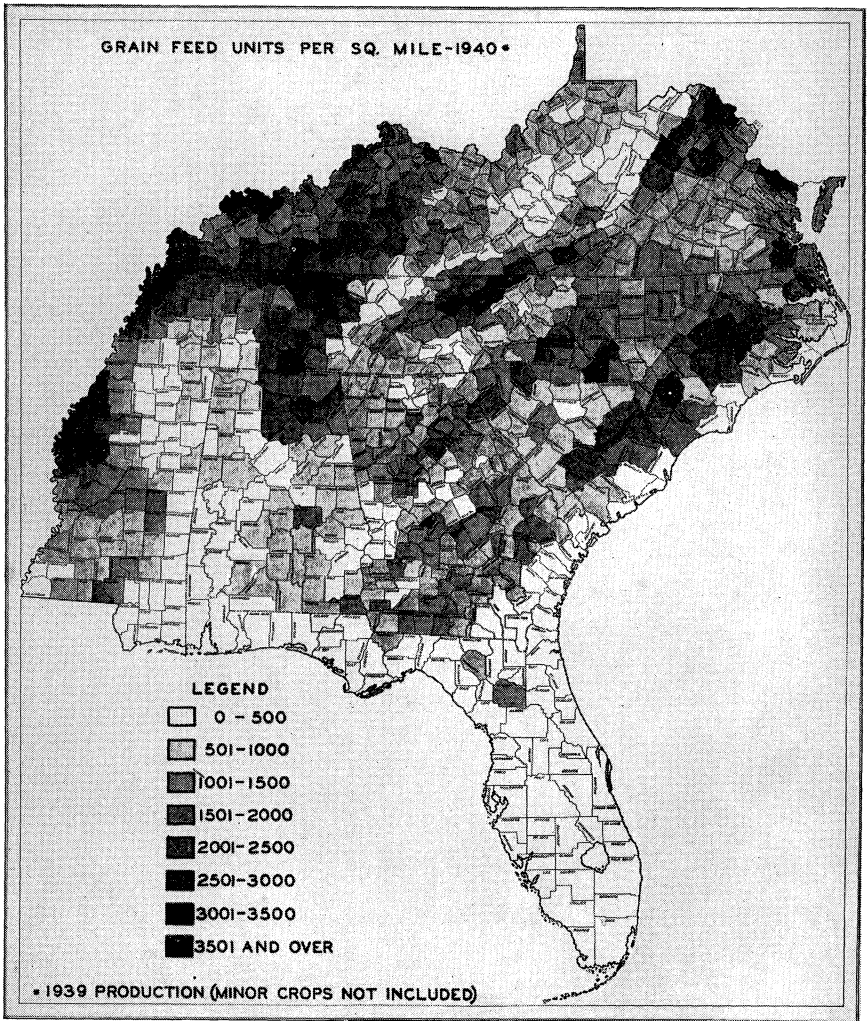


FIGURE 10.—Number of feed units produced in the form of concentrates per square mile by counties in 1939.

More concentrates are produced in the Coastal Plains than harvested or pasture forage.

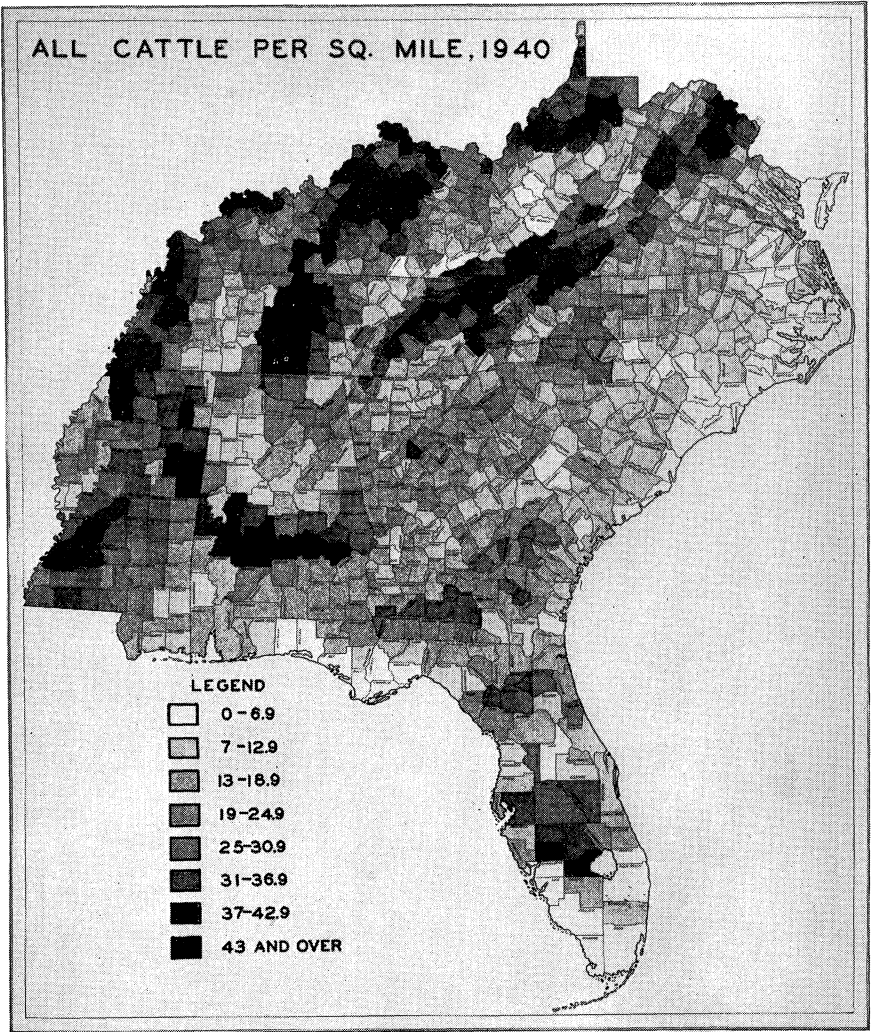


FIGURE 11.—Number of cattle and calves on farms per square mile by counties, January 1, 1940.

Farmers living in areas where pasture and harvested forage production is high maintain large numbers of cattle (see Figures 12 and 13).

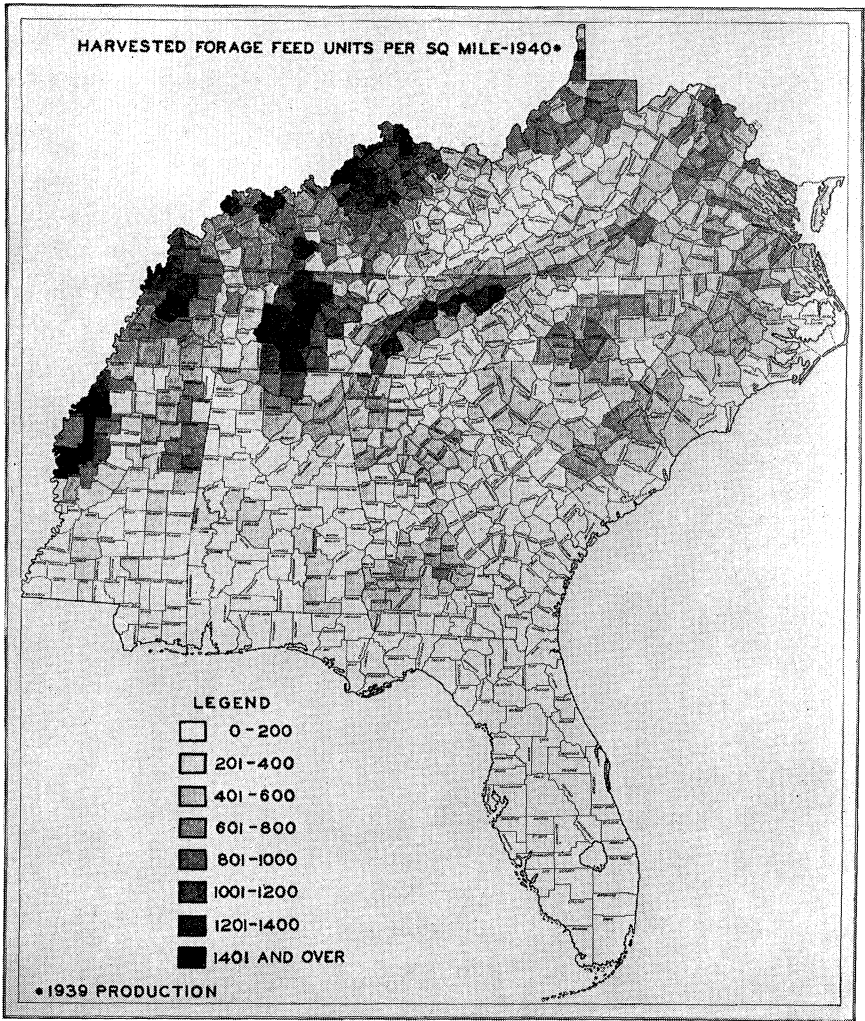


FIGURE 12.—Number of feed units produced in the form of harvested forage per square mile by counties in 1939.

Relatively little roughage is harvested for winter feeding in the Coastal Plain and Piedmont Areas.

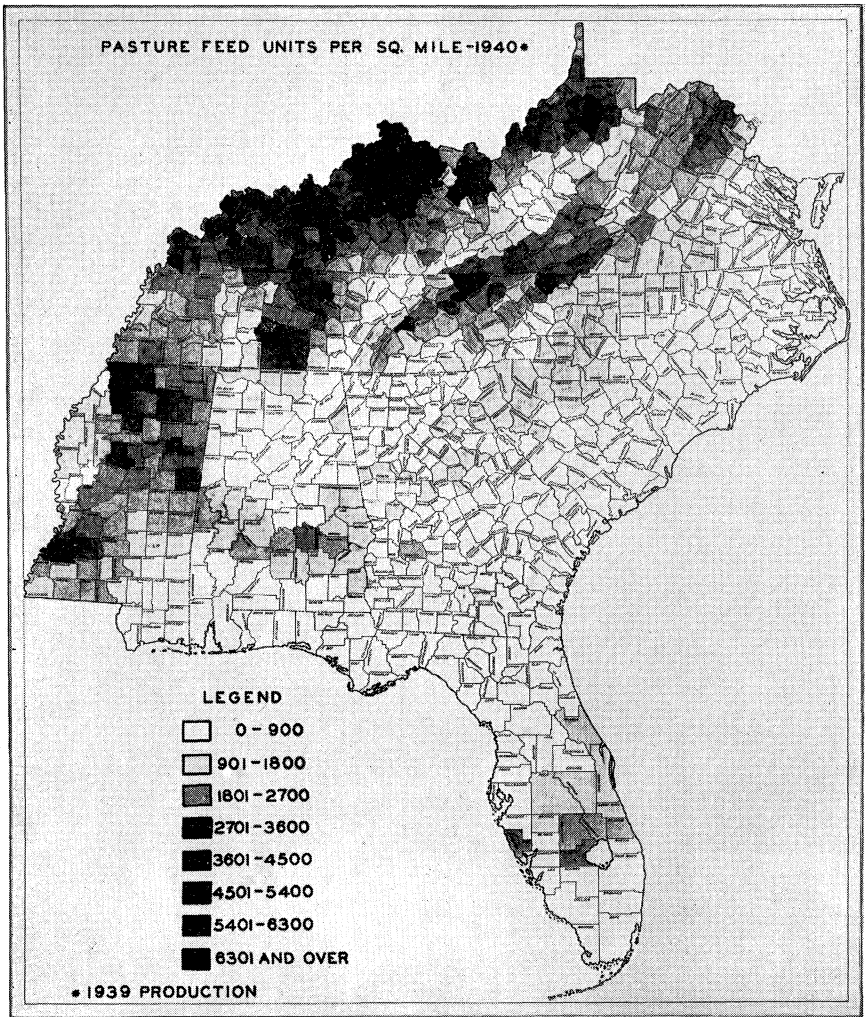


FIGURE 13.—Number of feed units produced in the form of pasture forage per square mile by counties in 1939.

Even though farmers in the cotton producing states have increased their pasture acreage, they still have much less than the farmers tilling limestone base soils.

gia and Alabama farmers would be at a disadvantage if they had to depend on corn grown in the Middle West to feed their livestock as long as the present transportation rate structure is maintained.

The location of the livestock industry is important to farmers from the marketing standpoint. The data on the amount of livestock presented in Figures 7, 9, and 11 are calculated as the number of animals or animal units per square mile to facilitate estimating the relative potential volume of marketings in given areas.

Satisfactory marketing facilities can and will be developed only at points where marketable volumes of products are offered for sale. In areas of low production farmers must transport their livestock longer distances to reach satisfactory markets than in areas of high production. This is reflected in farm income because the cost of transportation to market must be borne by the farmers. The development of markets located nearer to the farmers in these low production areas only partially remedies this situation because the volume of livestock or livestock products traded in such markets is smaller than those traded in markets located where production is more concentrated. The increased cost incurred by dealers in assembling small volumes and transporting them to a central marketing point will be reflected in lower prices paid to farmers and this in turn tends to decrease farm income. Consequently, the profitableness of the livestock industry to any farmer is somewhat dependent upon the amount of livestock products produced in the community in which he lives.

POSSIBILITIES OF EXPANDING THE LIVESTOCK INDUSTRY IN THE SOUTHEAST

The livestock industry in the Southeastern States will expand only if sufficient feedstuffs are available to produce more livestock products. It will expand substantially only in areas where farmers are able to economically produce these necessary feedstuffs. However, it may be profitable for some farmers to purchase feedstuffs to produce highly perishable products, such as milk, near large population centers. Thus, the question: "How much feedstuffs are available for the animals now on farms?" is of paramount importance. The amount of feedstuffs produced per animal unit in the various counties is a measure of the extent to which the livestock industry might be expanded if the production of feedstuffs remains about constant. These data for the counties in the Southeastern States are plotted in Figure 14. The fact that the amount of feedstuffs produced per animal unit is uniform over large areas in the cotton producing states is another indication that the size and location of the livestock industry as a whole are largely governed by the amount of feedstuffs produced.

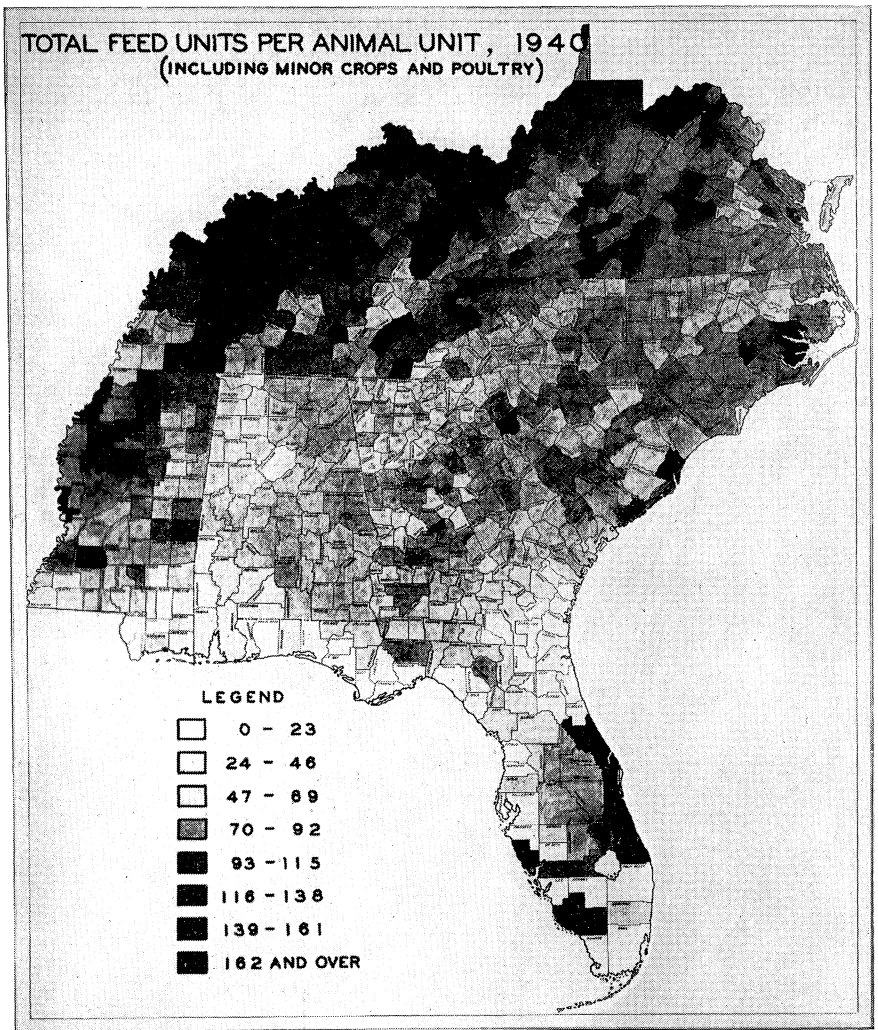


FIGURE 14.—Number of feed units produced in 1939 per animal unit on farms, January 1, 1940, by counties.

Farmers in the Coastal Plain and Piedmont Areas do not produce as much feedstuffs per animal unit as farmers tilling more fertile land.

In Florida, and the cotton producing states, particularly in Mississippi, Alabama, and Georgia, the average production of feed units per animal unit is considerably less than 75. Counties in these states producing more than 75 feed units per animal unit are rare. This is in contrast with a feed unit per animal unit production of over 150 in the nation as a whole.

In parts of Tennessee, Virginia, and in almost all of Kentucky the amount of feedstuffs produced per animal unit is higher than in the Coastal Plain states. There are three reasons for this: (1) The livestock industry is firmly established in these areas. Farmers living there receive a large portion of their farm income from the sale of these products and, consequently, have developed the skill of producing them to a high degree of perfection. Coastal Plain farmers have not had as much experience in producing commercial livestock and livestock products. (2) The warmer climate in the states farther south lowers the amount of feedstuffs necessary to maintain the animals during the winter months. This advantage is partially offset by the prevalence of parasitic infestation. (3) The animals in the Coastal Plains are somewhat smaller and therefore do not require as much feed per animal unit.

Is the amount of feedstuffs produced in the "deep South" sufficient to utilize the producing capacity of the animals on farms? There are strong indications that it is not. Good hog fattening practice requires the feeding of 60 bushels of corn, or its equivalent, and grazing from one to three acres of pasture per animal unit. This indicates the need of from 75 to 105 feed units per animal unit. A study of feedstuffs-livestock ratios of 40 dairy herds reveals that these farmers feed an average of 91 feed units per animal unit. These two examples strongly support a general conclusion that the feedstuffs produced per animal unit are not in excess and indeed may not be sufficient to feed the animals now on farms.

The abnormally poor crop yields obtained by farmers in some parts of the cotton belt states during 1939 account for only a small part of the low livestock-feedstuffs ratios. Had the crop yields been normal, the ratio would still have been somewhat below that indicated as necessary to economically produce livestock products with the livestock then on farms. This condition exists because adverse weather conditions in that year existed in areas in which livestock-feedstuffs ratios were comparatively low. In general, the low volume of feedstuffs produced in 1939 was sharply reflected in a drop in the production of livestock products in 1940. This fact further substantiates the conclusion that the production of livestock products is largely dependent upon the supply of feedstuffs available.

SUMMARY AND CONCLUSIONS

Feedstuffs are the basic raw materials for the livestock industry. Since farmers have been required to curtail the acreage

planted to cotton, they have increased the production of feedstuffs. The most significant shifts have taken place in the states in which cotton is the major source of farm income and in Florida.

Most of the increase in the production of hay and concentrates took place on land previously planted in cotton since crop yields have not changed enough to significantly alter the total volume of feed produced in the region during the period studied. In the cotton producing states considerable improvement has been made in the yields of feedstuffs obtained from pastures on land that had produced only a small amount of feedstuffs in the past.

In the Southeastern States as a whole, increases in the production of harvested forage feedstuffs are greatest, followed closely by the production of concentrates during the period studied. The production of pasture forage did not increase significantly. Farmers in principal cotton producing states, however, increased the production of all three types of feedstuffs a great deal more than indicated by the average increases for the region as a whole.

The production of livestock products has increased in all of the Southeastern States during the period from 1925 through 1940. Part of this increase is due to the use of better feeding and breeding practices, and part due to an increase in the production of feedstuffs coupled with a decrease of 7 per cent in the amount of work stock on farms.

Farmers in the cotton producing states increased their livestock populations significantly during the past ten years.

Livestock enterprises are located at or near the place where feedstuffs are produced. This will continue to be true under the present transportation rate structure wherein the cost of transporting feedstuffs necessary to produce a given unit of livestock products is greater than the cost of transporting the same unit of livestock or livestock products.

Some increases in the production of livestock products can be expected as farmers learn and put into use better breeding and feeding practices, but any material increase in the production of livestock or livestock products in the Southeastern States will be dependent upon the ability of the farmers to increase the production of feedstuffs. Since most of the land suitable for cultivation is now being farmed, increases in the production of feedstuffs must, for the most part, come through an increase in the per-acre yields. The fact that the yields of these crops can be increased has been demonstrated in the several experiment stations. Farmers will be more inclined to adopt the recommendations of the experiment station specialists if they have some assurance that attractive markets for the livestock and livestock products are available.

Farmers will and generally should continue to produce cotton to the extent that their acreage allotment permits as long as

the present relationship exists between the prices of cotton and livestock and livestock products. They will do so because under these conditions the production of cotton returns farmers a higher income per acre than almost any alternative enterprise.

The sale of livestock and livestock products can become a relatively more important source of farm income in the Southeastern States if farmers (a) increase the per-acre yields of feedstuffs, and (b) use better feeding and breeding practices.

APPENDIX

Methodology

Feed Units: Warren's concept of feed units was used in this work. One feed unit represents the amount of total digestible nutrients in one bushel of corn or its equivalent.

(1) *Concentrates.*—The factors used to convert the annual estimates of the production of feedstuffs to feed units are as follows:

Wheat*	1.07 F.U. per bu.
Rye	0.75 F.U. per bu.
Corn	1.00 F.U. per bu.
Oats	0.43 F.U. per bu.
Barley	0.73 F.U. per bu.
Grain sorghums	0.90 F.U. per bu.
Peanuts (hogged off)**	1.00 F.U. per 56 lbs.
(production estimated from county average yields)	
Cowpeas and velvet beans**	0.54 F.U. per bu.
Soybeans**	1.07 F.U. per bu.
Oats (unthreshed)	8.21 F.U. per acre

Where annual production data were not available, the change in production between census periods was distributed equally over the five intervening years.

(2) *Harvested Forage.*—The following conversion factors were applied to published annual production estimates of hay when these estimates were available.

Alfalfa hay	18 F.U. per ton
Annual legumes cut for hay	13 F.U. per ton
Sweet clover and lespedeza	15 F.U. per ton
Clover and timothy (alone or mixed)	14 F.U. per ton
Grain cut green for hay	13 F.U. per ton
Sargo	13 F.U. per ton

To estimate the feedstuffs produced as harvested forage in the years in which a complete breakdown of the production data was not available, the total production of hay was converted to feed units by using a factor arrived at by determining the composite average number of feed units available per ton of all hay in the nearest census year and multiplying the composite production estimates by it. Harvested forage feed units produced in 1939 were calculated directly from the census data which contained a complete breakdown of production by kinds in each county.

(3) *Pasture Forage.*—Estimates of the amount of feedstuffs made available for livestock as pasture forage were arrived at

*Wheat was not used in constructing the all feedstuffs indexes but was included in the charts showing production of concentrates and all feedstuffs per square mile by counties and feedstuffs-livestock ratios.

**Minor crops were included in the charts showing total feedstuffs produced per square mile and feedstuffs-livestock ratios.

by multiplying (a) the acreage of plowable and other pasture reported in the census (acreage changes between census periods were distributed equally over the intervening years), by (b) the average yield of tame hay in the State for the year in question, by (c) a conversion factor which represented the estimated number of feed units in a composite sample of all hay in the State. Because "other" pasture was not tabulated in the 1940 Census the acreage of "other land" was added to "plowable" pasture to obtain comparable estimates.

Animal Units: Warren's concept of the animal unit was also used. Animal populations on January 1 of each year as reported by the Agricultural Marketing Service were used in constructing the index of animal units on farms. The following factors were used to convert animal populations to animal units.

Horse, mule, cow, or heifer two years old and over	1.00 A.U.
Other cattle	0.50 A.U.
Swine	0.20 A.U.
Sheep	0.12 A.U.
Poultry (including chickens, ducks, turkeys, etc.)	0.01 A.U.

These simple conversion factors were used because of the difficulties encountered in breaking down the animal populations into age groups.

In estimating the number of animal units in each county in 1939, the livestock populations reported by the Agricultural Marketing Service were used as a base. Since these data are available on the State but not the county level, the distribution of these animals in the counties was assumed to be the same on January 1 as on April 1 of the following year — the date on which the census enumerations were made. Raw census data were not used because only animals which were on farms April 1 that were at least three months old were recorded. Thus, births were not included to offset deaths and sales. A conversion factor was arrived at by dividing the population reported by the Agricultural Marketing Service in each state on January 1, 1940, for each class of animals by the number reported in the census for the State. This factor was then applied to the population reported in each county by the census. The factors that were used to make these adjustments are shown in Table 1.

Indexes: Indexes of production of feedstuffs and of animal units on farms were constructed on the basis of feed units and animal units, respectively.

Production of Livestock Products: The annual estimates of the production of beef and veal, lamb and mutton, pork, eggs, poultry, and milk were converted to their dry weight equivalents by multiplying the total weight of products produced by the percentage of dry matter in the product.

Feedstuffs-Livestock Ratios: The total number of feed units produced in each county in 1939 was divided by the total number of animal units on farms January 1, 1940 in the county to obtain the amount of feedstuffs produced per animal unit.

Validity of the Data: The limitations of data of this type are fully recognized. Both the feed unit and animal unit are mental concepts originally devised for the purpose of comparing units which could not be directly compared by employing the units of measurement commonly used in commerce. Variations in size of animals is the chief source of error in using the animal unit. Feedstuffs, even within a given group such as concentrates, harvested forage and pasture forage, are not perfect substitutes for each other on the basis of total digestible nutrients. The substitutability of feedstuffs between these groups is, of course, a great deal less.

For these reasons the feed units, animal units, and feedstuffs-livestock ratios can be most effectively and accurately used in making comparisons between areas at a given time or in a given area through a period of time. Absolute values of these factors have been omitted from the text for two reasons: (1) the volume of material was too large to be incorporated in a publication of this type, and (2) to avoid any possible misinterpretation of the data through using the absolute values.

The data pertaining to concentrates and harvested forage feedstuffs are based upon more reliable production estimates than the data pertaining to pasture forage. Pasture forage production is most accurately estimated in areas in which a relatively high percentage of the land is under cultivation. These data are least reliable in the counties which still maintain "open range". Estimates of the number of livestock in these areas are also less reliable than in the major part of the region. Since both the reported livestock populations and amount of pasture forage feedstuffs are probably low in the "open range" counties, the estimates of feedstuffs per animal unit are probably more nearly correct than the estimates of the animal units and feed units on a square-mile basis.

TABLE 1.—Conversion factors used to adjust animal populations tabulated in the 1940 Census to agree with Agricultural Marketing Service estimates of animals on farms, January 1, 1940.

State	Horses all ages	Mules all ages	Cattle and calves all ages	Cows and heifers two years old and over	Swine	Sheep and lambs	Chickens	Other poultry
Tennessee	0.9557	1.0534	1.1074	1.0987	1.1847	1.1452	1.3999	2.0125
Kentucky	0.9926	1.0709	1.0999	1.0222	1.3292	1.2022	1.3384	2.5953
Georgia	0.9304	1.0569	1.2560	1.2350	1.4636	2.0504	1.4525	1.7450
North Carolina	0.9433	1.0194	1.2296	1.1174	1.6469	1.0881	1.3689	1.8381
Mississippi	0.8052	1.0692	1.1170	1.0968	1.4687	1.2418	1.2331	1.7689
South Carolina	0.9501	1.0288	1.3074	1.1512	1.5674	1.4284	1.5419	2.2284
Alabama	0.9066	1.0809	1.2135	1.1257	1.6842	1.5174	1.3648	2.0799
Virginia	1.0330	1.0727	1.1404	1.0849	1.4756	1.0671	1.4380	2.0275
West Virginia	0.9681	1.2333	1.1384	1.1660	1.2866	1.1523	1.3181	2.2184
Florida	0.9421	1.1296	1.1387	1.1474	1.1538	1.7661	1.2542	1.9095

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