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CHANGES IN SPATIAL GRAIN-PRICE PATTERNS

In the United States and
In the North Central Region
1946-1958

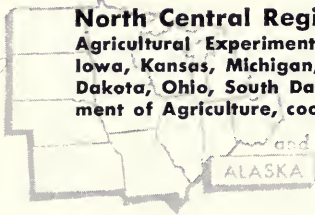
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CHANGES IN SPATIAL GRAIN-PRICE PATTERNS In the United States and In the North Central Region 1946-1958

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FOREWORD

Long-term changes in grain production, use of grain and grain products, and transportation costs between regions, states, and markets should be reflected in proportionate changes in price relationships.

One of the objectives of the North Central Regional Grain Marketing Committee project NCM-19, "Pricing and Trading Practices for Grain in the North Central Region," is to describe the spatial price patterns for grain and the changes that have taken place since 1946.

Price relationships and trends are observed on several levels over a period of time. Four different areas are examined:

1. Average prices in the United States for six grain crops.
2. Differences in prices among regions in the United States.
3. Differences in prices among selected states in the North Central Region.
4. Differences in prices among selected markets.

The material is presented as a series of graphs comparing relative price movements. *Agricultural Statistics* and *Grain Market News* provided most of the basic data; limited data were taken from the *Wall Street Journal*. Since these publications are readily available, the data for the figures are not reproduced in appendix tables.

Although major emphasis was placed on the period from 1946 to 1957 (or 1958, when data were available), some of the analyses were carried back to 1936 to provide a longer period for comparison.

U. S. PRICE, PRODUCTION, AND ACREAGE TRENDS AMONG GRAINS, 1935-1958

Price Trends

Soybeans, wheat, and corn increased more in price from 1937-1939 to 1956-1958 than sorghum, oats, and barley. If 1935 is taken as the base, barley and oats increased more than corn and wheat. The percent increases in the U. S. season average prices for these crops are given below.

	<i>Increase from 1935 to 1958</i>	<i>Increase from 1938 to 1958</i>	<i>Increase from 1937-1939 average to 1956-1958 average</i>
Soybeans.....	180	201	172
Wheat.....	109	209	155
Corn.....	76	124	134
Oats.....	126	148	124
Barley.....	137	134	108
Sorghum.....	81	143	107

All prices more than doubled from their late 1930 lows to 1956-1958, and soybeans and wheat were more than 2½ times their 1937-1939 level. Sorghum has had the most variation since 1948 (Fig. 1).

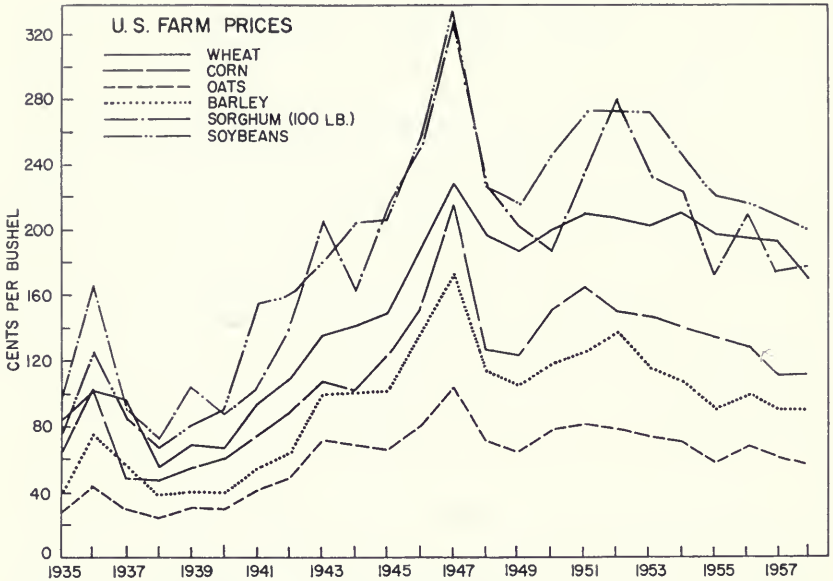
Grain prices show two distinct phases — a rapid rise from 1938 to the 1947 high, and a decline since 1947, broken by the Korean War period (1950-1952). Selecting a base year for comparisons is difficult because of the wide range of conditions of supply and demand. For this reason, the 1937-1939 to 1956-1958 averages probably afford as good a comparison as any that can be devised for the long period.

For the 1947-1958 period, wheat and soybean prices declined least from their 1947 highs (Fig. 1A). The feed grains had considerably greater declines, particularly corn and barley, which averaged only slightly over one-half their 1947 highs in 1958.

Soybean prices have been supported by the rapidly rising demand for soybean meal and by government support of the vegetable oil market, and wheat has been supported by a large loan and disposal program. The feed grains have had government supports, but the percentage going into government programs has been small in relation to total production, and support levels have been reduced considerably since 1954. Substantial reductions in wheat-support rates were not undertaken until the 1958 crop.

Production Trends

The average price relationships between 1937-1939 and 1956-1958 suggest that wheat, corn, and soybean production should have increased



U. S. farm prices of six grain crops, 1935-1958

(Fig. 1)

at a faster rate since the late 1930's than oats, barley, and sorghum (Fig. 2). Transposing the data from Fig. 2 to logarithmic scale (Fig. 2A) shows that soybean and sorghum production increased at the most rapid rate, followed by corn at a somewhat slower rate. Wheat and oat production appear to have increased very little, at least since 1945. Although barley production fluctuated considerably from 1935 to 1943, average production from 1935 to 1953 was about 280 million bushels. Since 1953, annual production has averaged about 400 million bushels.

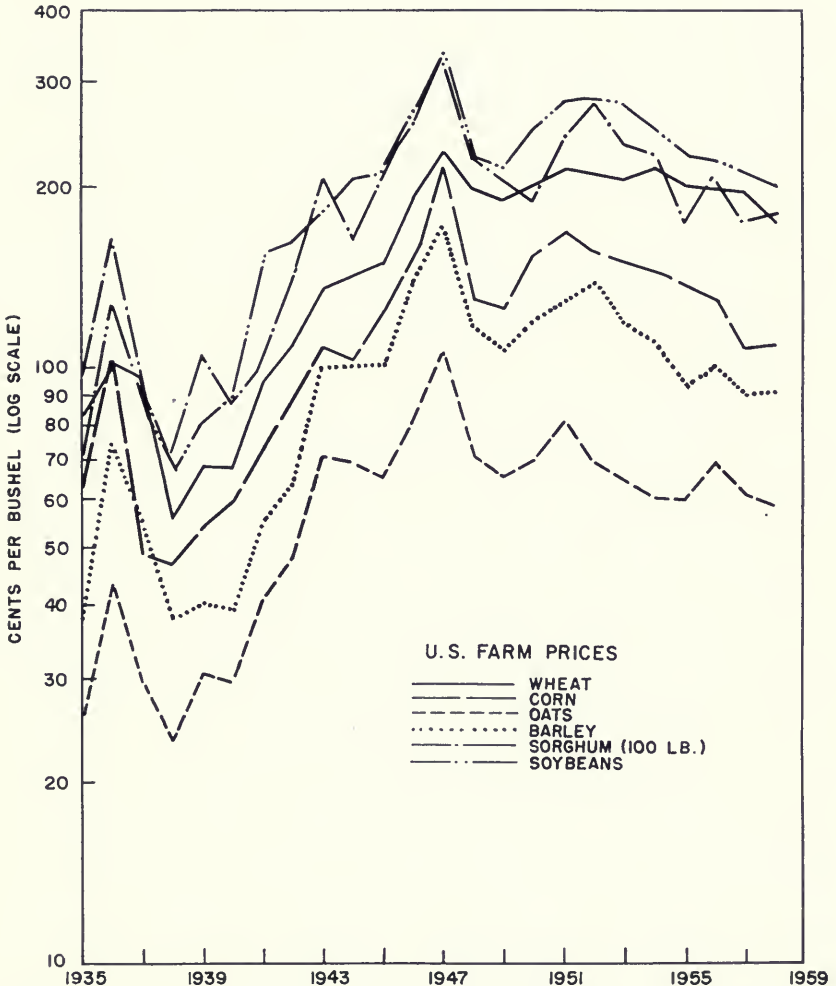
Until 1953, the production trends of corn, oats, soybeans, and barley behaved largely as would be expected from the price-relationship changes between 1937-1939 and 1956-1958. Wheat production has responded less than the price change would indicate and, since 1953, sorghum and barley have responded much more. Barley production and acreage increased rapidly between 1952 and 1956, and production in 1957 and 1958 exceeded the 1942 peak. Sorghum acreage and production increased from 4.6 million acres and 58 million bushels in 1935, to 16.7 million acres and 610 million bushels in 1958.

The production of wheat, sorghum, and barley has probably been affected as much, both directly and indirectly, by acreage restrictions on wheat and cotton as by price relationships. In addition, sorghum has been replacing corn in the southwest. Part of the growth in sorghum,

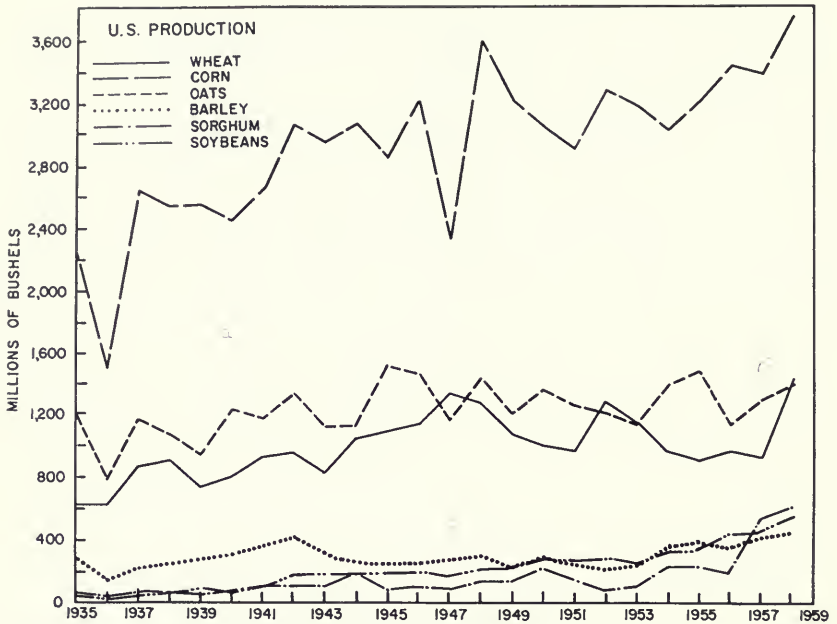
then, is substitution for corn, and does not represent a net gain in feed production except to the extent that sorghum is better adapted to southwest conditions than corn.

Of the first three crops in volume of production — corn, wheat, and oats — only corn made a significant gain in production between 1938 and 1958.

A record wheat crop was produced in 1958 in spite of tight controls that have cut acreage by one-fourth since 1938. This fact indicates a potential for much larger wheat production than we have actually had



U. S. farm prices of six grain crops, 1935-1958 (log scale) (Fig. 1A)



U. S. production of six grain crops, 1935-1958

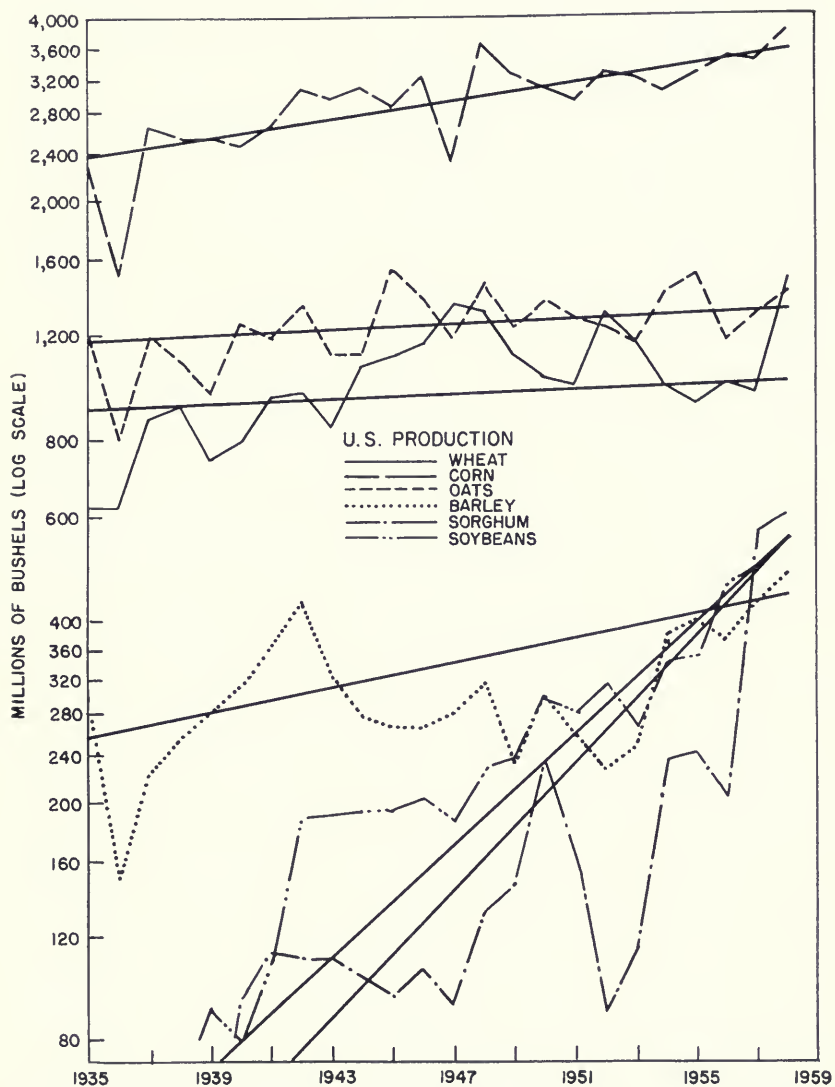
(Fig. 2)

since World War II. If it had not been for stringent acreage restrictions, wheat production probably would have increased at the support prices in effect from 1952 to 1957. As it was, production decreased to near the 1938 level.

Oat production went up slightly from 1935 to 1940, and has changed little since then. Acreage in 1958 was a little less than in the late 1930's.

The fact that barley and sorghum prices were less favorable than wheat prices in 1956-1958 does not prevent land forced out of wheat and cotton from going into barley and sorghum if these are the best alternatives. The fact that big increases in barley and sorghum have come in periods of rapidly declining wheat and cotton acreage suggests a direct connection between these crops.

Soybean acreage and production have increased steadily throughout the 20-year period — from 2.9 million acres and 40 million bushels in 1935, to 23.9 million acres and 580 million bushels in 1958. Since the 1930's, the demand for soybean products has been as great as the growth in soybean production, if not greater. Consequently, soybean prices had a more favorable relation to other grain prices in the 1956-1958 period than in the 1937-1939 period, despite large increases in production.



U. S. production of six grain crops, 1935-1958 (log scale)

(Fig. 2A)

Acreege Trends

Except for the war periods, corn acreage has decreased steadily from 1935 to 1957 (Fig. 3). But favorable price relationships have induced large enough yields to offset acreage decreases and increase total production.

Increases in the price of sorghum were comparable to those for corn and soybeans up to 1950, but sorghum acreage and production appear to have been affected at least as much by changes in cotton and wheat acreages as by price relationships. Sorghum and barley acreages and production increased most when wheat and cotton acreages were cut, and often decreased when cotton and wheat acreages expanded.

The introduction of acreage controls and price supports makes it impossible to explain changes in acreage and production of grains and soybeans on the basis of price relationships alone. Much acreage has been taken out of cotton, wheat, and corn, particularly from 1949 to 1957. Farmers usually cannot afford to let land lie idle. Barley, sorghum, and soybean acreage increased during this period, replacing acreage formerly devoted to other crops. The changes made in the feed-grain support programs in 1958 appear to have reversed the long downward trend in corn acreage, and may have been responsible for the decreases in barley and sorghum acreage.

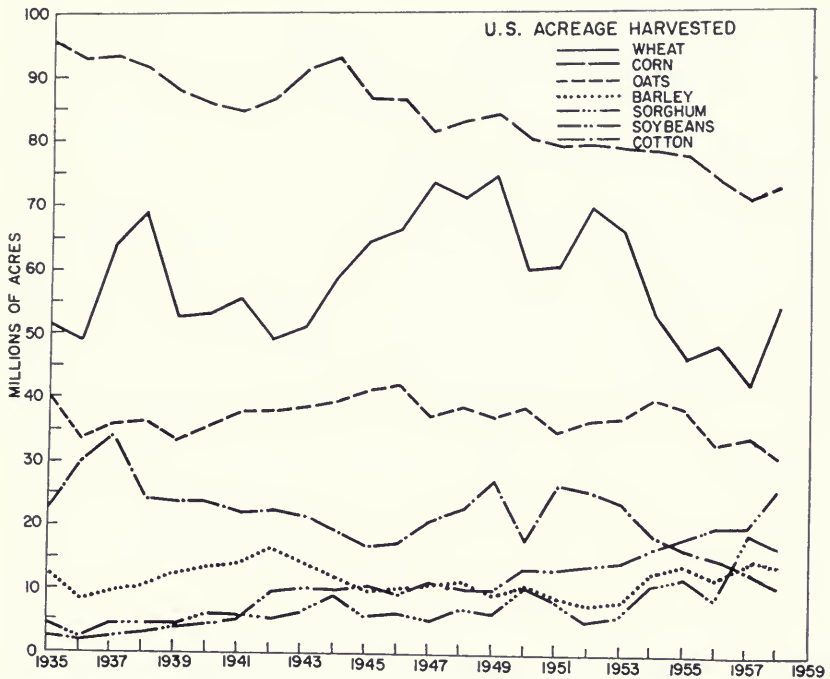
PRICE RELATIONSHIPS AMONG REGIONS

Corn

Corn prices among regions widened out from 1942 to 1946, and from 1949 to 1952 (Figs. 4 and 5). From 1947 to 1949, and from 1952 to 1954, price spreads narrowed. In 1955, contrary to usual behavior, the spread between regions widened in a period of record corn supplies and declining corn prices.

Two significant changes in regional corn-price relationships relative to the United States average appear in Fig. 5. These are the increase in prices in the Western Region from 1946 to 1956, and the decrease in prices in the South Atlantic and South Central regions from 1952 to 1956. The price increase in the Western Region was probably due to a growing demand in a deficit area and to increased freight rates from surplus areas. By 1957, corn, sorghum, and barley production in the Western Region were more than double the 1943 to 1952 average, and corn prices were not as high as they had been in relation to other regions.

Part of the decrease in corn prices in the South Atlantic and South Central regions may be due to expanded production of sorghum in the



U. S. acreage harvested for six grain crops and cotton, 1935-1958 (Fig. 3)

southwest. The increase in sorghum is reflected in decreasing corn production in Texas, Arkansas, and Louisiana. In addition, large areas in these regions are accessible to cheap barge transportation from the North Central Region, and, since 1946, barge-transportation rates have gone up much less than rail rates. The low prices in these two regions in 1955 correspond with the large corn crop that year. In 1957, corn production was about equal to the average of the preceding 10 years, and prices had approximately the same relationship to the U. S. average as in 1946.

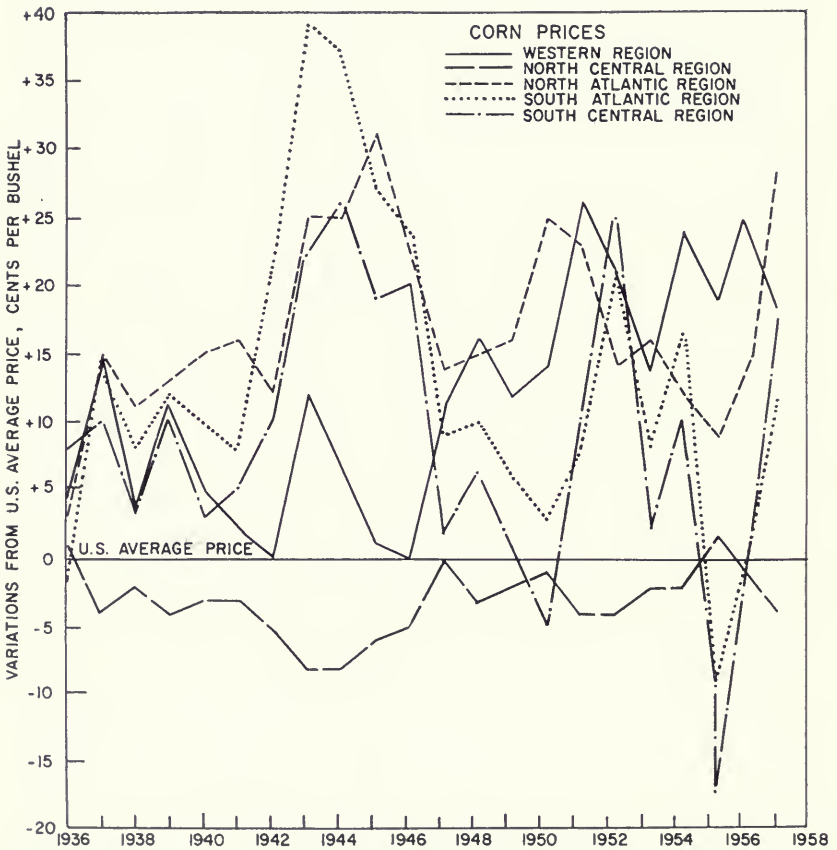
Oats

Oat prices seem to show more regional variation than either wheat or corn prices (Fig. 6). Oats are a bulky, low-value commodity, and over 80 percent of the crop is grown in the North Central Region. Since only a small percentage enters commercial trade, erratic regional price patterns could be expected. Using 1946 as a base price, differences widened out in 1947, and again in 1951 and 1952. By 1955, oat prices had declined to between 75 and 80 percent of their 1946 levels,

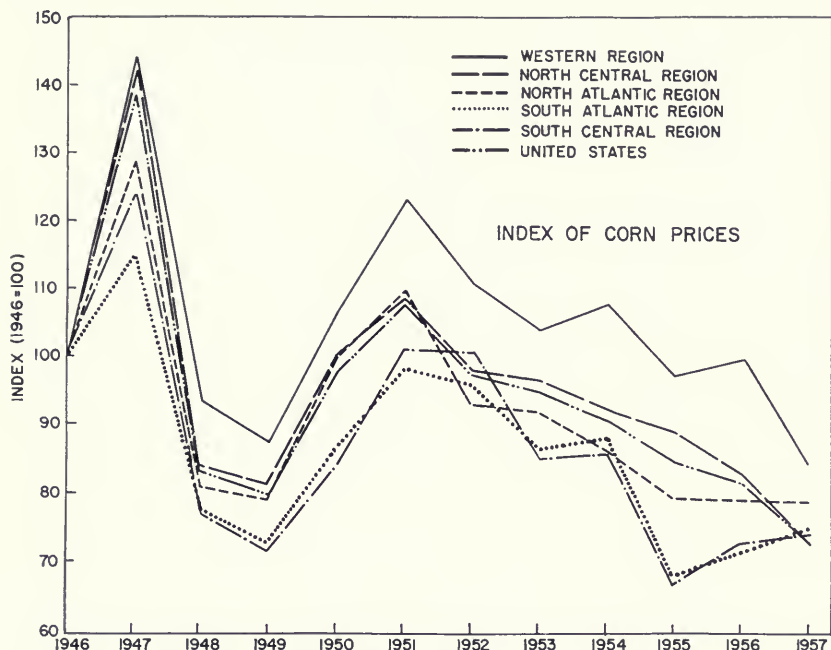
but regional variations had narrowed to near 1946 levels. The only regional price-relationship change is a decrease in South Central and South Atlantic prices. This decrease may be due to increased production in these areas since 1951.

Winter Wheat

Since the North Central Region produces over half of the nation's winter wheat, prices in this region most closely parallel the national average price (Fig. 7). Taking 1946 as a base point, winter wheat prices in 1957 were somewhat higher in the Western and South Central (Texas, Oklahoma) regions and somewhat lower in the North Atlantic and South Atlantic regions in relation to the average United States price. The North Central and United States averages remained

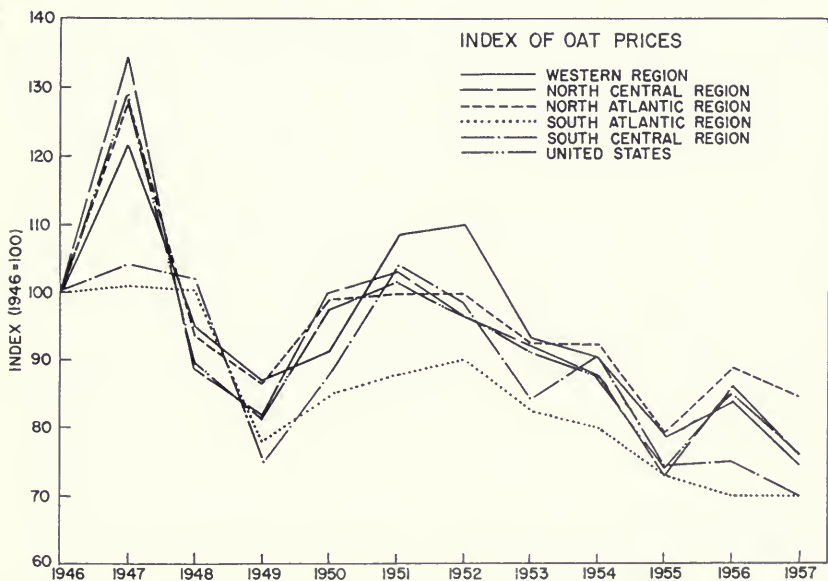


Differences between U. S. average price and regional corn prices, 1936-1958 (Fig. 4)



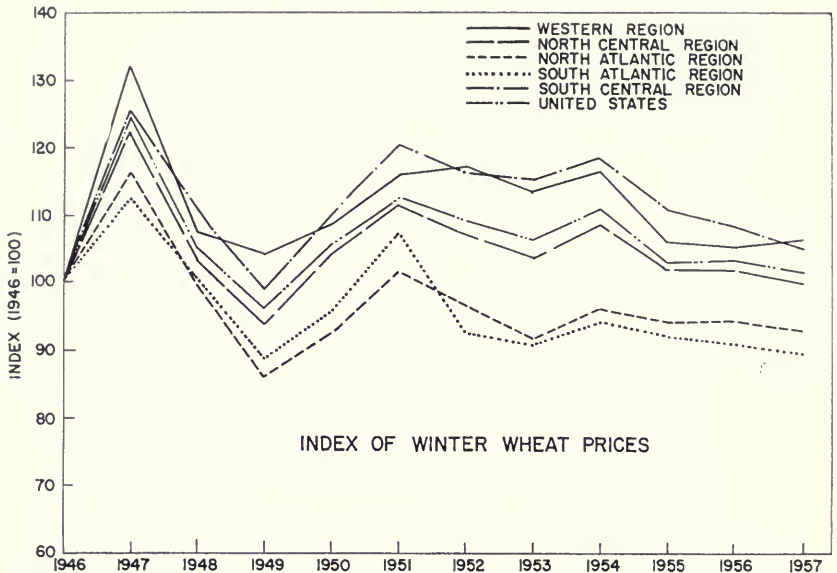
Regional indexes of corn prices, 1946-1957

(Fig. 5)



Regional indexes of oat prices, 1946-1957

(Fig. 6)



Regional indexes of winter wheat prices, 1946-1957

(Fig. 7)

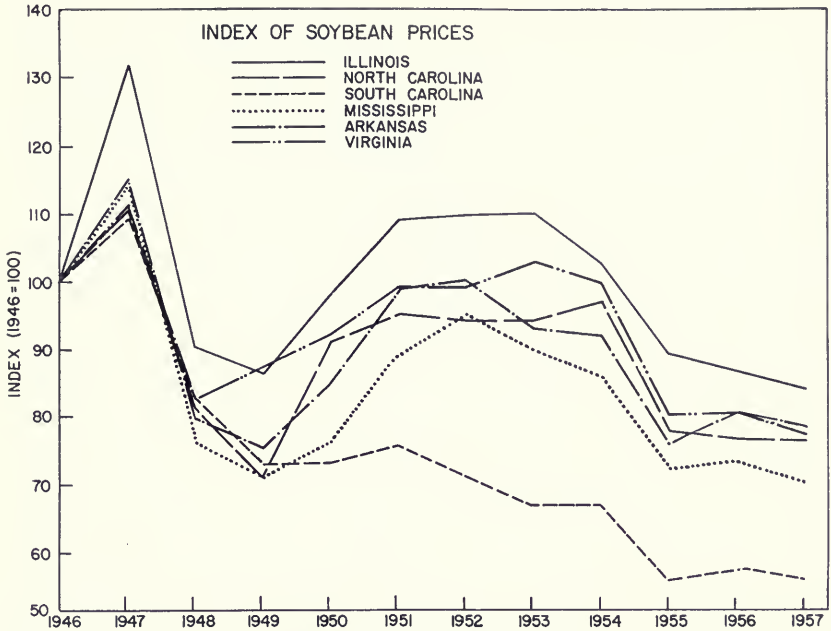
closely related because of the heavy weight the North Central Region carries in the United States average price.

We may theorize that wheat growers in the states along the Atlantic seaboard are largely small-scale producers who did not bother to place wheat in the loan, while most of the larger growers in the South Central and Western regions did take advantage of the loan. Since an allowance is made in the average prices paid to farmers for unredeemed loans, western prices would tend to be higher than eastern prices if a higher percent of the crop is placed in the loan.

Soybeans

No regional averages are given in *Agricultural Statistics* for soybeans. In Fig. 8, 1946 is used as a base and Illinois prices as representative of the North Central Region to compare the relationship with selected southern and southeastern states.

Prices in all of these states have declined relatively more since 1946 than those in Illinois. In part, this decline reflects a change from use of the soybean as a green manure crop in cotton fields to a commercial grain crop. In 1946, the South Carolina farm price was about \$1.30 more than the Illinois price.



Indexes of soybean prices for six states, 1946-1957 (Fig. 8)

But the spread has gradually narrowed and, since 1951, the South Carolina price has often been below that of Illinois. Somewhat similar price experiences have been noted in Mississippi, and to a lesser extent, in Arkansas, Virginia, and North Carolina. Since 1946, soybean production has increased much more rapidly in all of these states than in Illinois and the United States as a whole.

PRICE DIFFERENCES AMONG STATES IN THE NORTH CENTRAL REGION

Prices over the 11-year period 1946-1957, showed so much irregularity and variation that no trends could possibly be assigned. Consequently, the data were carried back to 1936 for the comparisons between states.

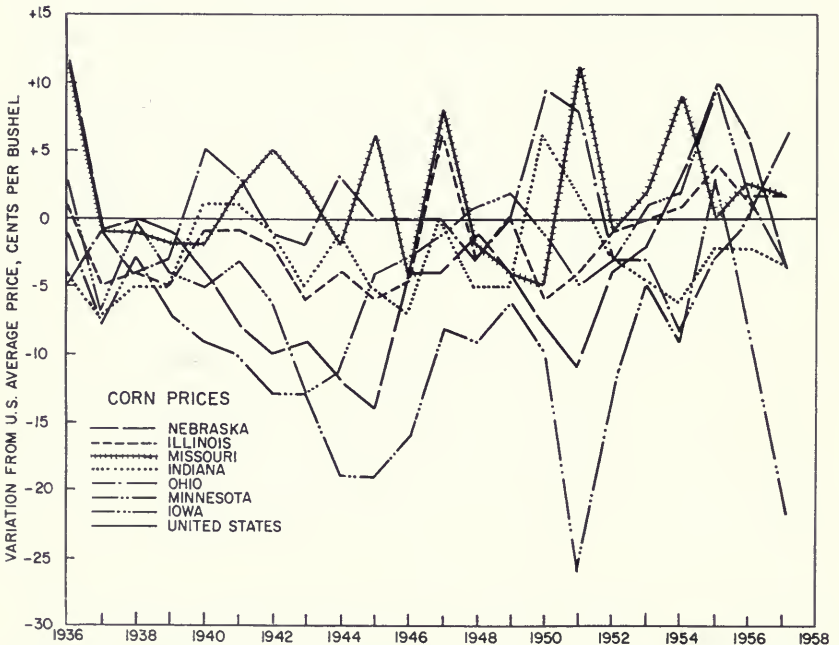
Corn

The average annual prices for seven states (Illinois, Indiana, Iowa, Minnesota, Missouri, Nebraska, and Ohio) were plotted against the United States average (Fig. 9). From 1945 to 1955, corn prices in

Iowa and Nebraska increased in relation to the United States average. In Ohio and Indiana, prices decreased from 1950 to 1954. Since 1954, both of these trends have been reversed.

Prices in the other three states show no discernible trends in relation to the United States average. Both Iowa and Nebraska were subject to drouths in 1953, 1954, and 1955. In addition, CCC accumulations of corn are heaviest in the western corn belt. The reversal in price trends since 1955 makes it seem likely that prices were influenced more by these drouths and CCC accumulations of corn than by long-term shifts in production and consumption patterns. Iowa and Nebraska prices have come down, Indiana prices have become stabilized, and Ohio prices have increased relative to the United States average.

Of more significance is the difference in spread in prices between years with large surpluses and years with short crops and stronger demand. The price spread narrows perceptibly in periods of large surpluses and lagging demand and widens with shorter crops and brisk demand. The narrowest spreads occurred in 1938-1939 and 1948-1949, both periods of large-scale CCC activity. The widest



Differences between U. S. average price and corn prices in seven states, 1936-1957 (Fig. 9)

spread occurred during and after World War II, 1943-1946, and during the Korean War, 1950-1951.

During the early part of the period, prices in Minnesota, Nebraska, and Iowa were below those in the other states. From 1952 to 1955, Iowa and Nebraska prices gained with relation to those in other states. Since 1955, crops in the western corn belt have been more normal in size, and 1957 figures show that this area has lost most of its 1955 relative advantage. Nebraska, the farthest west of the corn-belt states, should benefit most directly from the higher corn prices in the Western Region, provided that the increases in the consuming Western Region are not offset by higher freight rates.

At the same time, corn production in Indiana and Ohio has been increasing, making these states surplus the greater part of the year. This condition appears to have had the effect of reducing their prices in relation to the United States price from 1950 to 1954. Since 1954, Indiana and Ohio prices have recovered part of their relative loss.

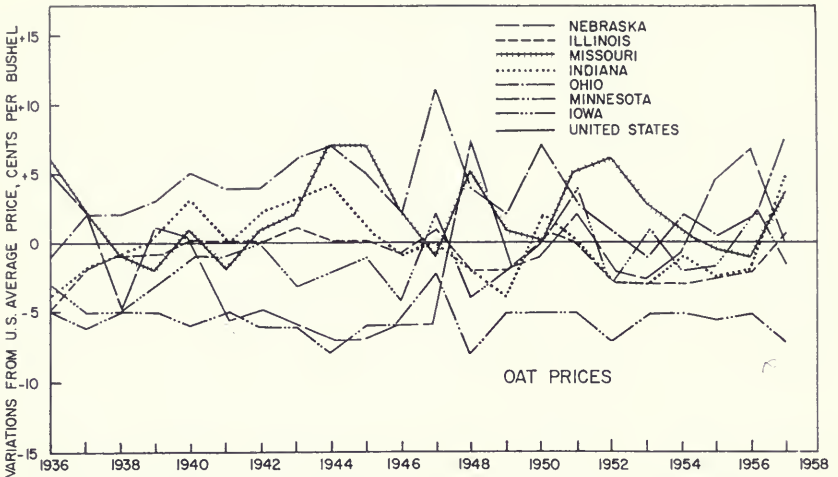
The wide variation in Minnesota and Nebraska prices is due partly to variations in quality. Over 85 percent of the 1951 corn received at Minneapolis graded No. 4 or lower.

Shepherd and Richards compared corn prices in Nebraska, Iowa, and Ohio over an even longer period, from 1910 to 1956.¹ There was no indication of any long-term shift in the price relationships between these three states. Ohio prices averaged about 9 cents higher than Nebraska prices from 1910 to 1920, and about 11 cents higher from 1944 to 1954. Iowa prices averaged about 0.7 cent over Nebraska from 1910 to 1920, and about 1.4 cents over from 1944 to 1954. As a percentage of the price of corn, the differences in the latter period are smaller than the differences in the earlier period; however, the demand for feed grain was very strong during most of the 1944 to 1954 period. A large part of the spatial difference in prices can be accounted for by transportation charges. When farm prices rise, relatively fixed transportation charges account for a smaller percentage of the price of corn.

Oats

Since oats and corn are substitutable feed grains, their prices would be expected to follow the same pattern. But oats did not vary as much as corn in cents per bushel because oats sell for less per bushel (Fig. 10). As a percent of average price, however, the variations for oats were usually as large as or larger than those for corn. The 1938

¹ Shepherd, Geoffrey, and Richards, Allen. Effects of the federal program for corn and other grains on corn prices, feed grains production and livestock production. Iowa Agr. Exp. Sta. Res. Bul. 459. 277 p. 1958.



Differences between U. S. average price and oat prices in seven states, 1936-1957 (Fig. 10)

and 1939 spreads were narrower than those of 1936 and 1937, and the 1948 and 1949 spreads narrowed even more, both periods corresponding with narrowing spreads between state prices for corn. Price spreads widened in 1940 and 1947, and narrowed along with corn in 1953.

The Minnesota price has been fairly consistent at about 5 cents under the national average. Average prices in Ohio, Illinois, and Indiana declined with relation to the national average from about 1944 to 1955, and increased for the following two years. The high Nebraska price in 1955 and 1956 appears to have been due to short crops in that state and in South Dakota.

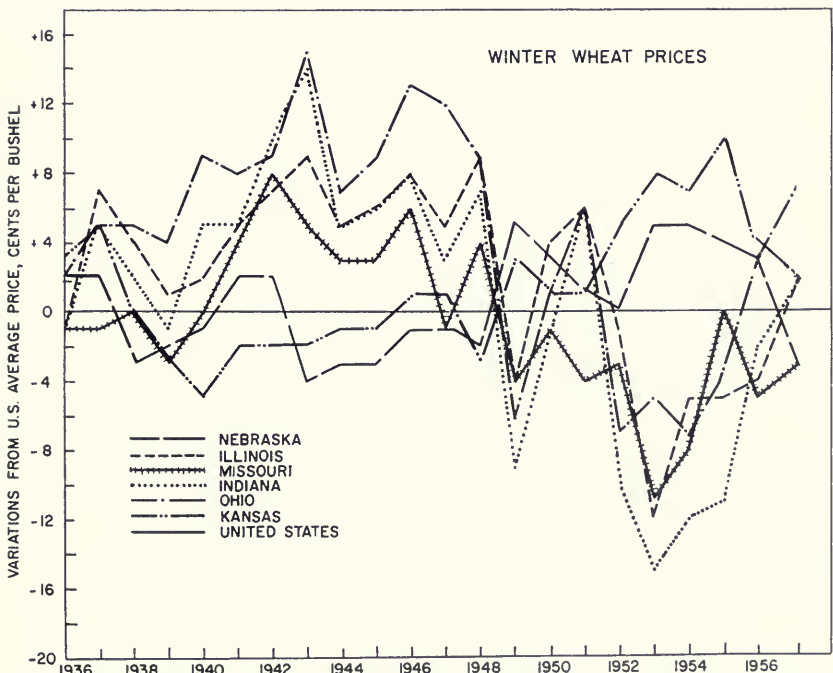
The total spread between the highest and lowest prices of the seven states has varied considerably during the 21-year period. The spread started out at about 10 cents, widened to 17 cents in the immediate postwar period, narrowed again to about 10 cents in 1953, and was 12 cents in 1956, and 15 cents in 1957. There is no evidence of any permanent widening of the spread between states in the North Central Region.

Winter Wheat

Fig. 11 shows prices for six states — Ohio, Indiana, Illinois, Missouri, Kansas, and Nebraska. The most apparent trend here is the reversal of the prewar and wartime pattern since 1952. Kansas and Nebraska prices went above those in the other four states. Indiana,

Ohio, and Illinois prices, which were usually above Kansas, Nebraska, and Missouri prices from 1936 to 1948, went below them. The 1952 date coincides with the beginning of the large postwar surpluses of wheat. Ohio, Illinois, and Indiana grow primarily soft wheat, and soft-wheat growers have had less tendency to take advantage of loan guarantees than western wheat growers.

Other factors may have contributed to the lower prices east of the Mississippi. Soft-wheat production increased rapidly in the early 1950's, while production in the plains states was cut back by acreage allotments without the compensating increases in yields characteristic of states east of the Mississippi. Price spreads between the areas narrowed in 1955 and 1956. In 1957, Ohio prices went above those of Kansas and Nebraska, and Illinois and Indiana had prices as high as Kansas and higher than Nebraska. Some of the factors that contributed to the soft-wheat price decline helped strengthen relative prices again. Soft-wheat production decreased in 1956 and 1957 until it approached domestic demand, while the hard winter wheat grown in Kansas and Nebraska continued to build up surpluses in storage.



Differences between U. S. average price and winter wheat prices in six states, 1936-1957 (Fig. 11)

Soybeans

About 80 percent of the total soybean crop in the United States is grown in Ohio, Indiana, Illinois, Missouri, Iowa, and Minnesota (Fig. 12), with 25 to 30 percent grown in Illinois alone. Soybean prices are affected by both location and oil content. Minnesota soybeans characteristically contain about one less pound of oil per bushel than Illinois soybeans.

Soybean prices in Illinois averaged highest of the six states in six of the 12 years from 1946 to 1957. Because of the large volume of Illinois soybeans, Illinois prices had the most stable relation to the United States average price. Ohio and Indiana were usually within 6 cents of Illinois. Iowa soybean prices for the 12 years probably average as high as Illinois, but the Iowa prices showed more variation (from 19 cents above to 6 cents below the United States average) than Illinois. Minnesota was lowest in six years and Missouri in five years of the 12-year period.

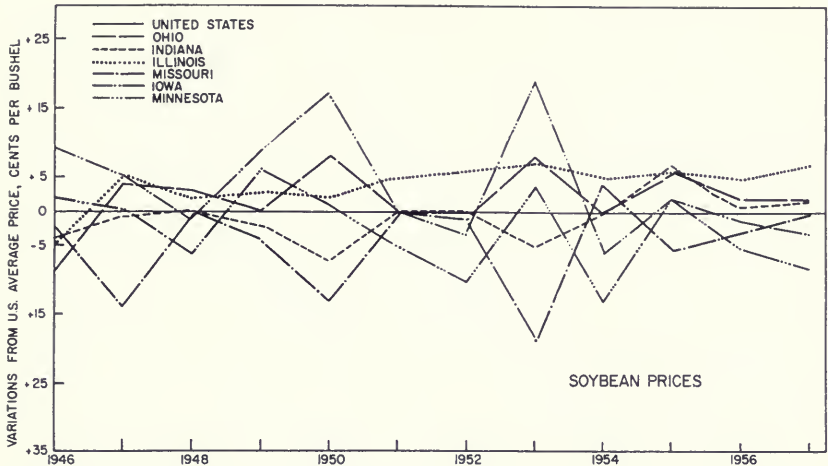
No readily identifiable changes in price relationships among the six states have taken place since 1946. Soybean prices for the three states east of the Mississippi have been about $3\frac{1}{2}$ percent higher than prices for the three states west of the Mississippi for the past three years.

PRICE CHANGES AMONG MAJOR MARKETS

Corn

Agricultural Statistics carries an annual calendar-year series on No. 3 corn prices at Chicago, Kansas City, Minneapolis, Omaha, and St. Louis, and on No. 2 corn prices at San Francisco (Figs. 13 and 14). Prices at the midwest markets have maintained a fairly small differential despite rising transportation costs, except that Minneapolis differentials have gone from 3 to 4 cents under Chicago in the 1930's to 9 to 10 cents under since 1947 (Fig. 14). The San Francisco differential rose gradually from about 25 cents above Chicago in 1937 to 60 cents above in 1955. In 1957, probably as a result of large western field crops, San Francisco corn prices approached Chicago prices for the first time since 1945. This differential appears to be tied to transportation in most years. It tends to rise as a percent of the Chicago price when prices are low, and to fall when prices rise.

The differential between San Francisco and Chicago tends to be higher when corn crops are short in the western corn belt, as they were in 1955. This trend lends support to the argument that the differential

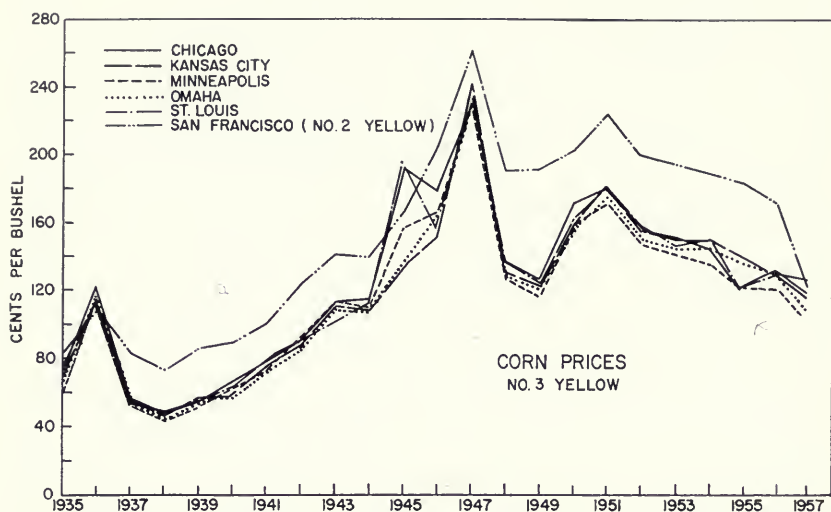


Differences between U. S. average price and soybean prices in six states, 1946-1957 (Fig. 12)

is closely related to transportation costs. In 1957, freight rates on corn from Kansas and Nebraska to San Francisco were about 70 cents a bushel. Rates from Iowa and Minnesota were about 75 cents, and from Illinois, about 85 cents. Rates have been increasing rapidly since 1945. In 1956, the rates from Kansas and Nebraska were approximately 31 cents over their 1946 level, closely approximating the increase in price differential between Chicago and San Francisco between 1946 and 1955.

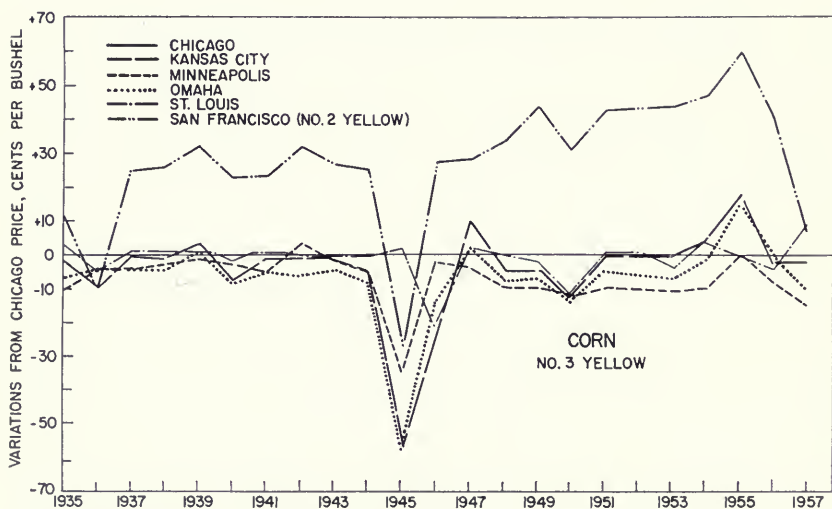
Grain Market News has a shorter series, dating from 1945-1946, based on crop-year data from Chicago, St. Louis, Kansas City, Omaha, Minneapolis, and Toledo (Fig. 15). St. Louis and Chicago prices are usually within 2 cents of each other, and the other terminals are under Chicago and St. Louis in most years. Minneapolis and Omaha are usually 8 to 10 cents under Chicago, and Kansas City and Toledo are usually 3 to 6 cents under. From 1950 to 1954, prices in Kansas City, St. Louis, and Omaha gained in relation to Chicago and Toledo, apparently as the result of short crops in the western corn belt. In 1956, with normal corn crops in the western corn belt, prices began to return to their usual relation to Chicago. Buffalo and Fort Worth prices, as reported in the *Wall Street Journal*, averaged 15 to 20 cents above Chicago for several years prior to 1958.

The spread between the markets (except Buffalo and Fort Worth) on a crop-year basis has been within the 10- to 15-cent range in most



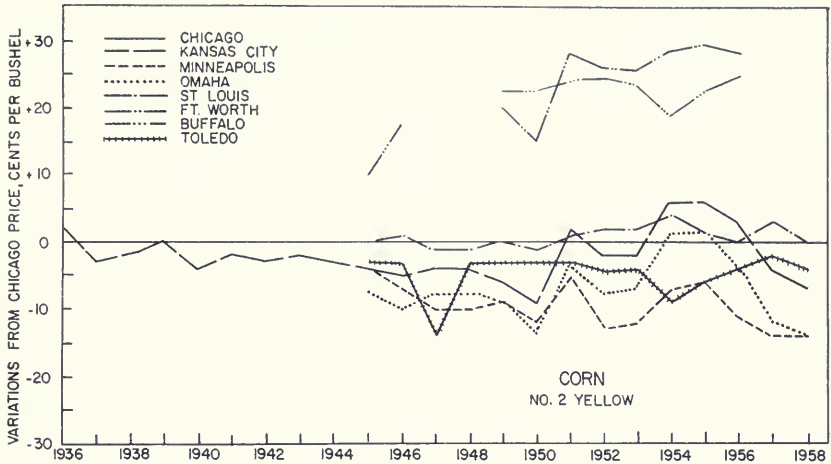
No. 3 yellow corn prices at six markets, 1935-1957

(Fig. 13)



Differences between Chicago price and No. 3 yellow corn prices at five markets, 1935-1957

(Fig. 14)



Differences between Chicago price and No. 2 yellow corn prices at seven markets, 1936-1958 (Fig. 15)

years since 1945. In three of the 14 years, the spread was less than 10 cents, and in one year it was more than 15 cents. The spread between the highest and lowest market averaged 10.4 cents for the five years 1945-1949, and 14.1 cents for the five years 1954-1958. Minneapolis was 17 cents below St. Louis in 1957, and 14 cents below Chicago and St. Louis in 1958. The rail proportional between Chicago and Minneapolis increased between 7 and 8 cents a bushel from 1946 to 1956; so the spread in corn prices has increased somewhat less than the change in freight rates.

Oats

Grain Market News carries a crop-year series on oat prices for Chicago, Kansas City, Portland, and Minneapolis, beginning with the 1945 crop (Fig. 16). During this 14-year period, Portland prices ranged from 2 to 24 cents above Chicago. During 10 of the 14 years, the difference was 10 cents or more. Kansas City prices were above Chicago in nine years, below in four years, and the same in one year. The greatest difference was 7 cents. In nine of the years, prices were within 3 cents of each other at Chicago and Kansas City.

Minneapolis prices were above Chicago in only one year, 1947, and have shown a downward trend in relation to Chicago since 1947.

St. Louis prices are usually 1 or 2 cents above the Chicago price. Buffalo prices, as reported in the *Wall Street Journal*, averaged about 15 cents above Chicago during the 1949-1957 period.

Chicago apparently has been a good market for oats in the postwar period. Since 1947, the Chicago price has gained rather consistently in relation to Kansas City, Portland, Minneapolis, and Toledo. In contrast, the Chicago price for corn declined in relation to other western corn-belt markets from 1950 to 1954. The behavior in corn and oat prices at the major markets indicates that oat prices behave somewhat independently of corn prices despite the substitutability of the two crops as feed grains.

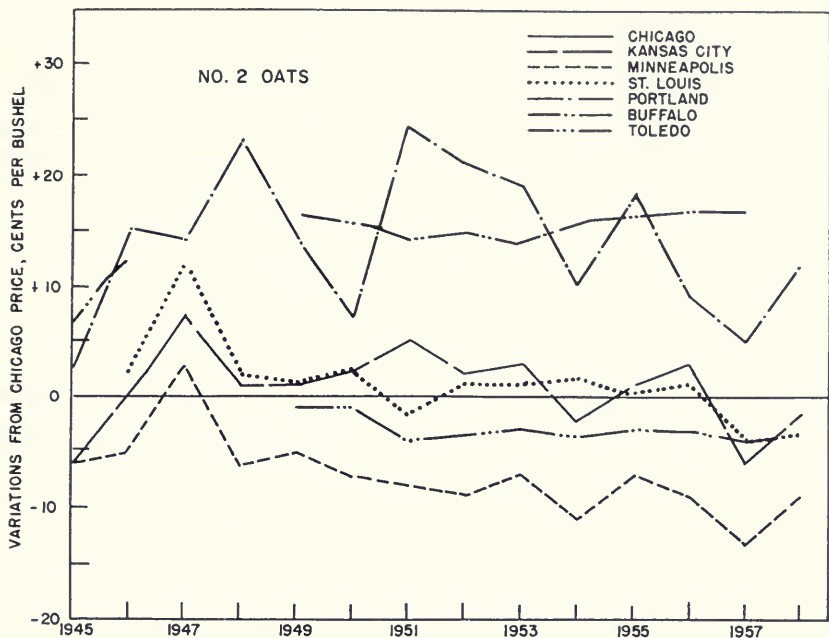
Wheat

Agricultural Statistics carries a long-term series for Portland, Oregon (No. 1 soft white), Minneapolis (No. 1 dark northern spring and No. 2 hard amber durum), St. Louis (No. 2 red winter), Kansas City (No. 2 hard winter), Chicago (No. 2 hard winter), and New York (No. 2 hard winter).

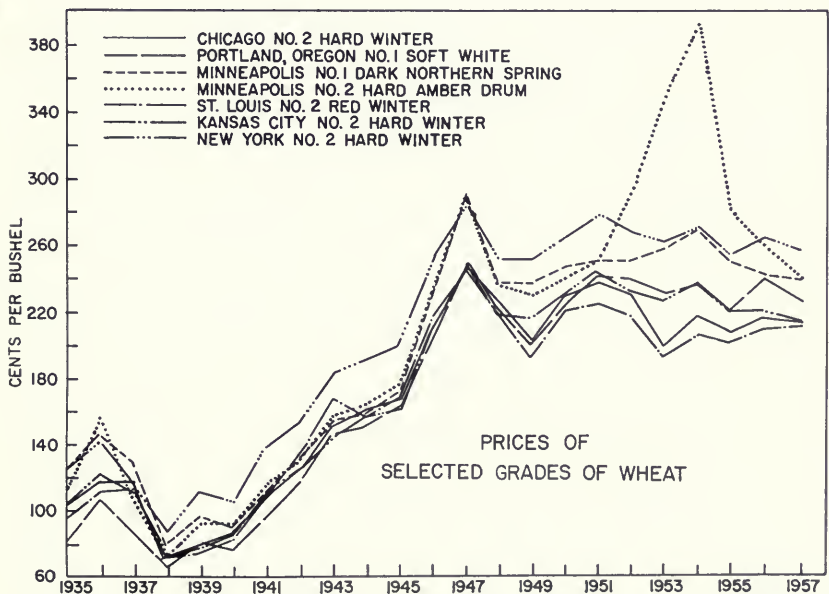
The widest spread for the 1935-1939 period, 35 cents, was between Portland and New York. The spread between St. Louis and New York for the 1953-1957 period was 57 cents, wider than any other spread except for Minneapolis durum, a considerably different type of wheat (Fig. 17).

During the 20-year period, Chicago and St. Louis wheat prices declined in relation to Minneapolis, New York, and Portland, Oregon. Most of this change occurred after 1946. St. Louis prices were most affected, probably because of the weakness in soft wheat demand and the generally small percentage of soft wheat placed in the loan. The Chicago quotation is for hard wheat, although much of the territory near Chicago does not produce good-quality hard wheat. The Chicago price probably reflects the increasing amount of Illinois hard wheat that was offered in the early 1950's.

New York prices were above those in Chicago in all years except 1937. Exports were small that year, and evidently New York was on an importing rather than an exporting basis for at least part of the year. For the other four years, 1935, 1936, 1938, and 1939, New York prices averaged 24.5 cents higher than Chicago prices. For the five years 1951-1955, the spread averaged 47.8 cents, about double the earlier period. The spread between Chicago and New York should be largely the transportation cost between these two markets, and rail rates approximately doubled between the two periods. The spread between the highest and lowest reported markets (except durum) as a percent of the low price is usually less than it was 25 years ago, despite a considerably wider absolute spread.

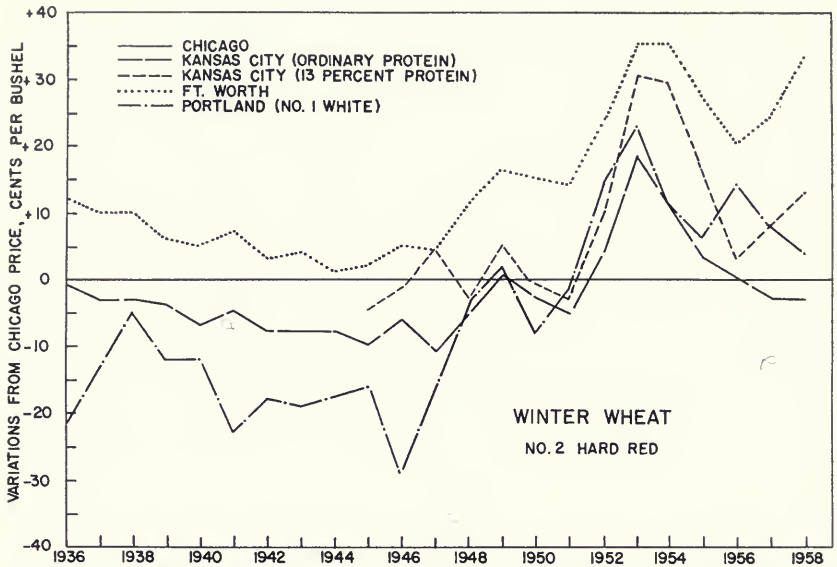


Differences between Chicago price and No. 2 oat prices at six markets, 1945-1958 (Fig. 16)



Prices for selected grades of wheat at six markets, 1935-1957

(Fig. 17)



Differences between Chicago price and winter wheat prices at three markets, 1936-1958 (Fig. 18)

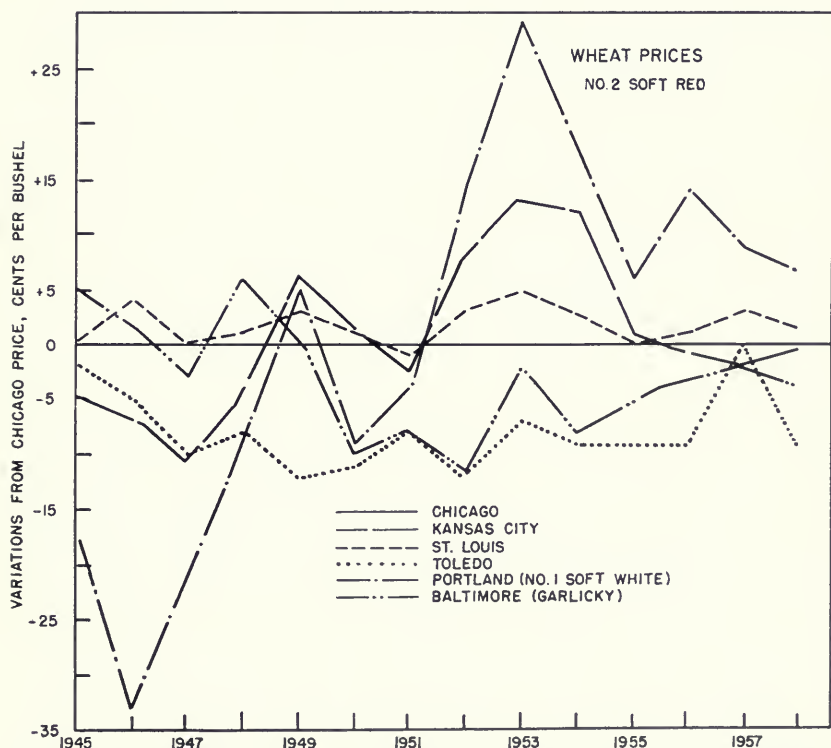
The amount of export subsidy paid at Gulf, Atlantic, and Pacific ports affects the price relationships between markets. Since these differentials are set administratively, they need not strictly conform with economic considerations. They may be set to relieve overloaded storage conditions or have other non-economic purposes. The payment-in-kind program instituted in the late 1950's for exports was an attempt to restore market-price forces to exporting.

In Fig. 18, the prices of No. 1 white wheat at Portland, Oregon, and No. 2 hard red winter wheat at Fort Worth and Kansas City (ordinary protein content and 13 percent protein) are compared with Chicago prices. During the 22-year period, price differentials were very unstable. Chicago prices tended to lose in relation to other markets from 1945 to 1953, and to regain some of this lost ground after 1953.

In Fig. 19, the prices of No. 2 soft red winter wheat at Chicago, Kansas City, St. Louis, and Toledo, and No. 1 soft white at Portland are compared for the period 1945-1958. The prices are averages of daily closing prices as reported by the *Grain Market News*. Portland No. 1 white went from 33 cents under the Chicago red winter price in 1947 to 29 cents over in 1953, and stayed substantially over from 1954

to 1957. St. Louis, the principal soft red winter wheat market, was one cent below Chicago in 1951; but in all other years St. Louis prices ranged from equal to Chicago prices to 5 cents above them. Toledo averaged about 10 cents below Chicago. Kansas City is not a very large soft wheat market, and its prices ranged from 11 cents under Chicago in 1947 to 13 cents over in 1953. Baltimore prices quoted in *Grain Market News* were under Chicago prices in most years. Apparently these Baltimore prices were for garlicky wheat rather than for export soft red winter wheat, since North Central wheat at Baltimore should carry a transportation differential over Chicago and St. Louis prices. In some years the price was no higher in Baltimore than in Toledo.

Although Chicago and St. Louis soft red winter wheat prices declined in relation to hard winter markets, they did not change much in relation to Toledo and Baltimore soft wheat prices. Chicago and St. Louis did lose in relation to Kansas City and Portland No. 1 white.



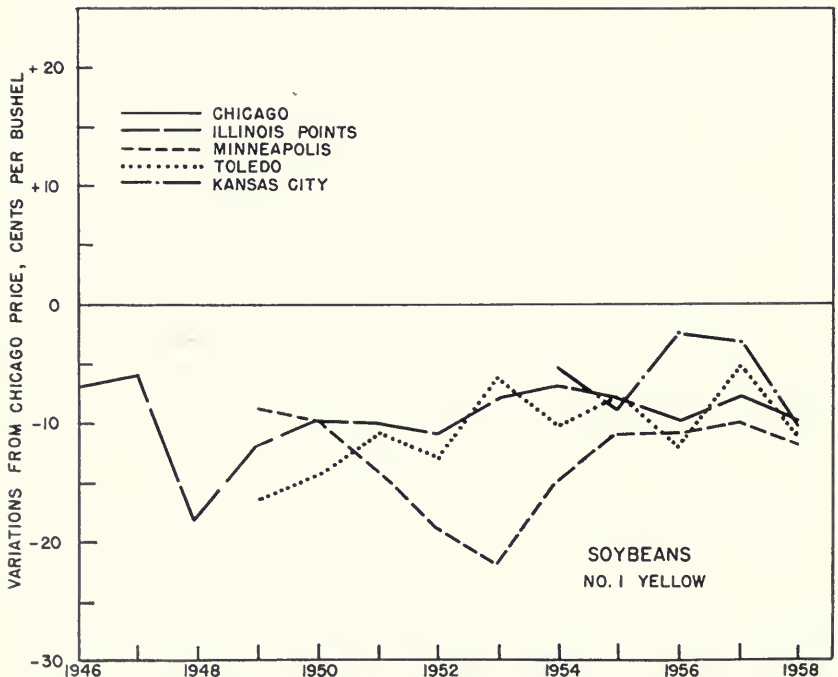
Differences between Chicago price and soft wheat prices at five markets, 1945-1958 (Fig. 19)

Soybeans

Grain Market News carries a short series including prices at Chicago, Illinois points (track country station in central Illinois), Minneapolis, and Toledo. Chicago prices were above those of other markets in all years (Fig. 20). Chicago's location near the center of soybean consumption and the high quality of Illinois soybeans account for most or all of the differences between Chicago and the other markets.

There is little evidence of any trends in price pattern except that the Toledo differential appears to have narrowed from 16 cents below Chicago in 1949 to about 10 cents below in 1958.

The production and processing of soybeans are concentrated in the central corn belt. Products are shipped in all directions from the central production area and priced basis Decatur. Under these conditions, it seems reasonable to assume that freight-rate increases will not affect any one of the markets differentially, except perhaps Toledo. A large volume of soybean meal and soybean oil moves east, and Toledo's position appears to have improved because of its nearness to eastern markets and the smaller freight-rate increases into these markets.



Differences between Chicago price and No. 1 yellow soybean prices at three markets, 1946-1958 (Fig. 20)

SUMMARY

Soybeans, wheat, and corn increased more in price from 1937-1939 to 1956-1958 than sorghum, oats, and barley.

From the late 1930's to the 1950's, corn and soybean production increased more rapidly than oat and barley production. This trend would be expected from the favorable price relationships of corn and soybeans. Wheat production increased less and sorghum production more than would be expected from their price relationships. Barley has increased rapidly since 1953. These reactions of wheat, sorghum, and barley appear to be tied to acreage restrictions for wheat and cotton.

From 1946 to 1956, corn prices increased in the Western Region and decreased in the South Atlantic and South Central regions relative to the United States average. In 1957, corn prices in the Western Region lost much of their former advantage.

Winter wheat prices in the Western and South Central regions in 1957 were somewhat higher in relation to the average United States price than in 1946.

Relatively few soybeans were grown outside the North Central Region in 1946, and these were largely sold and used for seed in cotton-growing areas at prices above those in the north central states. Since 1946, soybean production has expanded rapidly in the southern and southeastern states, and prices have declined in relation to those in the North Central Region.

No long-term trends in price patterns could be observed among states in the North Central Region. Kansas and Nebraska wheat prices were somewhat higher in relation to Indiana, Ohio, and Illinois prices in 1955 than in 1945. In 1956 and 1957, however, Kansas and Nebraska prices dropped drastically, while Indiana, Ohio, and Illinois prices recovered.

The North Central Region apparently acts as a huge pool for surplus corn, oats, and soybeans, which flow out to deficit areas as needed. Larger-than-average crops in a deficit region or drouth in part of the North Central Region (the western corn belt in the early 1950's) alters the price pattern for the year or years involved, but leaves the long-term relations unchanged. For example, corn differentials between Ohio, Nebraska, and Iowa show little change over the past 45 years.

The spread in corn prices among states in the North Central Region tended to be narrower in years of large supplies and slow demand than in years of short supplies and brisk demand. Oat-price spreads roughly approximate those for corn. No long-term trends could be observed in oat-price patterns among the north central states.

Most of the major grain markets for which grain-price series are available are in the North Central Region. Although annual average prices by markets reflect year-to-year differences in available supplies, the concept of a huge pool of surplus grain also applies to the markets in the North Central Region. In spite of the increases in transportation costs, there has been long-run stability in the price relations among markets in the region.

Increasing rail-freight rates apparently have caused an increase in the difference between the price of corn at Chicago and at San Francisco, although recent production increases on the Pacific Coast may make shipments of corn from the North Central Region to San Francisco unnecessary in certain years. Since 1945, the difference in the price of wheat at Chicago and at New York has shown a long-term upward trend about in line with rail freight-rate increases.

Other significant trends in the price patterns for major markets have been as follows: Chicago and St. Louis wheat prices, based largely on soft wheat, have declined in relation to Portland, Oregon, and predominantly hard wheat markets; Chicago oat prices have been strong in relation to other reported oat markets since 1947; Minneapolis corn prices have been below Chicago prices since 1946, but not as low as the freight-rate increase between the two markets might lead one to expect; and Toledo soybean prices have increased with respect to other reported soybean markets.

CONCLUSIONS

Although some gradual changes occur, grain prices move in line with the general price level. The increased demand for protein and decreased demand for oats have caused soybean prices to rise somewhat more and oat prices somewhat less than the average for all grains. Largely as a result of this situation, soybean production has increased rapidly since 1945, while oat production has remained about the same.

Wheat production has increased less and sorghum and barley production have increased more than the price relationships of these crops since the 1930's would lead one to expect. Acreage restrictions on wheat and cotton force farmers to plant other crops, even though the prices of these crops may be less favorable than those of the restricted crops. It seems likely that wheat production would increase at the expense of sorghum and barley production if wheat-acreage restrictions were relaxed or removed without substantially reducing wheat-support prices at the same time.

The North Central Region bulks so large in the production of all four of the principal grain crops that other regions must be discussed

in relation to it. Corn prices rose in the Western Region until 1955, apparently as a result of higher transportation costs and increasing demand. The demand is not yet strong enough, however, to have much effect on prices in the western corn belt. Domestic production in the western corn belt rose so rapidly in 1956 and 1957 that prices appear to have been forced down to the point where only a small amount of corn could move in from other regions.

On the other hand, livestock production in the southern United States has not increased enough to offset higher feed production in the southwest and cheap water-transportation advantages in the southeast. Since 1946, corn prices in the southern United States have declined in relation to those in the North Central Region. This situation points up the need for reducing transportation costs from the North Central Region to other parts of the country.

Western and South Central wheat prices were somewhat higher in relation to the United States average in 1957 than in 1946, possibly because of the differential effectiveness of price-support operations. East of the Mississippi, most of the wheat is produced by small-scale growers of soft wheat, many of whom found wheat profitable enough to plant their non-allotment 15-acre quotas. Ordinarily, wheat prices in the eastern corn belt were close to loan values. As a result, most of the wheat grown on allotment as well as non-allotment acreage was sold on the open market. This same reasoning applies to the relatively higher wheat prices in 1956 in Kansas and Nebraska as compared with Illinois, Indiana, and Ohio within the North Central Region.

The price position of the major markets in the North Central Region does not appear to have been seriously affected by the freight-rate increases of the past 10 years, although some instances of widening differences had appeared by 1957. Further percentage-increases in rail rates, coupled with the generally declining level of grain prices, would magnify the differences between markets. Here, as in regional competition, major breakthroughs in transportation would be extremely valuable. Prices of grain have been going down since 1947, while freight rates increased until 1957. Thus, transportation costs represented a much larger percentage of the price to grain users and consumers in 1957 than in 1947.

When transportation is a large share of the total cost of a commodity, consumers seek nearby sources of supply, thus making distant markets less accessible to producers. The North Central Region is the nation's surplus grain-production region, and major breakthroughs lowering the cost of transportation as a percent of the cost of grain to buyers would be of great benefit to the region's grain producers.



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