

AGRICULTURAL EXPERIMENT STATION of The Alabama Polytechnic Institute, Auburn, Ala.

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SIGNIFICANCE of HOG-FEED PRICE RATIOS in ALABAMA

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Feed is the chief expense item in hog production. Thus, cost of feed materially affects profits.

The decision of whether to increase or decrease production of hogs, therefore, depends usually on the relation between the price of hogs and the cost of feed. Price ratios, which have been computed to show this relation, represent the relative number of bushels of corn or hundreds of pounds of peanuts it would take to buy 100 pounds of live pork.

Various studies (1) have shown that variation in the hog-corn ratio is the chief cause of subsequent changes in hog supplies from year to year.

In 1933, Wells (2) concluded that the same general type of analysis that explains the variation in total hog production in the United States would also explain the variation in hog production within an individual market district, a state, or a broad type-of-farming area. When the sectional changes in hog production were studied, however, certain differences in response to price ratios became apparent. In the South, for example, the response during the period of 1921-1932 was found to be directly related to the acreage of corn, and indirectly related to the price of cotton.

In order to get a more complete explanation of farmers' response to specific hog-feed price ratios (hog-corn and hog-peanut) in Alabama, the relationship between hog-feed price ratios and commercial pork production has been analyzed. The hog-corn ratios in Alabama are typical of the low ratios that prevail in other Southeastern States.

HOG ENTERPRISE in ALABAMA

The quantity of Alabama pork (live-weight) used for farm home consumption during the 21-year period of 1924-1944 averaged 98.5 million pounds, 53 per cent of total production. While pork used annually for farm home consumption has varied little over the past two decades, production for sale, on the other hand although upward in trend, has varied considerably, Figure 1.

The size of hog enterprise and extent to which it is commercial vary among areas of the State. About 31 per cent of the average pork production in the 1937-1941 period was produced in the 12 counties of southeastern Alabama. The 12 northern counties of Alabama represent the second heaviest section, producing 24 per cent of

* Formerly Mimeograph Series

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- (1) Warren, G. F. and Pearson, F. A., *The Agricultural Situation, Economic Effects of Fluctuating Prices*, New York, 1924; Wright, S., *Corn and Hog Correlations*, U. S. Dept. of Agr., Bul. 1300, 1925; Haas, G. C. and Ezekiel, Mordecai, *Factors Affecting the Price of Hogs*, U. S. Dept. of Agr., Dept. Bul. No. 1440, Nov. 1926; Elliott, F. F., *Adjusting Hog Production to Market Demand*, 111. Agr. Expt. Sta. Bul. 293, 1927; and Russell, S. W., *Forecasting Hog Production and Marketing*, Journal American Statistical Association (M. S. 165 A) (Sup.) 1929.
- (2) Wells, O. V., *Farmers' Response to Price in Hog Production and Marketing*, U. S. Dept. of Agr., Tech. Bul. No. 359, April 1933.

POUNDS of PORK (LIVEWEIGHT) USED for HOME CONSUMPTION, SOLD COMMERCIALY, and TOTAL PRODUCTION, 1924-1944, ALABAMA

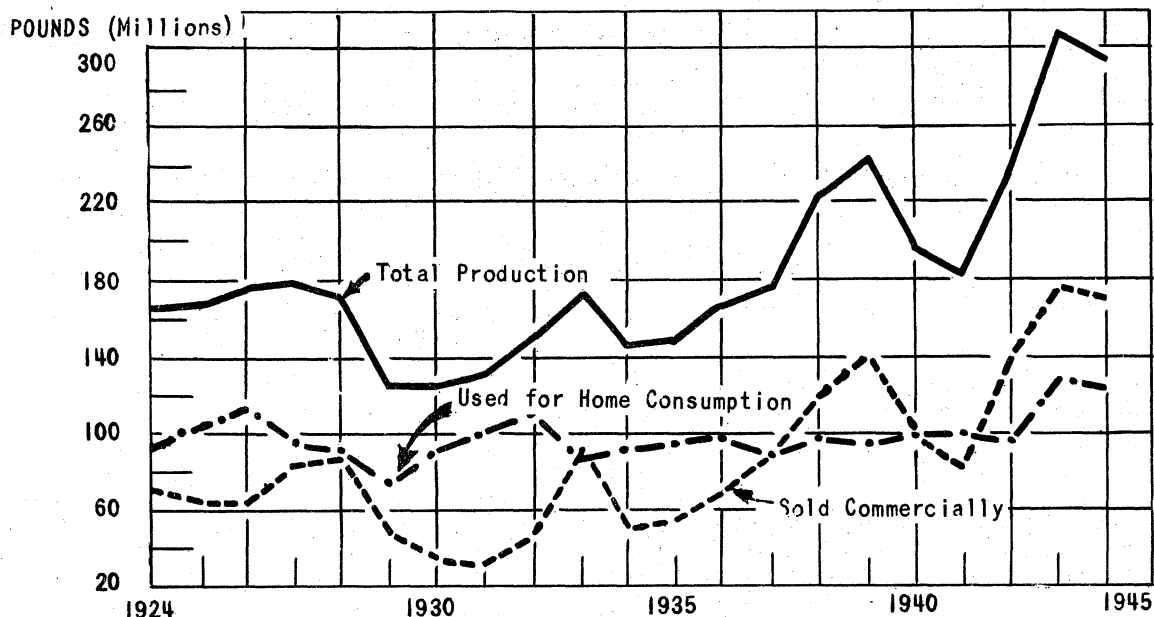


FIGURE 1. Pork produced for home use in the past 21 years has varied very little from year to year. Variations in total yearly production were primarily the result of variations in production for sale. The upward trend since 1934 is the result of increased feed production, particularly corn. This is also reflected in the higher-than-average hog-corn ratios, which generally prevailed from 1935-1943 as compared to the lower-than-average ratios, which were generally typical of the 1924-1934 period. (Data from Income Parity report, Agricultural Statistics, and Meat Animals, Farm Production and Income reports, U.S.D.A., B.A.E.)

HOG-CORN PRICE RATIOS, ALABAMA and CORN BELT, 1924-1944

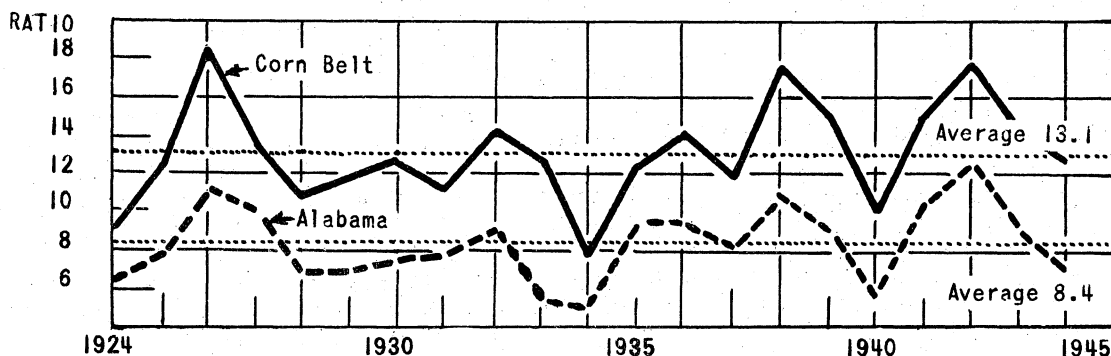


FIGURE 2. Yearly hog-corn price ratios in Alabama and the Corn Belt States fluctuated similarly from year to year. The Alabama price ratio on the average has been less than two-thirds that of the Corn Belt. (Ratios calculated from farm prices of corn and hogs reported by Crop Reporting Service, U.S.D.A.)

Alabama's total pork supply in the same years. In most of the other areas, production for home consumption has been the dominant feature.

Corn, the chief feed used for hogs in Alabama, is produced in all areas of the State. Peanuts represent an important hog feed only in the Southeastern part, where approximately half of the feed used is hogged peanuts. It is estimated that in 1939 (a year of low yields) approximately 29 million pounds of pork (12 per cent of the State's total) were produced from peanuts.

RELATIONSHIP of RATIOS to COMMERCIAL PORK PRODUCTION

During the 1924-1944 period, the hog-corn ratio in Alabama fluctuated similarly to the ratio in the Corn Belt states, Figure 2. (3) The Alabama hog-corn ratio averaged 8.4; the value of 100 pounds of hog was equal to 8.4 bushels of corn. This ratio was consistently below the Corn Belt ratio of 13.1.

The Alabama hog-peanut ratio averaged 2.0 during the period, 1924-44; in other words, the value of 100 pounds of hog was equal to the value of 200 pounds of harvested peanuts. The direction of year-to-year changes in hog-corn and hog-peanut ratios was generally similar, Figure 3. Although year-to-year changes in the hog-corn and hog-peanut ratios were generally similar, commercial pork production in the following year reacted slightly more to the hog-corn ratio movements during the periods in which the two ratios differed, Figures 4 and 5. This seems logical; hogs in most of the State are fed largely on corn, and in the peanut section, if two litters a year are farrowed per sow, only one litter can be fed to any extent on peanuts.

The amount of commercial pork production (total production less that saved for home consumption) was closely related to shifts in the hog-corn ratios. A hog-corn ratio above average in one year very generally was followed by an increase in commercial pork production the following year, Figure 4. (4) On the other hand, a hog-corn ratio below average generally was followed by a decrease in commercial pork production the following year, Figure 4. (4)

During the 1924-44 period, hog-peanut ratios averaging 2.0 or above were generally followed one year later by an increase in commercial pork production. Ratios below 2.0, however, were generally followed one year later by a decrease in commercial pork production, Figure 5. (5)

Shifts in the hog-corn ratio have given relatively good indications of changes one year later in commercial pork production. Yet, at a hog-corn ratio of 8.4, costs would not be covered. About 8.0 bushels of corn are generally required to produce 100 pounds of live hog, and the value of 2 to 3 bushels of corn in addition to feed costs is usually considered necessary to pay the other costs of labor, investment, and losses.

The response of Alabama hog producers to hog-corn ratios during the 20-year period is shown in Table 1. Average production of pork for home use one year following the different ratios varied little. On the other hand, production of pork for sale one year following above-average ratios was approximately 115 million pounds compared

- (3) The Corn Belt includes: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.
- (4) Hog-corn ratios were above average in 10 of the 20 years shown in Figure 4. The above-average ratios in 8 of the 10 years were associated with increases in commercial pork production in the following year, Figure 4.

In 10 of the 20 years the ratio was below average. The below-average ratios in 6 of these 10 years were associated with decreases in commercial pork production in the following year.

- (5) Hog-peanut ratios were average or above in 13 of the 20 years shown in Figure 5. The average or above-average ratios in 10 of those years were associated with increases in commercial pork production in the following year.

In 7 of the years, the ratio was below average. The below-average ratios were associated with decreases in commercial production the following year in 5 of the 7 years.

INDEXES of ANNUAL ALABAMA HOG-CORN and HOG-PEANUT PRICE RATIOS, 1924-1944
(1924-1944 = 100)

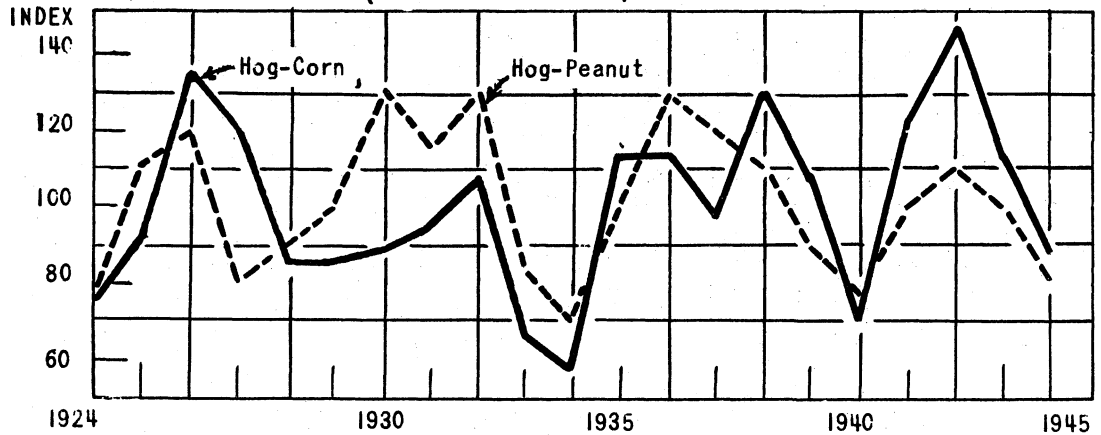


FIGURE 3. The direction of year-to-year changes in hog-corn and hog-peanut ratios was generally similar during the period, 1924-1944.

HOG-CORN PRICE RATIOS and COMMERCIAL PORK PRODUCTION, 1924-1944, ALABAMA

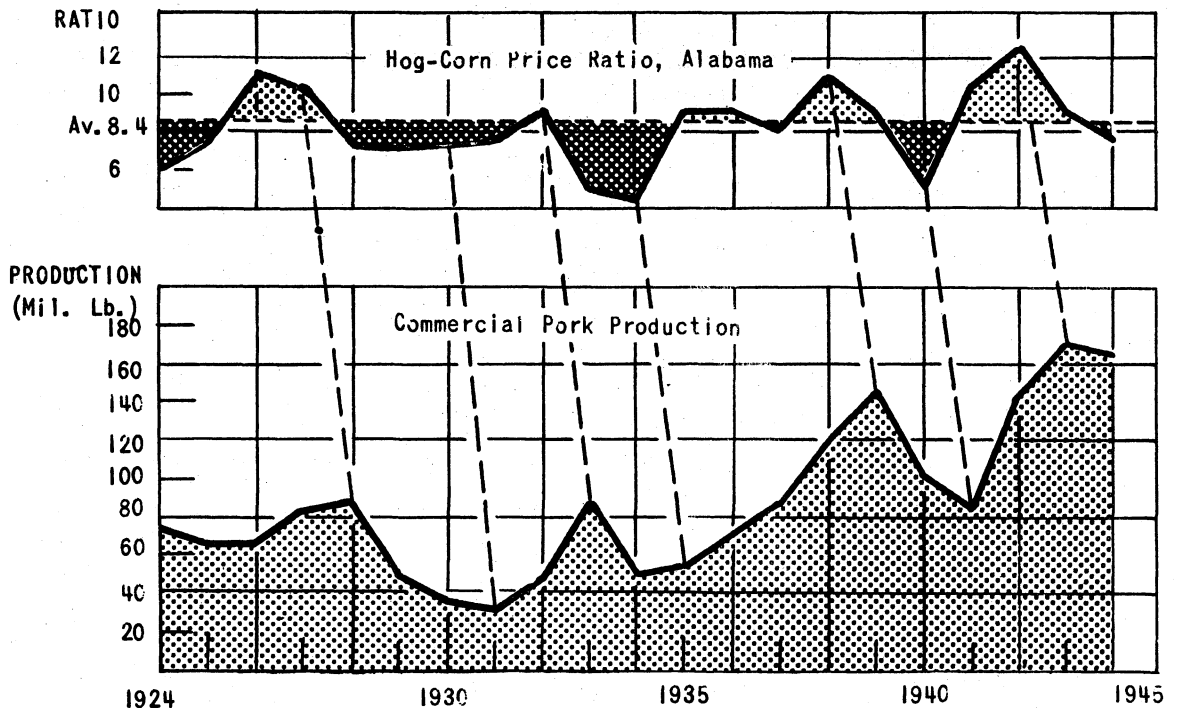


FIGURE 4. Ratios above average were generally associated with increase in commercial pork production one year later, whereas ratios below average were generally associated with decreases in commercial pork production one year later.

HOG-PEANUT PRICE RATIOS and COMMERCIAL PORK PRODUCTION, 1924-1944, ALABAMA

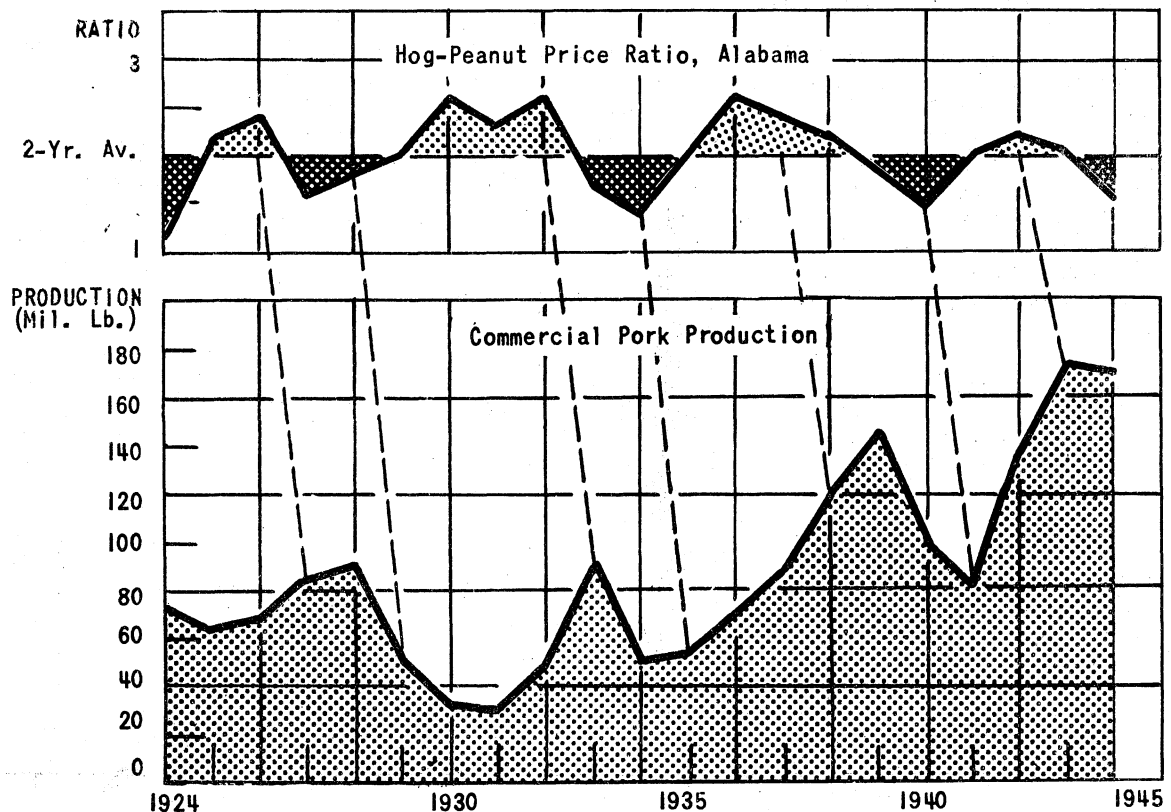


FIGURE 5. Ratios of average or above were generally associated with increases in commercial pork production one year later, whereas ratios below average were generally associated with decreases in commercial pork production one year later.

TABLE 1. AVERAGE PRODUCTION OF PORK FOR HOME USE AND FOR SALE ONE YEAR FOLLOWING INDICATED PRICE RATIOS, 1925-1944, ALABAMA

Hog-corn price ratio	No. of years	Average ratio	Average production of pork for home use one year later	Average production of pork for sale one year later
			1,000 pounds	1,000 pounds
Below average	10	6.7	97,794	60,396
Above average	10	10.0	99,541	114,778
Average	20	8.4	98,668	87,587

with about 60 million pounds in years after below-average ratios, Table 1.

The production of pork for sale might be explained in the 10 years in which the ratios averaged 10.0. The producer would receive the value of about 2 bushels of corn above feed costs. In the other 10 years of this period, however, the producer had little incentive to produce pork for sale. The ratios in those years averaged 6.7, and indicated that he did not receive enough from the pork to cover even his feed costs.

The production of hogs for market in years in which the ratios indicated that commercial pork production was unprofitable needs further investigation. Unless this situation can be explained, the ratios, except for their use as indicators of future production, lose significance as guides to the profitability of feeding or selling feed. The explanation requires examination of the factors affecting hog prices and feed prices in Alabama.

FACTORS AFFECTING ALABAMA HOG-FEED PRICE RATIOS

Hog prices. The average price received for hogs by Alabama farmers, 1924-44, was

\$7.79 per hundredweight. This was 82 cents, or 10 per cent, less than the \$8.61 per hundredweight received by Corn Belt farmers. Although Alabama hog prices averaged slightly lower than Corn Belt hog prices, yearly changes in Alabama and Corn Belt hog prices generally have been similar, Figure 6. In northern Alabama where a large quantity of commercial pork is produced from corn, hog prices averaged about the same as those of the Corn Belt. In southeastern Alabama somewhat lower prices reflect a discount for soft pork.

Corn prices. In contrast to hog prices, Alabama corn prices have generally been considerably higher than Corn Belt prices, Figure 7. The explanation of the low level of Alabama's hog-corn ratio, therefore, lies largely in the corn situation.

The similarity in fluctuations of Alabama corn prices to those of the Corn Belt and of the United States indicates that Alabama corn prices are largely dependent upon the corn situation in the country as a whole. The level of feed grain prices in the country as a whole is largely determined by the relationship between feed supplies and livestock numbers and by the general level of business conditions. Differences in prices between areas are large-

PRICES OF HOGS PER HUNDRED POUNDS, ALABAMA AND CORN BELT, 1924-1944

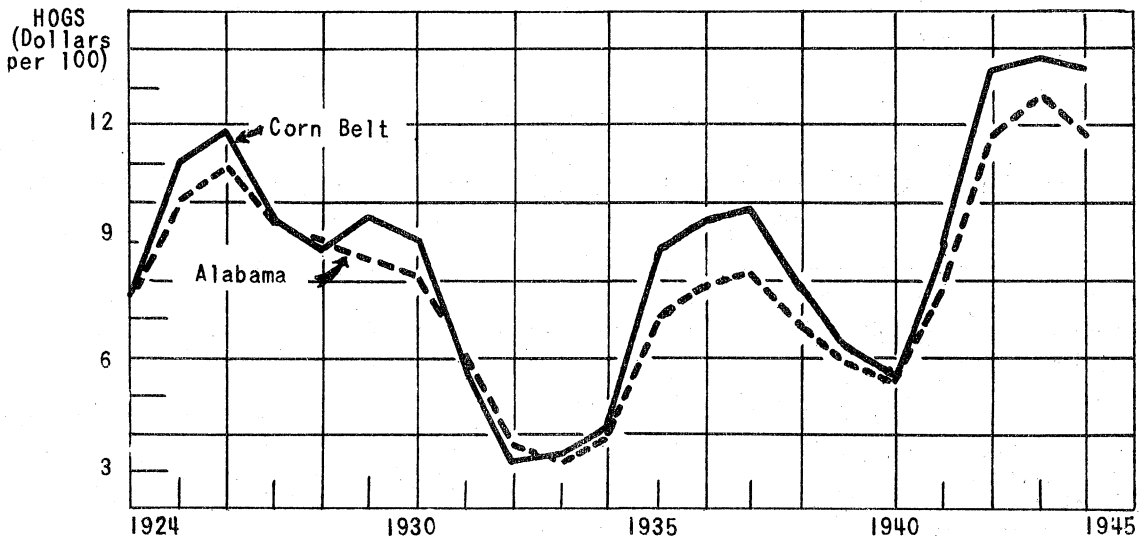


FIGURE 6. Yearly hog prices for Alabama show similar fluctuations to prices in the Corn Belt, although Alabama prices generally are lower. In years of low hog prices, the difference between Alabama and Corn Belt prices almost disappears.

PRICES of CORN PER BUSHEL, ALABAMA and CORN BELT, 1924-1944

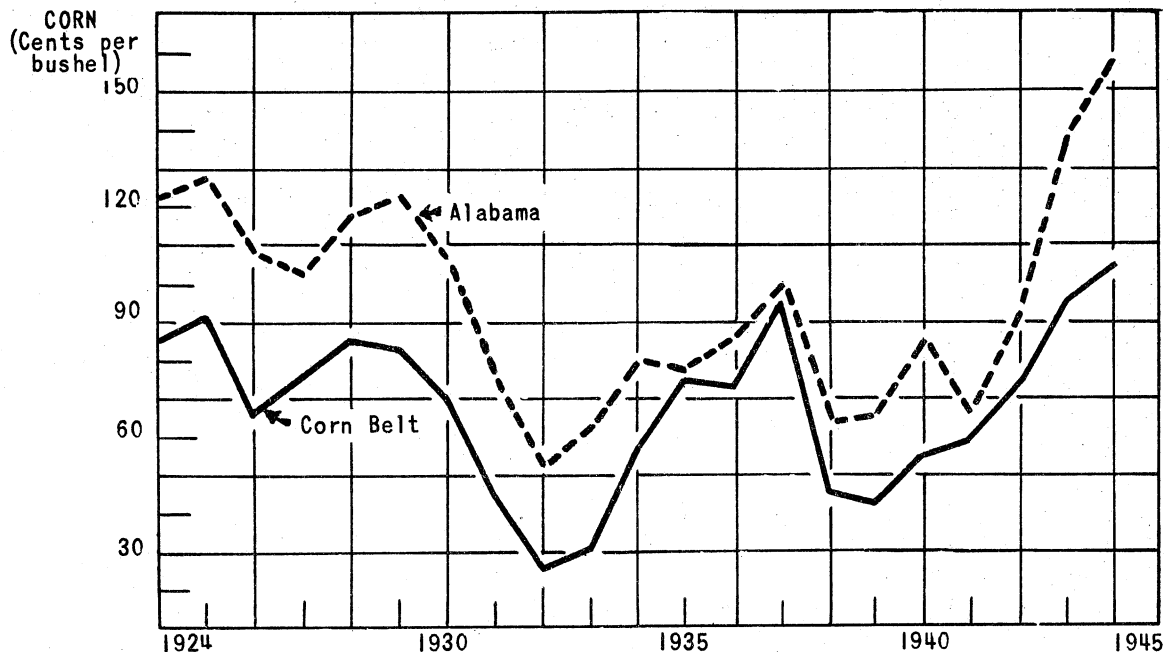


FIGURE 7. Yearly corn prices in Alabama show similar fluctuations to yearly corn prices in the Corn Belt States, although Alabama prices are higher.

ly cost items involved in transporting corn from surplus to deficit areas. Prices are lowest in areas of surplus feed supplies and highest in deficit areas. Alabama has been characteristically a deficit feed area. From 1924 to 1944, Alabama corn prices averaged 95 cents per bushel, compared to an average of 67 cents per bushel in the Corn Belt. The difference in the two regional prices during this period averaged 28 cents per bushel. This is 2 cents above the current freight rate from Chicago to Montgomery of 26 cents per bushel in carload lots.

Although prices of corn in Alabama have fluctuated in a pattern very similar to the fluctuations in the Corn Belt and in the United States, the difference between the Alabama price and the United States price is not constant from year to year. This difference is closely related to Alabama's supply of corn per animal unit in relation to the country's supply per animal unit. Since the bulk of the country's sup-

ply is in the Corn Belt, data on the United States supply would reflect the Corn Belt influence to a large extent. From 1926 to 1944, the Alabama corn price averaged 22 cents per bushel higher than the United States price. In the 8 years in which the Alabama corn supply per animal unit was considerably smaller than that of the United States, the Alabama price averaged 31 cents per bushel higher, Table 2. In the 3 years in which the Alabama supply per animal unit was greater than that for the whole country, the margin averaged 5 cents higher per bushel. Year-to-year changes in the difference in corn supplies and in the margin of prices between Alabama and the nation indicate that as Alabama becomes more self-sufficient in corn and other feeds the price difference narrows and largely ceases to exist, Figure 8.

To assure an amount of pork needed to supply family needs, there is a tendency for corn to be fed to hogs regardless of the relationship between the price of hogs

TABLE 2. FARM PRICES OF CORN IN ALABAMA AND THE UNITED STATES AND CORN SUPPLIES PER ANIMAL UNIT IN ALABAMA AND THE UNITED STATES, FOR SELECTED PERIODS, 1926-1944*

Relation of Alabama corn supply per animal unit to United States corn supply per animal unit	Number of years	Supply of corn per animal unit			Farm price of corn		
		Alabama	United States	Difference	Alabama	United States	Difference
		(Bushels)			(Dollars per bushel)		
Below normal ¹	8	16.4	21.8	-5.4	1.04	0.73	+0.31
Normal ²	8	18.8	20.6	-1.6	0.80	0.60	+0.20
Above normal ³	3	20.1	15.9	+4.2	0.87	0.82	+0.05

*Compiled from Agricultural Statistics, U.S.D.A., and Alabama Crop Reporting Service.

¹-3.0 or more. ²0 to -2.9. ³above 0.

RELATION OF DIFFERENCE IN CORN SUPPLIES PER ANIMAL UNIT TO THE DIFFERENCE IN FARM PRICE OF CORN, ALABAMA COMPARED WITH UNITED STATES, 1926-1944

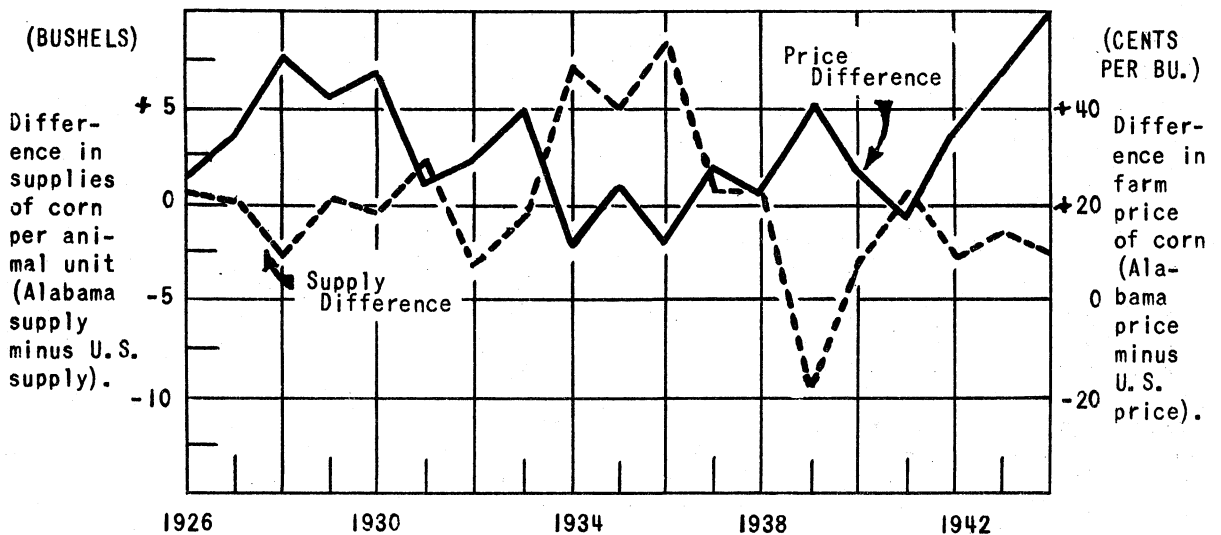


FIGURE 8. In 1928 Alabama had 5 bushels less per animal unit than the U. S. average, while the price difference was 40 cents a bushel greater for Alabama. In 1934 and 1936 Alabama had around 5 bushels more corn per animal unit than the U. S., while the price difference was practically 0.

and the price of corn. For commercial pork production, however, price relationships between the price of hogs and the price of corn become important. If the value of the 100 pounds of pork is no greater than the value of the 8 bushels of corn, it would pay the producer to sell the corn rather than feed it. In addition, the Corn Belt producers require a margin above feed costs to pay other production expenses. As a result, when the hog-corn ratio falls below 11.6, pork production (hog-marketings) in the Corn Belt declines. Although in Alabama the ratio has seldom been as high as 11.6, commercial pork production continues.

The question arises whether the reported Alabama corn prices are representative of actual prices that the producer could receive if he chose to sell his corn. On the basis of the average hog-corn ratio in Alabama (based on reported prices), it would pay farmers to sell their corn rather than feed it to hogs.

Apparently reported prices of corn for Alabama and other Southeastern States are higher than the actual prices that farmers could obtain in the event they chose to sell their corn rather than to feed it to livestock. This conclusion is based on: (1) the small quantity that commercial corn is of total corn produced; (2) the large portion of commercial corn that is used for human consumption; (3) the small quantity of feed purchased by farmers; and (4) the

lack of adequate storage facilities at market points. (6)

Corn prices reported for the Southeastern States have been based on a sample of sales considerably smaller than for the Corn Belt states. For example, only 8 per cent of the corn produced in the Southeast was sold during the period, 1920 to 1943, as compared to 22 per cent in the Corn Belt, Table 3. A detailed analysis for a selected Southern State (Alabama) and a selected Corn Belt State (Iowa) during this period revealed these same relationships that characterized the two regions.

Another factor affecting reported corn prices in Alabama is that corn sold to food manufacturers for meal and grits has been, for the most part, selected high

- (6) Schultz suggested that Alabama and other Southeastern States might have a situation for corn somewhat similar to the two-price system for barley in the Northern Plains States, where in most years there are in fact two prices for barley: (1) barley that can be used for malt and (2) barley that enters feeding channels. Malt barley of good quality at present returns 20 to 25 cents more per bushel than barley for feed. (Correspondence with Dr. T. W. Schultz, Professor of Agricultural Economics, University of Chicago.)

TABLE 3. AVERAGE ANNUAL PRODUCTION AND FARM DISPOSITION OF CORN PER STATE FOR THE SOUTHEASTERN STATES* AND CORN BELT,** 1920-1943¹

Region	Production	Farm household use	Feed & seed	Sold
	(1,000 bushels)			
Southeastern States*	30,584	2,593	25,589	2,402
Corn Belt**	154,481	130	119,683	34,668
	(per cent of total)			
Southeastern States*	100	8	84	8
Corn Belt**	100	1	77	22

* Alabama, Mississippi, Georgia, Florida, and South Carolina.

**Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

¹ Farm Production, Farm Disposition and Value of Corn, 1909-41, Dec. 1944, U.S.D.A., B.A.E., Crop Reporting Board; Agricultural Statistics, 1944, U.S.D.A., B.A.E.

quality ears, and therefore would bring a higher price per bushel than would the farmer's entire crop of corn. (7)

Although imports of feed into Alabama are large, purchases of feed grains are made by only a small proportion of Alabama farmers. Largest purchases of feed per farm in the 1929 Census were reported by dairy farmers. On dairy farms feed expenditures averaged \$1,739 and consisted largely of commercially-mixed high protein feeds. Poultry, animal-specialty, and stock-ranch farms were also relatively large feed purchasers. In contrast cotton farmers who constituted more than three-fourths of those reporting, bought feed valued at only \$57 per farm.

About a decade ago, Inman(8) discussed some of the limitations of marketing corn in Alabama. One of the most important was the shortage of storage space for bulk corn. As a result, only a small quantity of Alabama corn, chiefly from northern Alabama, was used by manufacturers and that was used during the six-months period from October through March. Other factors were weevil damage, crosses between white and yellow varieties, and lack of grades.

Changes have occurred in the last 10 years, particularly with respect to an easing of the storage situation. Yet, insofar as these conditions do continue to be limiting factors to corn marketing, they prevent the reported prices from reflecting the average farmer's actual opportunity to sell corn.

Because farmers in Alabama buy or sell little corn, hog-production would seem to depend not on the hog-corn ratio, which reflects reported corn sale prices, but on the supply of corn available on the individual farms and on the comparative profitability of feeding such corn as is available to hogs, chickens, or other livestock. The fact that fluctuations in hog production in Alabama correspond to fluctuations in the hog-corn ratio is significant. However, the general level of the reported hog-corn ratio is limited as a direct guide in determining whether profits can be maximized by feeding or selling for cash.

Peanut prices. The hog-peanut price ratio has been calculated from the report-

ed farm prices of hogs and of harvested peanuts. The price received for harvested peanuts reflects very largely the demands of consumers for peanut butter, peanut candy, salted and roasted peanuts, and the quantity of peanuts available for this edible trade.

The use of such a peanut price in the calculation results in a hog-peanut ratio that does not accurately reflect that price ratio between hogs and hogged peanuts. Peanuts are not hand-fed to hogs as is corn. By hogging-off a field of peanuts, the expenses of digging, stacking, and picking are eliminated. Hogged peanut prices, however, are unavailable since they enter the market only indirectly.

The use of prices of harvested peanuts in the hog-peanut ratio makes this ratio at best a crude guide in determining whether it would be more profitable to dig and sell peanuts or to use them as hog feed. For example, from 1924-44 the Alabama hog-peanut ratio averaged 2.0. This means that 200 pounds of harvested peanuts were equal in value to 100 pounds of live pork. Since 300 to 360 pounds of hogged peanuts are required to produce 100 pounds of live pork, the producer seemingly would find it more profitable to harvest and sell the peanuts, provided harvesting and other costs were not too high.

In order for the value of 100 pounds of pork to equal the value of the peanuts (at harvested prices) required to produce that pork, the producer would need a ratio of 3.0 to 3.5. Yet in only 1 year in the 35-year period of 1910-44 has the Alabama hog-peanut ratio been as high as 3.0.

The decision to dig or to hog-off peanuts, therefore, is only indirectly affected by the relative prices of hogs and of harvested peanuts. There are limiting

(7) Available data indicate that a sizeable portion of the commercial corn is used for human consumption. For example, from 1935-41 approximately two-fifths of Alabama's 5 million bushels of commercial corn was used for human consumption, whereas the remaining three-fifths was used for feed and seed.

(8) Inman, Buis T., Purchases of Feeds and Grains in Alabama, Alabama Agricultural Experiment Station, Cir. 77, 1937.

factors that may in some instances influence the farmer's decision to dig or to hog-off peanuts more than will the price ratio between hogs and harvested peanuts.

The problems of fencing and watering, as well as of obtaining enough hogs for the peanut acreage available, prevent complete flexibility of shifts from *digging to hogging* at harvest time. Late season shifts in plans from *hogging to digging* are handicapped by the problems of obtaining labor for harvesting and of disposition of unfinished hogs on hand.

The higher average yield of peanuts relative to other concentrate feed crops in southeastern Alabama is probably the major reason accounting for the large quantity of peanuts that is *hogged* in this area as compared to other areas of Alabama. Total pounds of digestible nutrients (after deducting seed requirements) produced from an acre of peanuts during the 5-year period, 1937-41, averaged 704 pounds, as compared to 507 pounds from corn. Peanuts, therefore, produced over a third more feed per acre than corn. Although corn produces less feed per acre, it is essential for hand-feeding the pigs before the peanuts are available, and in some cases for finishing the hogs as well.

As the hogs must usually be fed from corn, in addition to other feeds or purchased concentrates, until the peanuts are ready for *hogging-off*, the supply of corn available in the area would logically influence the number of sows farrowed and thus the number of pigs on hand. Since the supply of corn for the following year is fairly well known at corn harvest time, the decisions regarding the breeding of sows are probably made soon afterwards. These decisions are reflected in the number of hogs on farms the next spring and summer. The number of these hogs would logically influence the acreage of peanuts planted for *hogging*. However, the reaction to expand the hog business is limited by the availability of feed, and the decision to cut down on the hog business must consider alternative uses of the feed.

Estimated gross returns per acre from dug peanuts in 1943 in the Southeastern

Coastal Plains of Alabama were \$62.25 as compared to \$35.10 for *hogged* peanuts. After deducting estimated total expenses for dug peanuts and *hogged* peanuts, (including fertilizer, seed, labor, machinery, and mule work) net returns per acre for dug peanuts were \$25.80 as compared to \$13.67 for *hogged* peanuts. Net returns for dug peanuts were, therefore, 89 per cent greater than for *hogged* peanuts.

CONCLUSIONS

The reported Alabama hog-feed ratios are considerably lower than Corn Belt ratios. However, the similarity in fluctuations of Alabama ratios and Corn Belt ratios indicates that Alabama is a part of the general hog and feed situation.

The low Alabama hog-corn ratio results from using reported corn prices that seem too high to indicate actual prices obtainable by the farmer for feed corn. Reported prices of corn for Alabama and other Southeastern States are based on a small part of the State's corn supply, since only a small portion of the production normally enters marketing channels. In addition much of the corn sold is used for human consumption and is of better-than-average quality.

The hog-peanut ratio is also too low to serve as a direct profit guide in deciding whether to feed or sell. This results from using prices of harvested peanuts (used chiefly for edible purposes) since *hogged* peanuts enter the market only indirectly.

Obviously, these ratios do not reflect the farmer's actual feed situation and do not serve as direct guides to the producer in determining whether or not he could make more profit from feeding or from selling his feed.

However, if conditions and relationships in the future continue as in the past, the direction of future shifts in hog production in the State may generally be determined a year in advance from existing ratios. Such forecasts of the direction of future changes in production could be of value to the individual farmer as he appraises his own feed and hog situation.

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