

**THE CO-OPERATIVE  
MARKETING OF  
LIVESTOCK**

**THE INSTITUTE OF ECONOMICS  
OF  
THE BROOKINGS INSTITUTION**

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**THE CO-OPERATIVE  
MARKETING OF  
LIVESTOCK**

*by*

**EDWIN G. NOURSE**

*and*

**JOSEPH G. KNAPP**

**WASHINGTON, D. C.  
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In 1927 the Institute of Economics brought out a study of *The Legal Status of Agricultural Co-operation*. The closing sentences of that book ran as follows:

The present volume has attempted nothing beyond showing the evolving nature of co-operation as a modern economic institution. How this institution is actually being applied in particular branches of our agricultural industry—cotton, grain, tobacco, livestock, milk, or other—constitutes another, a larger, and an indefinitely continuing field of study.

*The Co-operative Marketing of Livestock* is the first contribution of the Institute in this latter field.

The origins of the book run back more than a decade to the time when the senior author was intimately engaged in co-operative marketing activities in various land grant colleges in the Middle West. The actual preparation of the manuscript has been going on for more than three years. Its publication was delayed awaiting developments under the Agricultural Marketing Act of 1929.

It is, of course, difficult to select any particular time for going to press with the discussion of a movement so dynamic as is co-operative marketing today. However, the broad outlines of Farm Board influence have now been revealed, the actual structure of a national system has been set up, and the issues which will confront the movement in the future are fairly well defined. The present moment therefore seems an opportune time for presenting the results of our study.

It is our hope that this volume not only will be found to have real educational value in the field of livestock



marketing but also will possess fundamental significance for all students of the co-operative form of economic organization.

The members of the staff who co-operated with the authors in the preparation of this volume were Leverett S. Lyon and Lynn R. Edminster.

EDWIN G. NOURSE  
*Director*

Institute of Economics  
April, 1931

## AUTHORS' ACKNOWLEDGMENTS

The authors are indebted to a large number of persons officially connected with co-operative livestock marketing organizations or with government agencies and educational institutions for supplying the data upon which this book is based. Besides the credit given in numerous footnote references, we wish here to express our gratitude for their generous assistance.

During the progress of the work we have derived great benefit from having the manuscript read by persons actively participating in or intimately informed concerning co-operative livestock marketing agencies in various sections of the country. Criticisms and suggestions covering all or part of the manuscript have been received from the following: C. G. Randell, chief, Livestock and Wool Section, Division of Co-operative Marketing, Federal Farm Board; C. L. Harlan, principal statistician, Division of Crop and Livestock Estimates, Bureau of Agricultural Economics, United States Department of Agriculture; Charles A. Ewing, president, National Livestock Marketing Association; H. H. Parke, treasurer, National Livestock Marketing Association; P. O. Wilson, secretary and general manager, National Livestock Marketing Association; Charles A. Stewart, manager, Feeder and Finance Corporation, National Livestock Marketing Association; J. S. Montgomery, general manager, Farmers' Livestock Marketing Association; D. B. Rumble, counsel, Farmers' Livestock Marketing Association; D. L. Swanson, manager, Chicago Producers Commission Association; Earl Elijah, president, Iowa Livestock Marketing Corporation; Knute Espe, secretary, Iowa Co-operative Livestock Shippers; Ray E. Miller,

director, Livestock Marketing Department, Illinois Agricultural Association; J. R. Allgyer, secretary, Ohio Livestock Co-operative Association; F. G. Ketner, general manager, National Order Buying Company; Chris L. Christensen, dean, College of Agriculture, University of Wisconsin, and formerly secretary of the Federal Farm Board; Paul L. Miller, professor of marketing, Iowa State College; Frank Robotka, marketing economist, Iowa Agricultural Experiment Station; S. H. Thompson, extension specialist, Iowa State College; George F. Henning, professor of marketing, Ohio State University; C. W. Hammans, extension specialist, Ohio State University.

The sound counsel and broad experience of these men have strengthened the book in innumerable ways. Although they were not in a position to correct all its shortcomings, they have saved the authors from many misstatements of fact or errors of interpretation into which they otherwise would have fallen. None of them, however, is to be held accountable in any way for the views expressed or the conclusions stated in the final draft of the volume.

EDWIN G. NOURSE

JOSEPH G. KNAPP

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## **APPENDICES**

## APPENDIX A

### HOG PRICE DIFFERENTIALS<sup>1</sup> BETWEEN PRINCIPAL TERMINAL MARKETS<sup>1</sup>

When we observe the general movement of hog prices over a considerable period, we find that their behavior is quite similar at all public markets. That is, the major trends, cycles, and seasonal variations in price between markets are much the same. Yet, a careful examination of the data shows that these price relationships are subject to considerable variation. A study of day-to-day and week-to-week price quotations at the different markets reveals striking dissimilarities. The purpose here is to examine carefully the yearly, seasonal (monthly), weekly, and daily behavior of hog prices with reference to the differentials that obtain between a few of the principal terminal markets in order to get a better picture of what is actually taking place.

The price quotations used are those supplied by the Division of Livestock, Meats, and Wool of the Bureau of Agricultural Economics of the United States Department of Agriculture. These quotations are gathered and prepared on a uniform basis at the different markets and are the most comparable hog price data available. Since the original quotations are given as a range from the lowest to the highest in the grade, it is necessary to convert the range to a single value in order to be able to subject them to statistical manipulation. The mid-point of the range is taken as being the most representative. The study is based upon the price differentials of medium weight (200-250 pounds, medium to choice) grade of hogs. The markets used are Chicago, Kansas City, Omaha, East St. Louis, and

<sup>1</sup> This appendix was prepared by Knute Bjorka.

South St. Paul. Analysis of yearly differentials embraces the period 1921-1929, while monthly, weekly, and daily differentials cover the period 1923-1929 inclusive.

By "price differential" is meant the difference in price per hundredweight of the same grade of hogs between two markets during a given period. The differentials given in this study have been obtained by designating one market as a base and measuring the difference in price at the other markets from it. Since the Chicago market is generally considered to be the one which the other markets follow, it has been used as a base. In order to get some measure of the validity of this belief, however, the study has been continued by taking the Kansas City market as a base and measuring differentials from it.

Price differentials between two markets remain the same from one period to another when the price at each point (1) remains unchanged, or (2) changes an equal amount in the same direction. Price differentials change (1) when the price at one market remains constant while the other changes, (2) when the price at both markets changes in the same direction but in different amounts, and (3) when the price at one market rises and the other falls. These different characteristics of price behavior at two given markets are all common.

#### I. YEAR-TO-YEAR DIFFERENTIALS

That the price relationship of hogs at the various markets tends to be fairly constant over a period of time, being governed by costs of moving the stock from one market to another (particularly from markets in the producing areas to markets in the consuming regions), is an idea quite generally held. The supposition is, therefore, that changes in the cost of transportation between markets, or changes in the relative costs of handling livestock at the different markets, are responsible for changing differentials. Since these

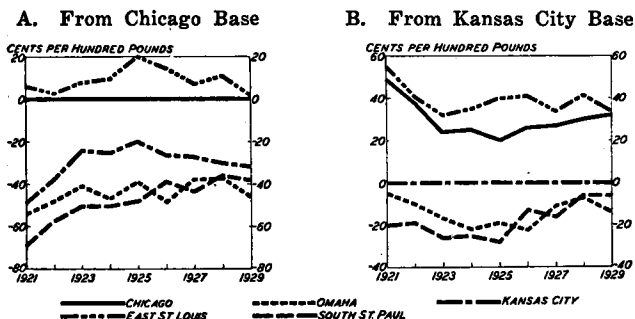


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costs change infrequently, it is assumed that market differentials remain uniform over long periods. We are interested to see whether this assumption is borne out by the data.

The yearly average hog price differentials at Kansas City, Omaha, East St. Louis, and South St. Paul measured from Chicago for the period 1921-1929 inclusive are shown in Chart 1-A on this page. It will be noticed that the price of hogs at the other markets improved

1. ANNUAL AVERAGE HOG PRICE DIFFERENTIALS AT SELECTED TERMINAL MARKETS, 1921-1929



relatively to the price at Chicago from 1921 to 1925, although the change at the different markets was not uniform. The price at Kansas City was 49 cents per hundredweight below Chicago in 1921 and narrowed to only 20 cents below in 1925. The differential at Omaha measured from Chicago was reduced from 54 cents in 1921 to 39 cents in 1925; and the South St. Paul differential changed from 69 cents to 48 cents during this time. The price at East St. Louis rose from 6 cents above Chicago in 1921 to 20 cents above in 1925.

The movement of differentials from 1925 to 1929 inclusive showed greater variation. Kansas City and East St. Louis had become relatively less favorable during the period. The Kansas City price of 20 cents

below Chicago in 1925 changed to 32 cents below in 1929. At East St. Louis the price of 20 cents above Chicago in 1925 was reduced to 2 cents above in 1929. The differential at Omaha, although varying from year to year, remained about the same during the period. In fact, the annual differential at Omaha has been fairly constant since 1923. The price at South St. Paul, on the other hand, has improved since 1925, as well as from 1921 to 1925. This improvement distinguishes South St. Paul from all the other markets used in the study.

The differentials at the other markets with reference to Kansas City for the period 1921-1929 inclusive are shown in Chart 1-B, page 371. The differential at Chicago measured from Kansas City was of course the same as at Kansas City measured from Chicago, except that the direction of the line was reversed. Omaha was 5 cents below Kansas City in 1921 and the differential steadily widened to 22 cents below in 1924. In 1925 it averaged 19 cents, and in 1926 it was again 22 cents below. The differential narrowed in 1927 and 1928 to 7 cents below in the latter year. For 1929 the differential at Omaha increased to 14 cents below Kansas City. The price at East St. Louis was 55 cents above Kansas City in 1921 and decreased to 32 cents in 1923. This differential has been irregular since, although it has shown a slight net improvement over Kansas City. At South St. Paul the differential of 20 cents below Kansas City in 1921 increased, though irregularly, to 28 cents in 1925. Since 1925 it has narrowed rather consistently to 6 cents below Kansas City for 1928 and 1929.

The data on yearly differentials as a whole offer little to substantiate the idea that Chicago sets the price and that other markets follow. Neither do they indicate that the five principal markets move together, establishing a consistent system of prices which could be counted on by minor markets in their several vicinities.

As to Chicago's position relative to other markets, it will be noted that the differentials of Kansas City, South St. Paul, and Omaha below Chicago rather steadily narrowed, and the differential of East St. Louis above Chicago widened during the period 1921-1925 inclusive. Stated from the opposite point of view, this would mean that Chicago prices became relatively less favorable during this five-year period. From 1925 to 1929 the East St. Louis differential above Chicago declined, that of Kansas City below Chicago increased slightly, that of Omaha averaged about the same, and that of South St. Paul below Chicago decreased about 10 cents. This would seem to indicate a partial recovery of Chicago's relative position.

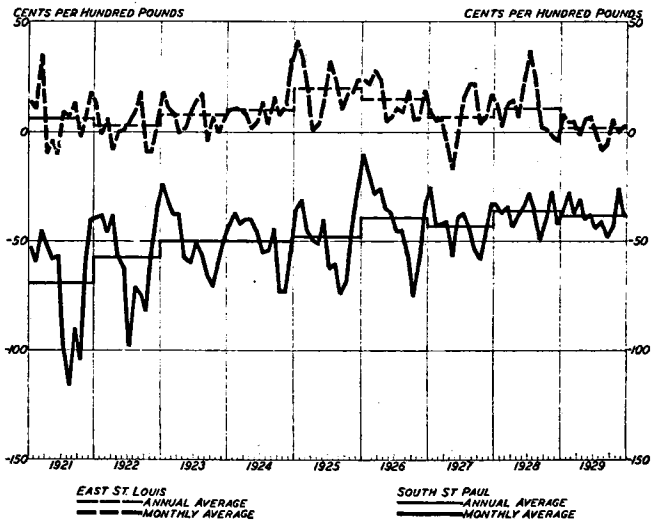
While Chicago was making this decline and partial recovery, the differential position of South St. Paul as compared with the other four markets, as shown either by the chart based on Chicago or by the chart based on Kansas City, was quite distinctly improving. The outstanding conclusion, however, appears to be that, even when the erratic day-to-day fluctuations have been largely ironed out through the process of deriving a yearly average figure, the relationships between the several markets still show a high degree of variability and do not indicate that the price bond between them has been established on a permanent basis.

## II. SEASONALITY OF DIFFERENTIALS

In the preceding discussion of yearly average price differentials there was no intention of implying that such yearly averages were maintained with any degree of consistency throughout the year. Any one at all familiar with conditions in livestock markets knows that this is not the case, but that there are rather erratic and often quite extreme changes of a very short-time character and also somewhat typical variations over periods of weeks or months. Such seasonal price changes appear to be based primarily on changes

in marketing costs, such as shrinkage in weight and loss through death or crippling in transit, which tend to increase during periods of hot weather and to be reduced when the temperature moderates. The shrinkage and loss affect markets located in the producing areas and those located at greater distances differently.

2. MONTHLY AVERAGE HOG PRICE DIFFERENTIALS AT EAST ST. LOUIS AND SOUTH ST. PAUL MEASURED FROM CHICAGO, 1921-1929

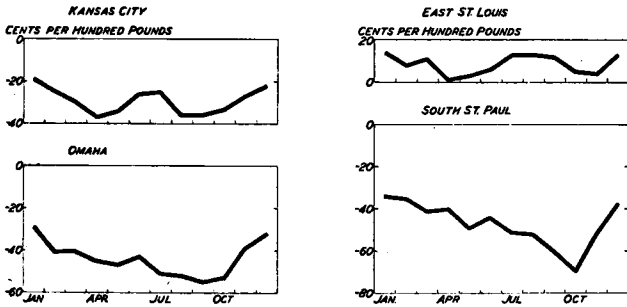


The monthly average hog price differentials at East St. Louis and South St. Paul for the period 1921-1929 measured from Chicago are shown in Chart 2 on this page.<sup>2</sup> A mere glance suggests that East St. Louis is characteristically a less advantageous market in early

<sup>2</sup> To economize space we have presented this material graphically for only two of the markets outside Chicago. Data for the other markets were plotted in the course of the study, and are essentially similar to those for East St. Louis and South St. Paul.

summer and a more advantageous one in midwinter, and that South St. Paul shows similar seasonal differences except that both high and low points fall in a later month. From like data for all five markets for the nine-year period 1921-1929, we have obtained representative seasonal price differential curves for the four other markets with Chicago as a base.<sup>3</sup> These are shown in Chart 3 below.

3. REPRESENTATIVE SEASONAL HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS MEASURED FROM CHICAGO, 1921-1929



The seasonality of behavior of hog price differentials between two markets showed some variation from year to year, but the derived curve tends to be fairly typical of the behavior for individual years. The differential curves for the individual years are more regular in their behavior for the first four and the last three months of the year than for the months intervening.

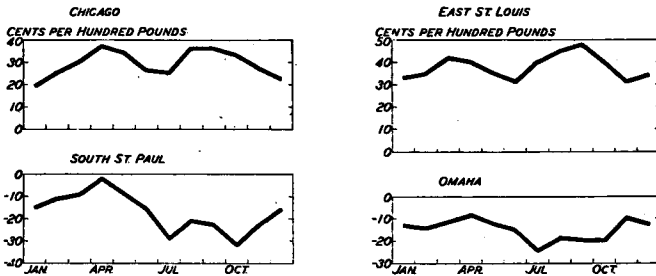
Of these four seasonal curves, those for East St. Louis and Kansas City respectively show the least marked seasonal movement, having an extreme range of 13 cents in the case of St. Louis, with low points

<sup>3</sup> The representative seasonal differential curve between a given market and the base market is obtained by taking the mean of the middle three values for each month when values are arrayed in order of magnitude.

in April and November; and of 18 cents for Kansas City, with low points in April and August-September. The curves for Omaha and South St. Paul, on the other hand, show a fairly steady down trend, amounting to 26 cents from January to September in the former case and to 35 cents from January to October in the latter.

Seasonal curves for the other markets with Kansas City as a base are shown in Chart 4 below. From this point of view, Chicago, Omaha, and East St. Louis

4. REPRESENTATIVE SEASONAL HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS MEASURED FROM KANSAS CITY, 1921-1929



all have two highs, in April and August-September, April and November, and March and September respectively. As compared with Kansas City, South St. Paul has a seasonal high in April and low in October, with a range of 30 cents between them. This compares with a range of 18 cents for Chicago, 16 cents for Omaha, and 17 cents for East St. Louis.

### III. WEEK-TO-WEEK DIFFERENTIALS

The notion is not uncommon that, although hog price differentials between two markets vary rather sharply from day to day, these variations tend to be eliminated in weekly averages. An analysis has been made of weekly differentials in order to test the validity

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of this contention. The period 1923-1929 inclusive has been used for this purpose.

Chart 5 on page 378 gives the weekly average hog price differentials at Kansas City, Omaha, East St. Louis, and South St. Paul measured from Chicago for the years 1923-1929 inclusive. Since the Chicago price is represented by a horizontal base, if the price at the other markets varied uniformly with Chicago, the price differential curves for these markets would parallel Chicago, allowance being made for changes in normal differentials, which would be expected to occur during the year due to seasonal changes in marketing

I. AVERAGE CHANGE IN WEEK-TO-WEEK HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM CHICAGO AND FROM KANSAS CITY, 1923-1929  
(In cents per hundredweight)

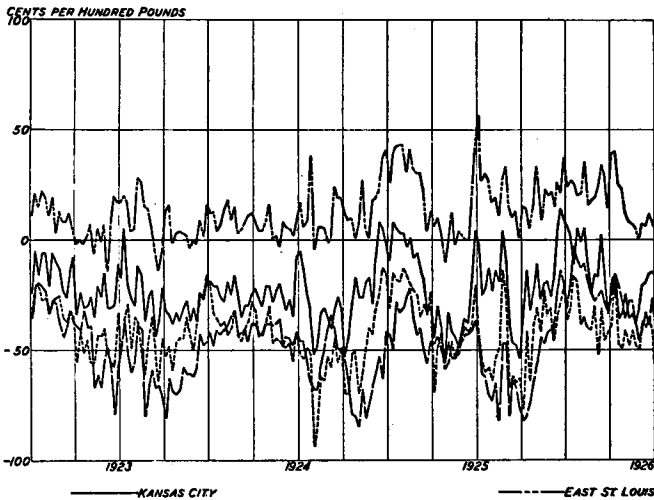
Market	1923	1924	1925	1926	1927	1928	1929	7-Year Average
From Chicago Base:								
Kansas City.....	9.3	7.4	10.0	9.1	7.4	8.1	8.4	8.5
Omaha.....	9.6	7.3	10.9	11.8	7.2	8.3	9.1	9.2
East St. Louis.....	7.5	7.2	9.3	7.3	10.4	8.4	5.6	8.2
South St. Paul.....	8.1	5.6	7.7	8.6	7.2	7.1	9.1	7.6
From Kansas City Base:								
Chicago.....	9.3	7.4	10.0	9.1	7.4	8.1	8.4	8.5
Omaha.....	7.7	7.0	9.0	11.7	7.1	7.5	6.7	8.1
East St. Louis.....	7.9	10.0	7.4	8.3	10.4	7.7	7.3	8.4
South St. Paul.....	8.0	8.6	8.8	10.5	10.5	8.5	9.5	9.2

costs. This, however, is not the case. In fact, for the same differential to prevail for even two successive weeks between the base market and one of the other terminal markets is not very common. Between Kansas City and Chicago the same price differential occurred two successive weeks 16 times during the seven-year period (or on an average slightly more than twice a year); between Omaha and Chicago 14 times; between East St. Louis and Chicago 14 times; and between South St. Paul and Chicago 20 times.

The character of weekly differentials at the other markets when measured from Kansas City instead of Chicago is not very different. Between Omaha and Kansas City the same price differential continued for

two successive weeks 19 times in seven years, between East St. Louis and Kansas City 11 times, and between South St. Paul and Kansas City 9 times. At no time during the period did the same weekly price differential remain for more than two consecutive weeks between any of the terminal markets and the base market.

#### 5. WEEKLY AVERAGE HOG PRICE DIFFERENTIALS AT SPECIFIED



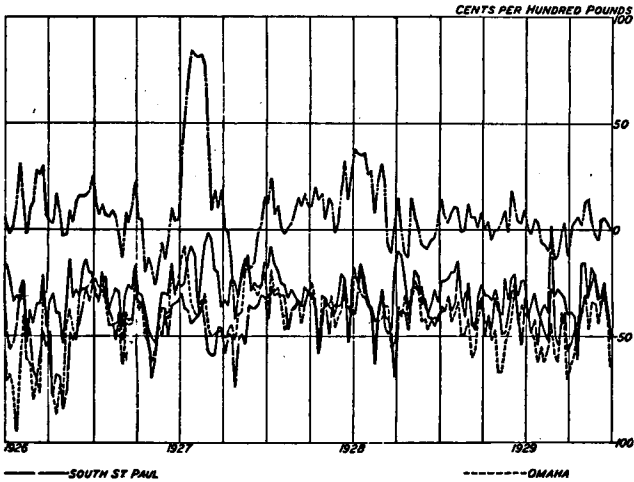
The average change in hog price differentials varied from week to week, as shown in Table I on page 377. The average week-to-week change by years between Kansas City and Chicago ranged from 7.4 cents to 10 cents, with 8.5 cents as an average for the seven years; between Omaha and Chicago from 7.2 cents to 11.8 cents, with 9.2 cents as an average; between East St. Louis and Chicago from 5.6 cents to 10.4 cents, with 8.2 cents as an average; and between South St. Paul and Chicago from 5.6 cents to 9.1 cents, with 7.6 cents as an average.



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Measured from Kansas City the average changes were not very different. It is interesting to note, however, that the average week-to-week change in differentials for all seven years was greater between Omaha and Chicago than between Omaha and Kansas City. It was less between East St. Louis and Chicago than between East St. Louis and Kansas City for 1923, 1924,

TERMINAL MARKETS MEASURED FROM CHICAGO, 1923-1929



1926, and 1929; but the reverse was true for 1925 and 1928. For 1927 the average change was the same between East St. Louis and the two base markets. It was less every year between South St. Paul and Chicago than between South St. Paul and Kansas City, except in 1923, when the reverse was true.

The frequency distribution of week-to-week changes in hog price differentials at terminal markets, for the period 1923-1929 inclusive, measured from Chicago and from Kansas City, is shown in Table II on page 380. Grouping changes into 5-cent classes, we note

that the 0-5 cent class had the greatest frequency of change, the 5-10 cent class the next greatest, and the other classes less frequent changes as the amount of change increased. A change of 15 cents or more occurred 48 times between South St. Paul and Chicago, and 76 times between Omaha and Chicago, or 13 and 21 per cent respectively.

We were also interested in obtaining a measure of the degree of variability of price differentials from the average. The mean weekly differential and the

II. FREQUENCY DISTRIBUTION OF WEEK-TO-WEEK CHANGES IN HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM CHICAGO AND FROM KANSAS CITY FOR THE SEVEN-YEAR PERIOD 1923-1929  
(In cents per hundredweight)

Week-to-Week Change	From Chicago Base				From Kansas City Base			
	Kansas City	Omaha	East St. Louis	South St. Paul	Chicago	Omaha	East St. Louis	South St. Paul
Less than 5 . . .	130	117	141	139	130	131	123	114
5 to 10 . . . . .	103	100	102	117	103	115	122	103
10 to 15 . . . . .	59	71	70	60	59	64	62	77
15 to 20 . . . . .	41	41	29	30	41	31	26	41
20 to 25 . . . . .	20	21	11	9	20	13	22	15
25 to 30 . . . . .	9	6	7	2	9	4	6	9
30 to 35 . . . . .	1	1	2	3	1	5	1	3
35 and over . . .	1	7	2	4	1	1	2	2

average deviation from the mean for each of the markets used in this study, measured from Chicago and from Kansas City for the years 1923-1929 inclusive, are given in Table III on page 381. The dispersion of price differential was affected by both week-to-week and seasonal changes, since the variability was measured from the mean differential for the year. The average deviation was not constant from year to year. Measured from Chicago, it ranged from 8.3 cents to 14.6 cents for Kansas City, from 8.5 cents to 15 cents for Omaha, from 5.3 cents to 21.7 cents for East St. Louis, and from 6.3 cents to 15.2 cents for South St. Paul. The dispersion of differentials measured from the Kansas City base showed an average of from 6.2

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cents to 12.2 cents for Omaha, 6.5 cents to 18.6 cents for East St. Louis, and 8.3 cents to 13.9 cents for South St. Paul.

A comparison of the variability of differentials measured first from Chicago and then from Kansas City should throw some light on the question of how

**III. MEAN WEEKLY HOG PRICE DIFFERENTIALS AND AVERAGE DEVIATION FROM MEAN FOR SPECIFIED TERMINAL MARKETS, MEASURED FROM CHICAGO AND FROM KANSAS CITY, 1923-1929**

**A. From Chicago Base**

Year	Mean Weekly Differentials				Average Deviation			
	Kansas City	Omaha	East St. Louis	South St. Paul	Kansas City	Omaha	East St. Louis	South St. Paul
1923	-24	-41	8	-50	8.6	9.9	7.9	14.0
1924	-25	-47	10	-50	8.5	11.1	7.4	11.0
1925	-30	-39	20	-48	14.6	14.2	12.1	13.0
1926	-26	-48	15	-39	11.5	15.0	9.3	15.2
1927	-27	-38	7	-43	8.3	10.0	21.7	9.0
1928	-30	-37	11	-36	8.5	8.5	10.9	6.3
1929	-22	-46	2	-38	8.5	8.8	5.3	7.8

**B. From Kansas City Base**

Year	Mean Weekly Differentials				Average Deviation			
	Chicago	Omaha	East St. Louis	South St. Paul	Chicago	Omaha	East St. Louis	South St. Paul
1923	24	-17	32	-26	8.6	7.4	6.5	9.6
1924	25	-22	35	-25	8.5	8.3	8.8	13.9
1925	20	-19	40	-28	14.6	10.2	7.0	13.4
1926	26	-22	41	-13	11.5	12.2	10.8	10.9
1927	27	-11	34	-16	8.3	8.9	18.6	11.4
1928	30	-7	41	-6	8.5	6.9	13.3	8.3
1929	32	-14	34	-6	8.5	6.2	6.9	12.1

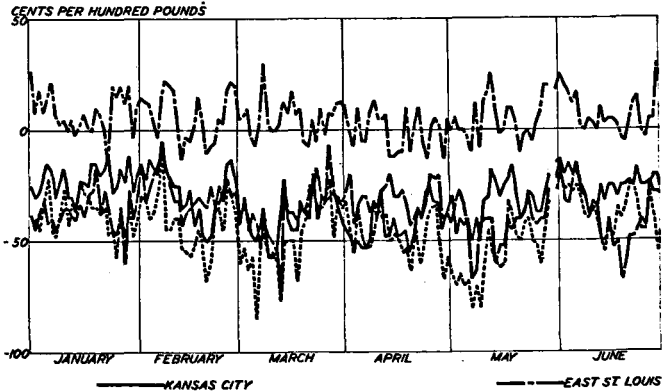
important Chicago is in directing price at the other markets. If prices follow Chicago closely, the variation in week-to-week differentials during the year will be small, being due to seasonal changes. Working from the average deviations given in Table III, however, we find that Omaha weekly differentials varied less from the average differential when measured from Kansas City than when measured from Chicago. Omaha and Kansas City prices moved together more closely than either of them moved with Chicago. This was true for

all seven years. The differential at East St. Louis followed Chicago more closely than Kansas City for 1924, 1926, 1928, and 1929, but the reverse was true for 1923, 1925, and 1927. The average deviations were less for South St. Paul when measured from Chicago for 1924, 1925, 1927, 1928, and 1929, but the reverse was true for 1923 and 1926.

#### IV. DAY-TO-DAY DIFFERENTIALS

Differences in the general price level of one market as compared with another which we have presented as

##### 6. DAILY HOG PRICE DIFFERENTIALS AT SPECIFIED

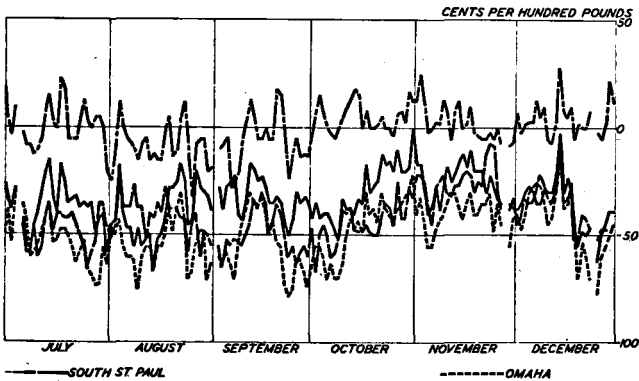


annual average differentials, the minor fluctuations in these differentials discussed as seasonal phenomena, and the greater variation shown by week-to-week change in differentials do not complete the story. Short-time influences such as the volume of receipts, the placing of extraordinarily heavy orders, or the failure of expected orders to materialize may cause the prices at a given market on a particular day to move in a way which has little or no relation to what is happening at other markets.

Local and temporary influences of this sort may be regarded as maladjustments of the market machinery.

While they tend to set forces to work toward restoring equilibrium between the locality affected and other markets, such an adjustment takes time. The flow of stock to market is not freely re-directed to meet the new situation; and delay, although perhaps less marked, is experienced in shifting the demand for the product. During the process of correcting one price discrepancy between markets, other disturbances are likely to occur, and forces to correct these are set in motion. Price relationships have a tendency to gravitate toward a certain point; but they are continually being buffeted

TERMINAL MARKETS MEASURED FROM CHICAGO, 1929



about by various disturbing forces. In order to show the behavior of short-time price relationships at the various principal terminal markets, we shall undertake a detailed study of day-to-day hog price differentials at these points.<sup>4</sup>

*Frequency of change.* Much more often than not the hog price differential between any two primary mar-

<sup>4</sup>The price of hogs may change during the trading period of the day at public markets, but no attempt is made to show such change. The price used represents the mid-point of the range of quotable prices on medium weight (200-250 pounds, medium to choice) grade of hogs for the day.

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kets changes from one day to the next. A general idea of this movement may be secured by examining Chart 6 on page 382, which gives the daily price differentials for the year 1929 at Kansas City, Omaha, East

IV. NUMBER OF CONSECUTIVE DAYS SAME HOG PRICE DIFFERENTIALS PREVAILED AT SPECIFIED TERMINAL MARKETS WHEN MEASURED FROM CHICAGO AND FROM KANSAS CITY, 1923-1929

Market and Year	From Chicago Base:						From Kansas City Base:				
	1	2	3	4	5	6	1	2	3	4	5
<b>Chicago and Kansas City:*</b>											
1923.....	221	31	8	—	—	—	221	31	8	—	—
1924.....	222	35	5	—	—	—	222	35	5	—	—
1925.....	229	33	4	—	—	—	229	33	4	—	—
1926.....	253	21	2	1	—	—	253	21	2	1	—
1927.....	234	28	4	1	—	—	234	28	4	1	—
1928.....	246	23	5	—	—	—	246	23	5	—	—
1929.....	263	21	1	—	—	—	263	21	1	—	—
<b>Omaha:</b>											
1923.....	235	27	3	2	—	—	242	28	3	—	—
1924.....	200	46	5	—	—	—	215	35	6	1	—
1925.....	245	26	3	—	—	—	249	21	3	2	—
1926.....	259	21	2	—	—	—	267	16	1	—	1
1927.....	262	22	—	—	—	—	250	26	2	—	—
1928.....	270	17	1	—	—	—	239	30	3	—	—
1929.....	268	18	1	—	—	—	221	36	5	—	—
<b>East St. Louis:</b>											
1923.....	245	26	3	—	—	—	218	34	3	3	—
1924.....	253	24	2	—	—	—	235	33	1	1	—
1925.....	245	31	—	—	—	—	243	31	1	—	—
1926.....	245	22	6	—	—	—	257	25	—	—	—
1927.....	267	15	1	—	1	—	248	26	—	2	—
1928.....	247	30	—	—	—	—	247	24	3	1	—
1929.....	266	21	—	—	—	—	242	31	—	1	—
<b>South St. Paul:</b>											
1923.....	246	22	4	1	—	—	245	25	4	—	—
1924.....	228	33	3	1	—	—	238	32	2	—	—
1925.....	248	26	2	—	—	—	256	21	3	—	—
1926.....	228	32	5	—	—	—	245	29	1	—	—
1927.....	223	33	4	—	1	—	224	36	4	—	—
1928.....	247	26	1	1	—	—	232	23	7	2	—
1929.....	256	22	—	—	—	1	236	29	3	1	—

\* Chicago measured from Kansas City and Kansas City measured from Chicago.

St. Louis, and South St. Paul measured from Chicago. The differential between Chicago and these markets for other years behaved in general very similarly.

The number of consecutive days for which the same price differential prevailed between the other markets and Chicago, and between the other markets and Kan-

sas City for the period 1923-1929 inclusive is shown in Table IV on page 384. The differential at Kansas City measured from Chicago changed on the average 238 times, or 78 per cent of the market days. The same differential prevailed for two days in succession on the average 27 times, or 18 per cent of the market days; and three days in succession 4 times, or 4 per cent of the time. Only twice during the seven years did the same differential prevail four days in succession, and at no time during the period did the same hog price differential maintain for more than four consecutive days.

In individual years the behavior of daily hog price differentials at Kansas City measured from Chicago varied considerably from the average of the period. The differential changed from one day to the next 221 times in 1923 and 263 times in 1929, or 72 per cent and 85 per cent of the market days respectively. The differential was the same for two days in succession 21 times in each of the years 1926 and 1929, and 35 times in 1924, or 14 per cent and 23 per cent of the market days respectively. The same differential remained more than two days in succession only 1 per cent of the market days in 1929, and 8 per cent in 1923.

The price differentials at Omaha, East St. Louis, and South St. Paul behaved very similarly to those at Kansas City when measured from Chicago. On the average the differential at Omaha changed from one day to the next 248 times per year, at East St. Louis 253 times, and at South St. Paul 239 times, or 81, 82, and 78 per cent of the market days respectively. Omaha showed the greatest variability from year to year during the period. During 1924 the differential changed from one day to the next 200 times, or 65 per cent of the days; while in 1928 it changed 270 times, or 88 per cent of the time. On the other hand, the same differential prevailed two consecutive days 46 times, or 30 per cent of the market days in 1924; and 17 times, or 11 per cent of the days in 1928. The variability at

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East St. Louis was very similar to that at Omaha, and at South St. Paul very much like that at Kansas City. At South St. Paul, however, at one time the same differential below Chicago was maintained for

V. NUMBER OF DAYS HOG PRICE DIFFERENTIALS MOVED IN THE SAME DIRECTION AT SPECIFIED TERMINAL MARKETS WHEN MEASURED FROM CHICAGO AND FROM KANSAS CITY, 1923-1929

Market and Year	From Chicago Base:							From Kansas City Base:							
	1	2	3	4	5	6	7	1	2	3	4	5	6	7	10
<b>Chicago and Kansas City:</b>															
1923	134	53	14	5	1			134	53	14	5	1			
1924	123	49	14	8		2		123	49	14	8		2		
1925	128	47	15	6	2	1		128	47	15	6		2	1	
1926	91	45	22	12	2			91	45	22	12				
1927	118	47	20	7	1			118	47	20	7		1		
1928	119	53	22	4				119	53	22	4				
1929	129	50	19	3	2			129	50	19	3		2		
<b>Omaha:</b>															
1923	128	38	18	4	5		1	140	45	19	5				
1924	123	34	19	11	3			121	53	18	4		2		
1925	84	51	15	8	5	3		115	46	22	5		3		
1926	115	37	22	8	4			116	46	19	8		2		
1927	101	49	26	6	1			112	51	26	4				
1928	98	50	26	4	3			114	47	18	6		2	2	
1929	117	45	22	6	2			128	53	20	1		2		
<b>East St. Louis:</b>															
1923	118	51	14	7	2	1		130	43	20	2		2	1	1
1924	126	47	19	5	2			116	39	23	7			1	1
1925	100	58	22	5	1			131	47	19	5			1	
1926	121	61	12	7				122	55	12	6		3		
1927	103	44	27	7	1			96	53	25	6			1	
1928	124	44	15	10	2			123	46	19	5		2	1	
1929	115	58	12	5	3	1		104	49	24	5		3		
<b>South St. Paul:</b>															
1923	115	51	16	9	1			126	50	13	7		3		
1924	125	43	21	7	1			121	46	21	4		2	1	
1925	124	52	13	7	1	1		123	49	18	8				
1926	144	47	17	2	2			152	41	18	2		2		
1927	139	54	13	5				152	42	17	5				
1928	127	46	22	4	1			119	49	16	9			1	
1929	120	48	19	7	1			137	56	12	3		2		

\* Chicago measured from Kansas City and Kansas City measured from Chicago.

five consecutive days, and at another time for six consecutive days.

When measuring differentials of the other markets from Kansas City, we found a little less tendency to change from one day to the next than when measuring from Chicago. Variations were found for individual



years, but even then the behavior was very uniform. On the average differentials changed from one day to the next at all markets 78 per cent of the time during the seven-year period. The same ones prevailed two successive days 18 per cent of the time at Chicago, Omaha, and South St. Paul, and 19 per cent at East St. Louis. The differentials for the other 3 or 4 per cent of the time were not so regularly distributed, but were limited to periods of three and four consecutive days, except at Omaha, where the differential at one time remained the same for five successive days.

We have observed that it was characteristic for differentials between terminal markets to change from day to day. It is of interest to see what the nature of this change was. Over how long a period did differentials change in the same direction before they reversed themselves? Table V on page 386 shows what happened at Kansas City, Omaha, East St. Louis, and South St. Paul with differentials measured from Chicago, and at Chicago, Omaha, East St. Louis, and South St. Paul measured from Kansas City for the period 1923-1929 inclusive. On the average, Kansas City differentials, measured from Chicago, moved in the same direction one day and changed direction on the next 120 times, or 39 per cent of all market days; two consecutive days 49 times, or 32 per cent of the time; and three days 18 times, or 18 per cent of the time. The frequency decreased with four, five, six, and seven consecutive days respectively. In fact, it was uncommon for differentials to move in the same direction for five or six successive days, and at no time did they move in the same direction more than six days in succession at Kansas City.

The movement at other markets was very similar. At Omaha the differential changed direction on the average 109 times per year, or 36 per cent of the time; and at East St. Louis 115 times, or 36 per cent of the time. Differentials changed direction from one day

to the next most frequently at South St. Paul—on the average 128 times per year, or 42 per cent of the time. The behavior for individual years showed some variation at all markets, but a little more at Kansas City and Omaha than at South St. Paul and East St. Louis. At Omaha the differential changed in the same direction seven days in succession once during the period.

When differentials were measured from Kansas City they behaved very much the same as when measured from Chicago. They changed in the same direction at East St. Louis seven consecutive days twice, and ten consecutive days once during the period. With these exceptions they did not change in the same direction more than six successive days at any market.

The question arises as to why differentials between markets have this seesaw behavior, typically moving one, two, or three days in one direction, and then reversing. Presumably there is a normal differential between any two markets at a given time of the year. It is difficult to determine specifically what this is. We have observed from the frequency distribution of the amount of differential that it fluctuates within limits. If the differential between two markets is out of line, how long does it take for it to swing back into line? This question presupposes a normal differential, and this norm is an elusive thing, the amount of which cannot be determined with precision. Instead of attempting to find the precise normal differential, which would change during the year, we have used a range differential measured above and below an average differential for the month. This range necessarily had to be arbitrary. The average we used was the monthly median,<sup>5</sup> and a range of ten cents was allowed on either side. Months where it was evident from the nature of the data that the average for one

<sup>5</sup> The median was used as an average in the analysis of daily differentials while the mean was used when analyzing yearly, seasonal, and weekly differentials.

PRICE DIFFERENTIALS AT TERMINALS 389

month was more applicable to the first part of the following month, or to the last part of the preceding month than was the median for the specific month, this average was arbitrarily used for these periods.<sup>6</sup>

VI. NUMBER OF DAYS IT TOOK HOG PRICE DIFFERENTIALS WHICH HAD VARIED TEN CENTS OR MORE FROM THE MONTHLY AVERAGE TO GET BACK WITHIN TEN-CENT RANGE OF AVERAGE, 1923-1929

Terminal Markets Measured from Chicago and from Kansas City

Market and Year	From Chicago Base:							From Kansas City Base:						
	1	2	3	4	5	6	over	1	2	3	4	5	6	over
<b>Chicago and Kansas City:<sup>a</sup></b>														
1923.....	26	11	2	4	—	1	1	26	11	2	4	—	1	1
1924.....	14	7	3	2	—	2	1	14	7	3	2	—	2	1
1925.....	14	11	6	2	—	1	2	14	11	6	2	—	1	2
1926.....	24	8	9	5	1	—	—	24	8	6	5	1	—	—
1927.....	14	8	2	3	2	—	2	14	8	2	3	2	—	2
1928.....	20	2	5	1	1	—	2	20	2	5	1	1	—	2
1929.....	30	7	3	1	1	1	1	30	7	3	1	1	1	1
<b>Omaha:</b>														
1923.....	20	7	6	2	1	2	—	30	6	3	3	2	1	—
1924.....	13	7	2	5	3	—	1	11	7	4	—	2	—	1
1925.....	23	14	9	3	—	1	3	37	10	9	1	1	—	—
1926.....	32	7	6	4	—	3	1	27	10	9	3	1	—	1
1927.....	29	11	4	1	3	—	—	31	8	4	3	—	1	—
1928.....	33	7	2	4	1	1	—	23	10	3	1	—	1	2
1929.....	30	13	3	4	2	—	1	32	6	5	—	2	—	—
<b>East St. Louis:</b>														
1923.....	28	7	3	4	1	1	—	23	6	9	1	4	1	1
1924.....	29	7	3	2	—	—	2	21	6	1	2	2	5	2
1925.....	25	15	7	2	1	—	—	30	15	5	3	1	—	—
1926.....	32	8	8	—	1	2	1	22	16	3	4	1	—	2
1927.....	25	7	6	—	2	3	1	22	15	5	2	—	—	1
1928.....	20	8	1	1	1	2	1	21	7	5	2	—	2	1
1929.....	32	9	2	1	—	1	—	29	11	7	1	1	—	—
<b>South St. Paul:</b>														
1923.....	26	9	1	3	—	1	2	33	7	2	3	1	—	1
1924.....	17	5	6	1	1	1	—	14	16	9	5	—	—	—
1925.....	33	12	6	1	2	1	1	41	12	7	4	4	—	—
1926.....	39	17	6	3	2	1	1	37	14	3	3	—	3	—
1927.....	33	8	3	3	1	—	—	30	10	5	3	2	1	1
1928.....	33	6	4	2	—	—	1	27	9	4	—	1	—	1
1929.....	23	7	8	3	—	—	—	26	8	8	1	1	1	1

<sup>a</sup>Chicago measured from Kansas City and Kansas City measured from Chicago.

Specifically, therefore, this was an attempt to measure the number of days price differentials, when they

<sup>6</sup> This procedure of necessity requires the exercise of personal judgment to a greater extent than is customary in statistical analysis.

varied more than ten cents from the median, took to get back within this range. The results obtained for markets measured from the Chicago and the Kansas City base are shown in Table VI on page 389.

When Chicago was used as a base, the most common behavior was for differentials to swing back to within ten cents of the average in one day. This occurred 54 per cent of the time at Kansas City, 55 per cent of the time at Omaha, 61 per cent of the time at East St. Louis, and 62 per cent of the time at South St. Paul on the average for the seven-year period. About 20 per cent of the time the differentials swung back within the ten-cent range of the average in two days, and about 10 per cent of the time in three days. The number of times four or more days were required decreased as the number of days decreased, the longest period being 14 days.<sup>7</sup>

With Kansas City as a base, a differential, when varying more than ten cents from the average differential for the month, swung back to within the range in approximately the same manner as with Chicago as a base. There was some variation, however. When the differential at Omaha measured from Kansas City moved outside the prescribed belt, it came back in one day 61 per cent of the time on the average as compared to 55 per cent of the time when measured from Chicago. At East St. Louis the corresponding figures were 53 per cent and 61 per cent, and at South St. Paul 58 per cent and 62 per cent. The times it took more than one day to swing back within the range also varied somewhat at these markets when measured from different bases.

The significant thing is that about 55 to 60 per cent of the time, when the differential at these markets

<sup>7</sup> When it takes more than about six days for differentials to get back within the ten-cent range of the median, it is almost always a question whether the average used for the month was representative.

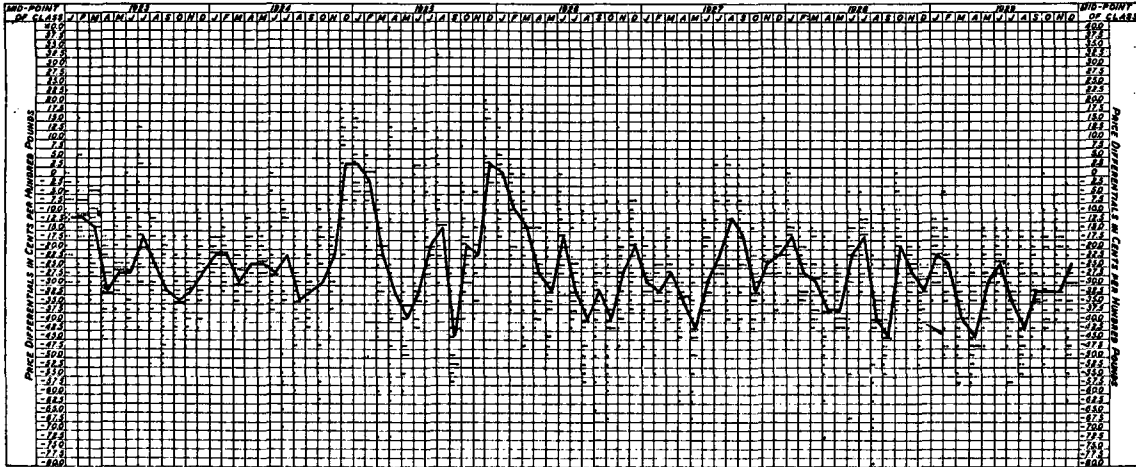
measured from either Chicago or Kansas City moved outside the ten-cent range from the average, it swung back in one day. From 75 to 80 per cent of the time, it came back within two days, from 85 to 90 per cent of the time within three days, and from 90 to 95 per cent of the time within four days.

*Magnitude of change.* The foregoing discussion shows how often changes in differentials between markets took place. It is of interest also to see how large these variations were. The upper portions of Charts 7, 8, 9, and 10 on pages 392-95 show the frequency distribution of daily differentials (at 2.5-cent intervals) by months for the seven years 1923-1929 when markets were measured from Chicago; and the upper portions of Charts 11, 12, and 13 on pages 396-98 present similar data for the markets when measured from Kansas City.<sup>8</sup> Although there is apparent similarity in the distribution of daily differentials by months for some of the markets, there are differences in detail; and the data are shown for all markets studied in order that the comparison may be more complete. A detailed analysis will not be made, but attention is called to two general characteristics of the daily differentials at all markets: (1) They showed considerable variability during the month with but slight tendency to concentration at given values. (2) They displayed a certain degree of seasonality. A discussion of the latter characteristic has been given in Section II of this appendix. Monthly medians are shown in Chart 7 on page 392, however, in order that we may get a better idea of the character of daily differentials.

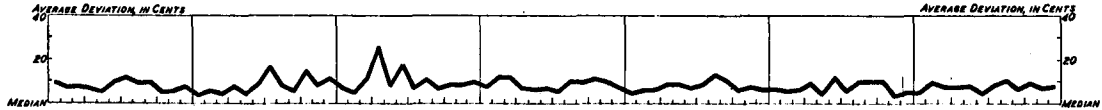
It is convenient to resort to some statistical measure of dispersion in comparing the variability of daily differentials. The average deviation is adopted as a

<sup>8</sup> Since the distribution of daily differentials at Chicago measured from Kansas City was the same as for Kansas City measured from Chicago, except when one was positive the other was negative, it is not shown graphically.

7. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929  
 KANSAS CITY FROM CHICAGO



— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH

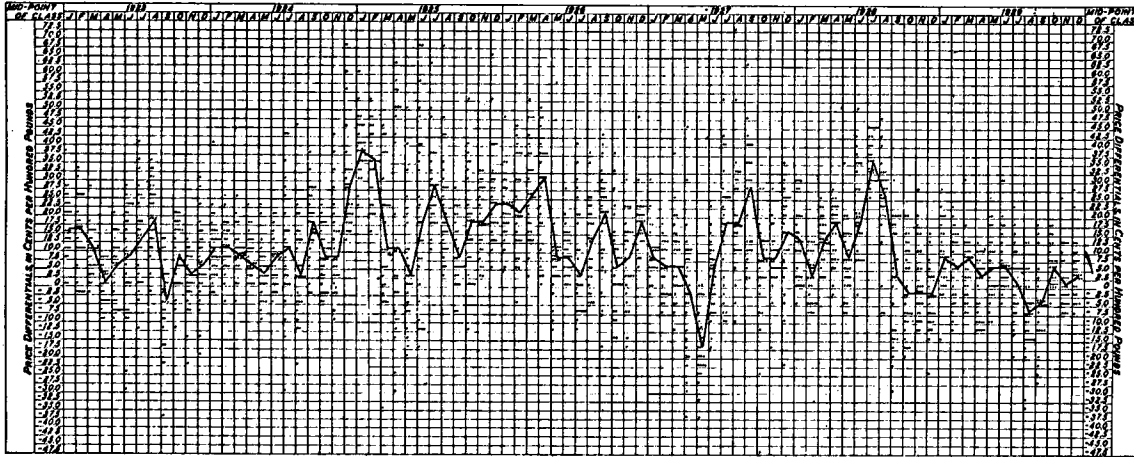


**DIFFERENTIALS, BY MONTHS, 1923-1929\***  
**OMAHA FROM CHICAGO**



\* There was a price difference in July, 1924 of \$1.625 and in July, 1926 of \$1.25.

9. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929\*  
 EAST ST. LOUIS FROM CHICAGO

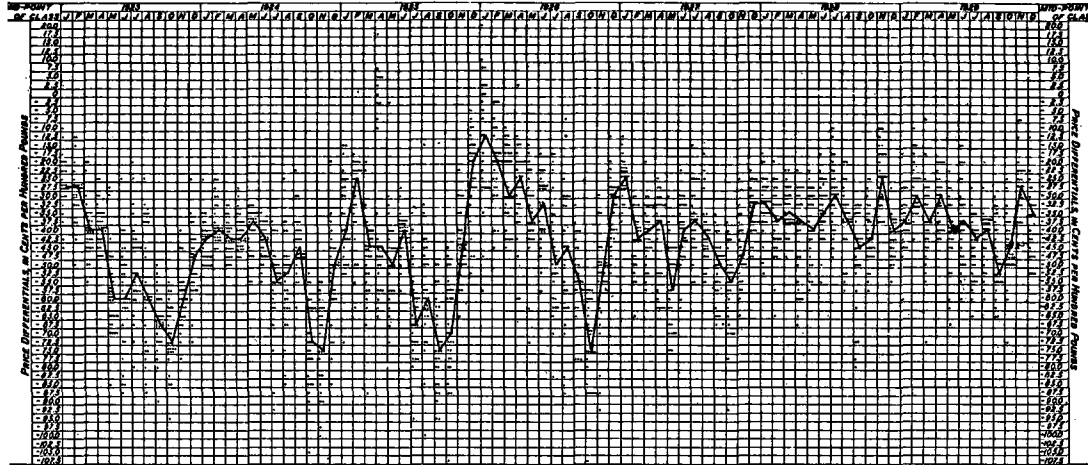


— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH





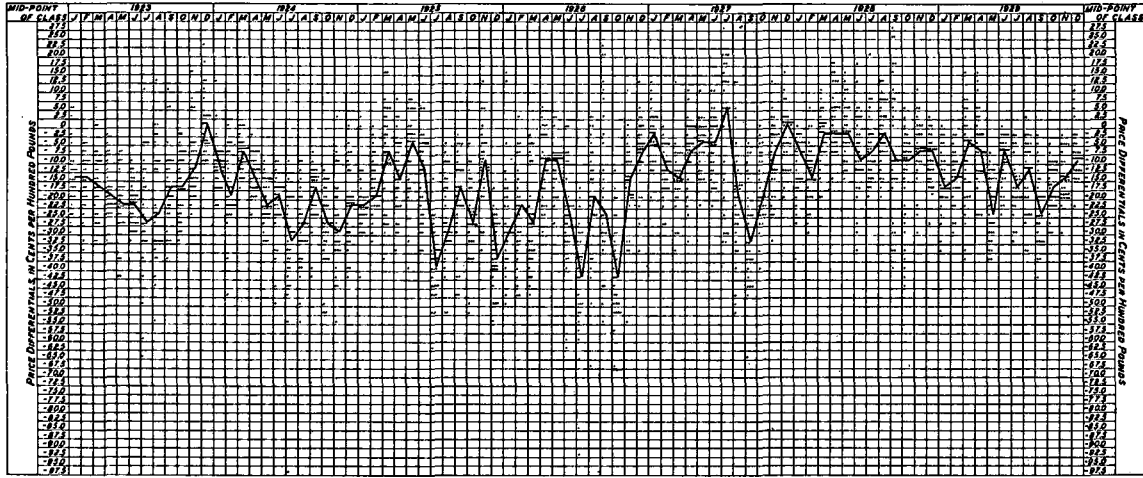
10. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929  
SOUTH ST. PAUL FROM CHICAGO



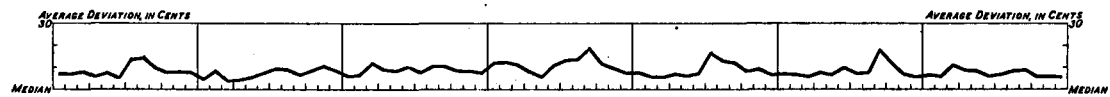
— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH



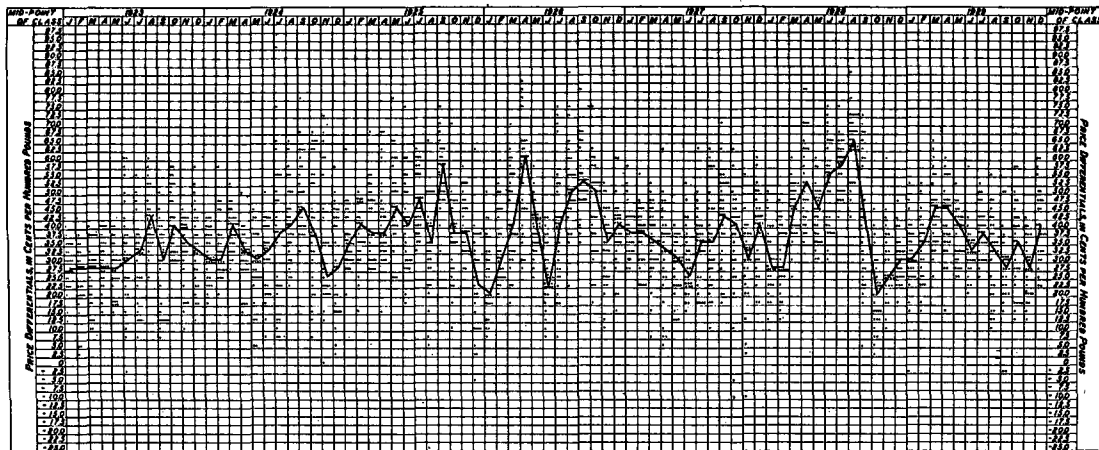
11. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929  
 OMAHA FROM KANSAS CITY



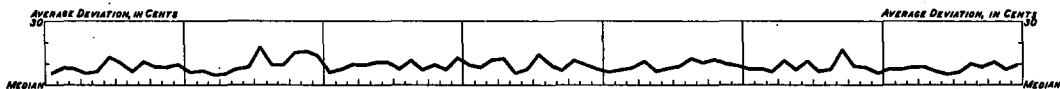
— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH



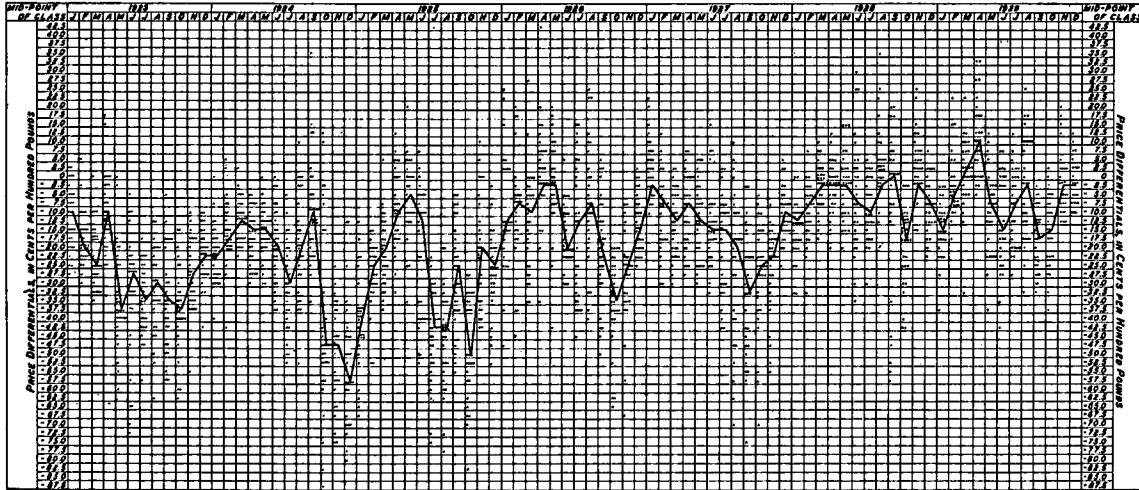
12. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929  
 EAST ST. LOUIS FROM KANSAS CITY



— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH



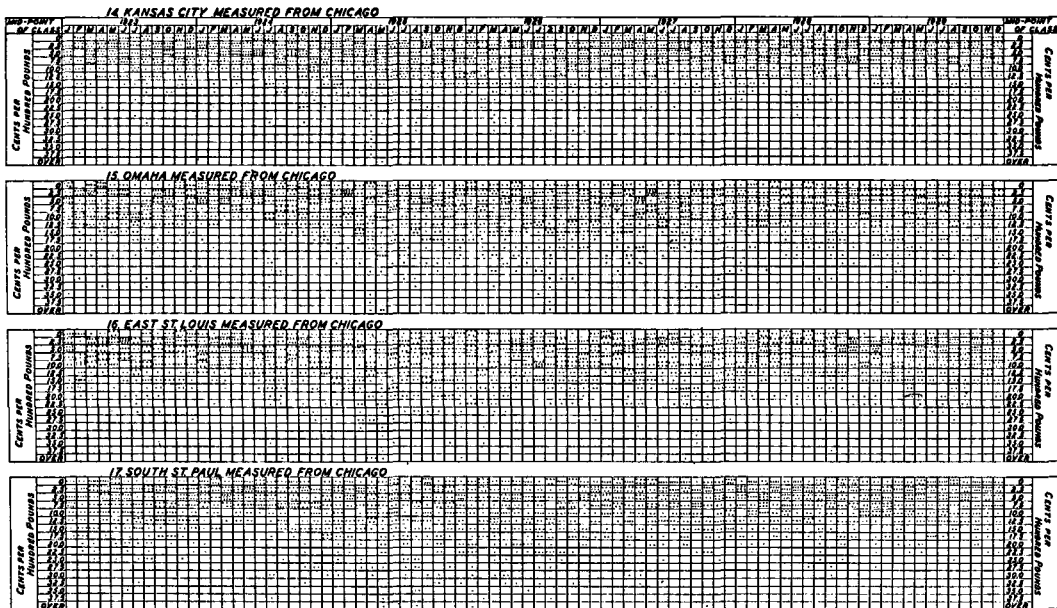
13. FREQUENCY DISTRIBUTION, MEDIAN, AND AVERAGE DEVIATION FROM MEDIAN, OF DAILY PRICE DIFFERENTIALS, BY MONTHS, 1923-1929  
SOUTH ST. PAUL FROM KANSAS CITY



— MEDIAN DAILY PRICE DIFFERENTIAL FOR EACH MONTH



14-17. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGE IN PRICE DIFFERENTIALS,  
BY MONTHS, 1923-1929



18-20. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGE IN PRICE DIFFERENTIALS,  
BY MONTHS, 1923-1929

18 OMAHA MEASURED FROM KANSAS CITY

MID-POINT OF CLASS	1923												1924												1925												1926												1927												1928												1929												MID-POINT OF CLASS
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																									
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19 EAST ST LOUIS MEASURED FROM KANSAS CITY

MID-POINT OF CLASS	1923												1924												1925												1926												1927												1928												1929												MID-POINT OF CLASS
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																									
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20 SOUTH ST PAUL MEASURED FROM KANSAS CITY

MID-POINT OF CLASS	1923												1924												1925												1926												1927												1928												1929												MID-POINT OF CLASS
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D																									
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measure of variability and the median is used as the average differential for the month. The dispersion is measured from this average. The average deviation of hog price differentials for the different markets measured from Chicago and Kansas City is shown in the lower portions of Charts 7 to 13 on pages 392-98 at the corresponding markets for which frequency distributions of price differentials are given.

The variation of daily differentials from monthly medians at the different markets was not uniform throughout the year. As a rule, deviations tended to be less during the first two or three and the last one or two months of the year, and there was a tendency for the average deviations to increase during the summer. This statement applies in general to all markets whether measured from Chicago or from Kansas City. Although average deviations showed some seasonality, it was by no means regular.

The means of monthly average deviations for markets measured from Chicago were quite uniform for 1923, 1924, 1927, 1928, and 1929, while the average deviations for 1925 and 1926 were somewhat greater. The only exception to this was East St. Louis, where the average deviation for 1927 slightly exceeded the average deviation for 1926 when measured from Chicago, and the average deviation for 1924 was greater than for 1925 when measured from Kansas City.

The average for the year shows that Omaha differentials when measured from Kansas City varied less than when measured from Chicago during 1924, 1925, 1928, and 1929, but varied more during 1923, 1926, and 1927. The deviation of daily differentials at East St. Louis was less when measured from Kansas City than when measured from Chicago for 1925 and 1927, but greater in the other five years. For South St. Paul the differentials varied less measured from Chicago in all years except 1925, when they varied less measured from Kansas City.

402 CO-OPERATIVE LIVESTOCK MARKETING

VII. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGES IN HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM CHICAGO, 1923-1929  
(In cents per hundredweight)  
A. Kansas City

Day-to-Day Change	1923	1924	1925	1926	1927	1928	1929
0.0	47	45	41	28	48	45	31
2.5	64	70	54	69	73	71	79
5.0	57	80	56	42	61	61	54
7.5	63	46	49	59	54	55	54
10.0	25	30	23	30	24	29	31
12.5	23	11	36	25	21	25	24
15.0	10	9	15	23	12	9	10
17.5	7	8	12	12	6	5	15
20.0	4	1	7	6	3	3	5
22.5	2	6	3	3	3	1	4
25.0	1	—	2	1	—	1	1
27.5	2	2	2	2	—	2	—
30.0	1	—	2	4	—	—	—
32.5	—	—	1	—	—	—	—
35.0	—	—	1	1	—	—	—
37.5	1	—	1	—	—	—	—
40.0	—	—	—	—	—	—	—
42.5	—	—	—	—	—	—	—
45.0	—	—	—	—	—	—	—
47.5	—	—	—	—	—	—	—
50.0	—	—	—	—	—	—	—
52.5	—	—	1	—	—	—	—
Total.....	307	307	307	305	305	307	308

B. Omaha

0.0	39	56	32	25	25	25	25
2.5	71	74	55	48	57	49	52
5.0	42	69	48	51	55	66	64
7.5	39	41	43	38	49	44	46
10.0	51	29	27	33	43	38	38
12.5	29	19	25	32	26	36	31
15.0	12	7	22	33	19	21	12
17.5	9	5	15	9	8	9	17
20.0	3	1	11	15	11	8	5
22.5	4	—	9	6	4	4	7
25.0	—	2	7	4	3	3	4
27.5	2	1	3	5	2	1	4
30.0	2	—	2	3	1	2	—
32.5	2	1	1	2	—	—	1
35.0	1	—	1	1	—	—	—
37.5	—	—	1	1	—	—	1
40.0	—	—	—	—	1	1	—
42.5	—	—	—	—	—	1	—
45.0	—	—	—	—	—	—	—
47.5	—	—	1	—	—	—	—
50.0	—	—	—	—	—	—	—
52.5	—	—	1	—	—	—	—
55.0	—	1	—	1	—	—	—
57.5	—	—	—	—	—	—	—
60.0	—	—	1	—	—	—	—
62.5	—	—	—	—	—	—	—
65.0	—	—	—	—	—	—	—
67.5	—	—	—	—	—	—	—
70.0	—	—	—	—	—	—	—
72.5	—	—	—	—	—	—	—
75.0	—	1	—	—	—	—	—
Total.....	306	307	306	307	306	307	307



PRICE DIFFERENTIALS AT TERMINALS 403

VII. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGES IN HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM CHICAGO, 1923-1929—Continued  
(In cents per hundredweight)

C. East St. Louis

Day-to-Day Change	1923	1924	1925	1926	1927	1928	1929
0.0	32	28	31	34	28	36	34
2.5	72	59	40	44	57	66	68
5.0	50	72	52	55	51	54	53
7.5	45	50	36	42	40	48	41
10.0	45	42	30	54	40	45	35
12.5	19	22	23	21	29	23	21
15.0	21	11	32	19	21	12	26
17.5	11	9	13	16	17	8	4
20.0	6	2	16	7	7	9	12
22.5	2	5	7	9	9	3	5
25.0	2	2	8	2	2	1	—
27.5	1	—	8	—	—	1	4
30.0	—	—	8	1	—	—	—
32.5	—	—	1	—	1	—	—
35.0	—	1	2	1	1	—	—
37.5	—	—	1	—	—	1	—
40.0	—	1	2	—	—	—	—
42.5	—	—	—	—	1	—	—
45.0	—	—	1	—	—	—	—
47.5	—	—	—	—	1	—	—
50.0	—	—	1	—	—	—	—
52.5	—	—	1	—	—	—	—
55.0	—	—	—	—	—	—	—
57.5	—	—	—	—	—	—	—
60.0	—	—	—	—	—	—	—
62.5	—	—	—	—	—	—	—
65.0	—	—	1	—	—	—	—
67.5	—	—	—	—	—	—	—
Total	306	307	307	307	305	307	308

D. South St. Paul

0.0	33	42	33	42	50	38	40
2.5	61	79	53	33	55	65	58
5.0	51	54	47	54	48	62	63
7.5	44	59	37	28	46	42	40
10.0	30	19	28	29	32	34	39
12.5	29	17	29	30	28	27	27
15.0	30	16	19	23	18	13	9
17.5	13	8	14	14	13	12	12
20.0	10	2	12	18	6	6	8
22.5	5	2	8	15	5	2	2
25.0	6	1	6	4	2	2	—
27.5	—	3	7	3	—	—	—
30.0	—	3	5	4	2	1	—
32.5	1	1	2	4	1	—	1
35.0	1	—	2	2	1	—	—
37.5	—	1	1	3	—	—	—
40.0	—	—	—	—	—	—	—
42.5	1	—	1	—	—	—	—
45.0	—	—	—	—	—	—	1
47.5	1	—	2	—	—	—	—
50.0	—	—	1	—	—	—	—
52.5	—	—	—	—	—	—	—
55.0	—	—	—	—	—	—	—
57.5	—	—	—	—	—	—	—
60.0	—	—	—	—	—	—	—
62.5	—	—	—	—	—	—	—
65.0	—	—	—	—	—	—	—
67.5	—	—	—	1	—	—	—
Total	306	307	307	307	306	306	306

404 CO-OPERATIVE LIVESTOCK MARKETING

VIII. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGES IN HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM KANSAS CITY, 1923-1929

(In cents per hundredweight)

A. Omaha

Day-to-Day Change	1923	1924	1925	1926	1927	1928	1929
0.0	34	50	33	22	30	40	46
2.5	66	78	51	49	53	54	65
5.0	54	54	52	37	52	62	53
7.5	41	53	43	43	48	46	47
10.0	32	30	38	42	45	38	29
12.5	25	14	27	34	33	30	24
15.0	27	13	28	25	20	14	16
17.5	6	3	13	18	12	13	12
20.0	6	2	9	8	6	7	6
22.5	5	3	7	9	3	3	5
25.0	3	3	4	4	4	—	2
27.5	3	—	—	4	1	—	1
30.0	1	1	2	5	—	—	1
32.5	2	—	—	2	—	—	1
35.0	1	—	1	1	1	1	—
37.5	1	1	—	2	—	—	—
40.0	—	—	—	2	—	—	—
42.5	—	—	—	—	—	—	—
45.0	—	—	—	—	—	—	—
47.5	—	—	—	—	—	—	—
50.0	—	—	—	—	—	—	—
52.5	—	—	—	—	—	—	—
55.0	—	—	—	—	—	—	—
57.5	—	—	—	—	—	—	—
60.0	—	1	—	—	—	—	—
62.5	—	—	—	—	—	—	—
65.0	—	—	—	—	—	—	—
67.5	—	1	—	—	—	—	—
Total	307	307	308	307	308	308	308

B. East St. Louis

0.0	49	38	39	25	32	35	34
2.5	60	64	52	67	43	72	82
5.0	54	48	43	44	66	59	49
7.5	46	47	44	44	51	40	37
10.0	23	39	32	21	35	35	38
12.5	22	26	27	30	24	31	28
15.0	20	20	22	30	18	19	18
17.5	16	7	22	17	15	8	12
20.0	7	8	11	11	8	6	9
22.5	4	3	6	4	3	1	6
25.0	2	3	7	5	4	1	2
27.5	1	1	2	4	3	1	—
30.0	1	1	2	5	2	—	—
32.5	—	1	—	—	2	—	—
35.0	2	—	1	—	—	—	—
37.5	—	1	1	—	—	—	—
40.0	—	—	—	—	—	—	—
42.5	—	1	—	—	—	—	—
45.0	—	—	—	—	—	—	—
47.5	—	—	—	—	—	—	—
50.0	—	—	—	—	—	—	1
52.5	—	—	1	—	—	—	—
Total	307	308	308	307	307	308	309

PRICE DIFFERENTIALS AT TERMINALS 405

VIII. FREQUENCY DISTRIBUTION OF DAY-TO-DAY CHANGES IN HOG PRICE DIFFERENTIALS AT SPECIFIED TERMINAL MARKETS, MEASURED FROM KANSAS CITY, 1923-1929—Continued  
(In cents per hundredweight)

C. South St. Paul

Day-to-Day Change	1923	1924	1925	1926	1927	1928	1929
0.0	33	36	27	31	46	44	41
2.5	64	57	51	48	58	66	58
5.0	60	52	49	35	53	56	58
7.5	42	44	38	32	40	48	40
10.0	29	40	28	31	37	35	30
12.5	22	25	24	38	26	25	28
15.0	18	20	23	20	12	13	15
17.5	20	10	18	19	14	7	16
20.0	9	10	15	14	7	6	5
22.5	4	3	3	11	4	2	6
25.0	2	2	10	3	4	2	3
27.5	2	2	4	5	3	3	3
30.0	—	1	2	6	1	—	2
32.5	—	2	5	5	2	1	2
35.0	—	1	3	5	—	—	—
37.5	—	1	1	—	—	—	—
40.0	—	2	—	—	—	—	—
42.5	—	—	—	1	—	1	—
45.0	1	—	—	—	—	—	—
47.5	—	—	1	1	—	—	—
50.0	2	—	—	1	—	—	—
Total	308	308	307	306	307	307	307

Besides making a frequency distribution of differentials between given markets, we examined the extent of the change from one day to the next. Such day-to-day variations at Kansas City, Omaha, East St. Louis, and South St. Paul measured from Chicago for the period 1923-1929 inclusive are shown in Charts 14, 15, 16, and 17 respectively on page 399; and at Omaha, East St. Louis, and South St. Paul measured from Kansas City for the same period in Charts 18, 19, and 20 respectively on page 400.<sup>9</sup> There was no apparent seasonal characteristic in day-to-day change in differential at any of the markets measured from Chicago and Kansas City, although there was a tendency for the change to be less from one day to the

<sup>9</sup> Original prices of hogs break at 5 cents per hundredweight and, since the data used are based upon the mid-point of the range quoted, the minimum change in differential between two markets is 2.5 cents.

next at the beginning and end of the year than during the summer.

Table VII beginning on page 402 gives the frequency distribution of day-to-day change in hog price differentials for the period 1923-1929 inclusive at Kansas City, Omaha, East St. Louis, and South St. Paul respectively measured from Chicago; and Table VIII beginning on page 404 gives similar data for Omaha, East St. Louis, and South St. Paul respectively measured from Kansas City. The figures for Kansas City indicate that on 22

IX. AVERAGE CHANGE IN DAY-TO-DAY HOG PRICE DIFFERENTIALS  
AT SPECIFIED TERMINAL MARKETS, MEASURED FROM  
CHICAGO AND FROM KANSAS CITY, 1923-1929  
(In cents per hundredweight)

Market	1923	1924	1925	1926	1927	1928	1929
From Chicago Base:							
Kansas City.....	6.5	5.9	8.0	7.9	5.9	6.1	6.8
Omaha.....	7.4	5.9	9.5	9.8	8.3	8.3	8.4
East St. Louis.....	7.2	7.4	10.7	8.4	8.6	7.1	7.8
South St. Paul.....	8.3	6.7	10.1	10.4	7.5	7.1	7.4
From Kansas City Base:							
Chicago.....	6.5	5.9	8.0	7.9	5.9	6.1	6.8
Omaha.....	8.0	6.4	8.5	10.2	8.0	7.2	7.1
East St. Louis.....	7.4	7.7	6.3	8.9	8.3	6.9	7.2
South St. Paul.....	8.1	8.2	10.3	10.9	7.6	7.0	7.8

per cent of the market days a change of 2.5 cents occurred, on 19 per cent a change of 5 cents, on 18 per cent a change of 7.5 cents, on 13 per cent no change, on 9 per cent a change of 10 cents, on 8 per cent a change of 12.5 cents; that in general, as the amount of change increased, the percentage of days decreased. The greatest day-to-day change was 52.5 cents. The frequency distribution of the day-to-day changes whether measured from Chicago or from Kansas City was not very different in character.

The average amount of daily change in hog price differentials for the years 1923-1929 at the other markets measured from Chicago and from Kansas City appears in Table IX on this page. Measured from Chicago the average day-to-day change in differentials was

fairly uniform during 1923, 1924, 1927, 1928, and 1929 for each market, but the average change was greater during 1925 and 1926. The same was true, with slight exceptions, when markets were measured from Kansas City.

By a comparison of the average day-to-day change in differentials at East St. Louis and South St. Paul when measured from Chicago and from Kansas City, we find that the average change per day at East St. Louis (and also at Omaha) was greater when measured from Chicago for 1925, 1927, 1928, and 1929, and from Kansas City for 1923, 1924, and 1926. At South St. Paul the average change was greater when measured from Chicago during 1923 and 1928 and from Kansas City for the other five years.

#### V. SUMMARY AND CONCLUSIONS

The most common characteristic of hog price differentials between terminal markets is change from year to year, month to month, week to week, and day to day. In fact, it is rather unusual for a differential—particularly a year-to-year, month-to-month, or week-to-week average differential—to remain the same between two markets for two successive periods. Even day-to-day changes in differentials occur approximately four-fifths of the time.

Changing price differentials from period to period (year, month, week, or day) are the result of the action upon the price at individual markets of influences which are effective to a different degree, or are entirely absent, at other markets. The price at every market, from day to day as well as over longer periods, is affected by the broad supply and demand factors in the trade which cause the price movement at all markets to be somewhat similar. However, local market disturbances cause relative prices between markets to change almost continually. These disturbances will affect local prices within limits as the shifting of the

supply of hogs and the orders for hogs and for hog products among markets will tend to bring the price relationship between markets toward an equilibrium.

The daily differential may continue to increase or decrease on successive days, but will reverse itself from one day to the next from one-third to one-half of the time. It is unusual for the differential to change in the same direction more than two or three days in succession. This behavior is the result of price relationships between markets that tend to gravitate to a normal differential after being affected by local market factors.

Daily differentials change most commonly from 5 cents to 10 cents. Even though this does not seem large, a change of from 30 cents to 50 cents, or even more, from one day to the next may take place. Since hogs are sold at terminal markets after they are delivered, the frequent change in market differentials is of concern to the producer or shipper who has access to more than one market. Basing his choice of market upon price relationships one day is hazardous because he has no assurance what the price relationship at alternative markets will be the following day, or perhaps later, when his hogs finally arrive. The market differential is almost sure to change, but the amount and direction of change are uncertain. Changing seasonal and long-time hog price differentials between markets may be taken advantage of with greater dependability.

If the price at other markets followed Chicago closely we would find day-to-day and week-to-week differentials, at least for limited periods, to be constant. This is not the case. It has been pointed out that there was greater uniformity in day-to-day differentials between Omaha and Kansas City for four years, but that Omaha moved in closer conformity with Chicago for three years during the period 1923-1929 inclusive.

East St. Louis varied less when measured from Chicago for five years, but more for two years; and South St. Paul moved more closely with Chicago than with Kansas City every year except one.

Based on average weekly prices, Omaha moved in closer conformity with Kansas City than with Chicago every year during the period. East St. Louis followed Chicago more closely for three years but varied more during the other four. South St. Paul moved with Chicago more closely than with Kansas City for five out of the seven years.

With Omaha following Kansas City more closely than Chicago during the period, and with East St. Louis and South St. Paul following Kansas City more uniformly than they followed Chicago for part of the time, there appears to be no justification for saying that "other markets follow Chicago" or "Chicago sets the price for other markets." Neither does it appear that because Omaha and Kansas City move together more closely than either of them moves with Chicago one of these markets is the price-determining point for the other, or for other markets. On the other hand, the price at the various markets is determined by the same general factors, modified at specific markets by local influences. Chicago affects prices at these other markets but, conversely, other markets influence Chicago; and it is the interplay of forces between markets that causes local price disturbances to be adjusted. Because of the relative size of the Chicago market and its strategic geographical position, we may expect it to have more influence on inter-market price than has any other market. Even so, it is far from being in a position to control price elsewhere.

## APPENDIX B

### THE HOG PRICE STRUCTURE AT INTERIOR MARKETS<sup>1</sup>

The behavior of prices at terminal livestock markets has been discussed in Appendix A. We propose here to call attention to the price situation at interior markets<sup>2</sup> and to point out how it differs from that at terminal markets. Since prices quoted at interior points are not altogether dependable, and since these markets do not classify hogs uniformly, no exhaustive study will be attempted. The rather fragmentary data presented, however, should suffice to illustrate the price structure as we found it and to give a basis for appraising the character and dependability of prices at these points.

The daily prices of medium weight hogs at Austin (Minnesota), Ottumwa (Iowa), and Chicago for 1929 are shown in the chart on page 412.<sup>3</sup> Chicago, a pri-

<sup>1</sup> This appendix was prepared by Knute Bjorka.

<sup>2</sup> The interior markets are private markets where yards and other facilities are available only to those dealing with the agency providing them, and are represented by local packing establishments and concentration points. They are located in producing areas. Interior markets are distinguished from terminal, primary, or public markets, which are open to any trader who complies with the regulations of the local trading organization. Austin, Mason City, Des Moines, and Ottumwa are examples of interior markets while Chicago, Omaha, and Kansas City are terminal markets.

<sup>3</sup> The price at Chicago is based on medium weight (200-250 pounds, medium to choice) grade, at Austin on choice to medium (200-220 pounds), and at Ottumwa, although the classification changed several times during the year, on the grade which comprised the 220-pound weight. The prices at Chicago and Austin are quoted as a range. This was converted to a single value by taking the mid-point of the range price. Ottumwa prices are reported as a single value for each grade. Price



mary market, is plotted on the same graph with the interior markets Austin and Ottumwa. An examination of the curves in this chart will show that (1) the general movement of hog prices at interior markets was similar to that at Chicago; (2) the prices at Austin and Ottumwa were very close together for certain periods during the year but diverged at other periods; (3) the interior market prices were consistently below Chicago throughout the year; and (4) the same price frequently maintained for several days in succession at Austin and Ottumwa while it was uncommon for the price at Chicago to remain the same for even two consecutive days.

Although the various interior markets showed some variation in the frequency of hog price changes, it was more common at each interior market for the same price to continue for two or more days in succession than it was for such stability to occur at any terminal market. The number of consecutive days that the same price quotations prevailed on medium weight hogs at various interior and terminal markets for 1927, 1928, and 1929 is shown in the table on page 414.<sup>4</sup> It may be observed that the price at each interior market maintained for two or more successive days more frequently than at any terminal market. The change from one day to the next for the period 1927-1929 was 36 per cent of the market days at Austin, 33 per cent at Mason City, 47 per cent at Des Moines, and 60 per cent at Ottumwa. These figures compare with 77 per

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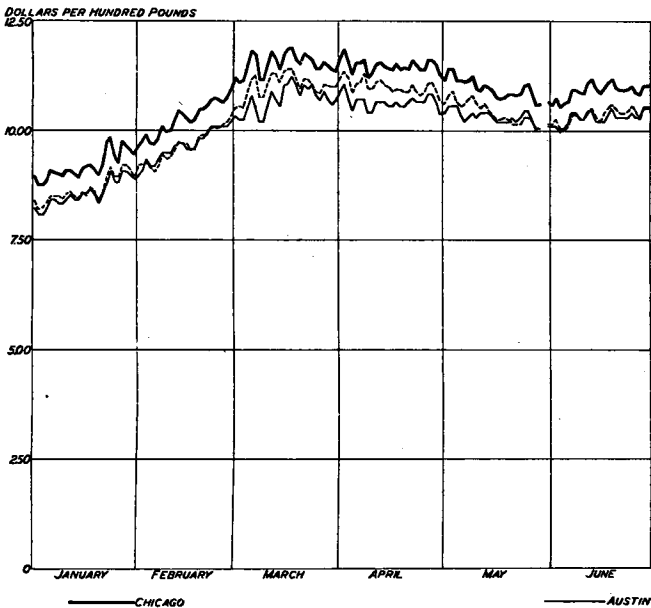
quotations for Chicago were obtained from the Bureau of Agricultural Economics of the U. S. Department of Agriculture, for Ottumwa from the daily files of the *Des Moines Register*, and for Austin from the price cards issued daily by the packer at this market.

<sup>4</sup> Price quotations for Des Moines were obtained from the daily files of the *Des Moines Register* and for Mason City from the price cards issued daily by the packer at this market. The source of the quotations for Austin, Ottumwa, and Chicago is given in footnote 3, p. 410.

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cent at Chicago, 82 per cent at Omaha, and 74 per cent at Kansas City. At interior points the same price continued for three or more consecutive days 35 per cent of the time at Austin, 39 per cent at Mason City, 27 per cent at Des Moines, and 14 per cent at Ottumwa. At terminal markets, on the other hand, the same

DAILY PRICES OF MEDIUM WEIGHT HOGS AT



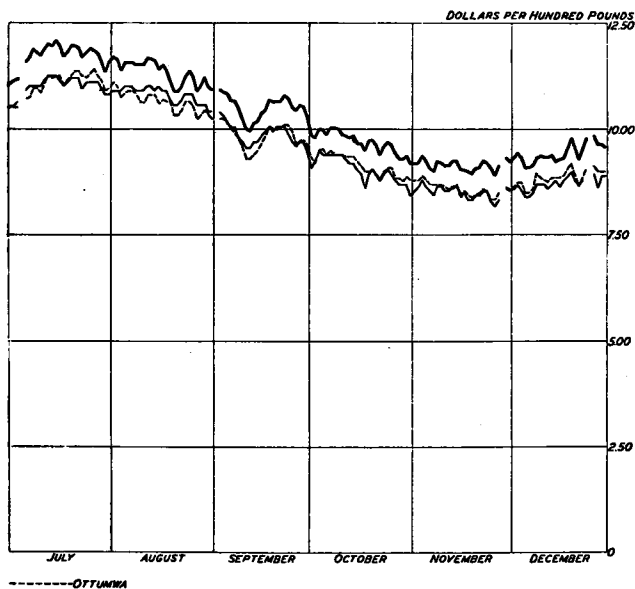
price remained for three or more days in succession 3.7 per cent of the market days at Chicago, 2.4 per cent at Omaha, and 4.7 per cent at Kansas City. The maximum length of time the price remained unchanged at any of the terminal markets was four consecutive days, and this occurred on the average less than once a year, while at interior markets the price remained unchanged for five days or more several times, the

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longest period (nine successive days) having occurred at Mason City.

The price differential between any two interior markets changed less frequently than the differential between an interior market and a terminal market. One reason for this was that the terminal market price

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usually changed from day to day while the price at interior markets was less sensitive in its movement. Although the prices at the various interior markets changed less frequently than at terminal markets, they did not necessarily show equal changes in the same direction at the same time, nor remain unchanged for identical periods.

The price of hogs at one interior market was not

CONSECUTIVE DAYS FOR SAME QUOTATION ON MEDIUM WEIGHT HOGS AT SPECIFIED  
INTERIOR AND TERMINAL MARKETS, 1927-1929

I. Interior Markets

Market and Year	Number of Days										As Percentage of All Market Days in Year									Market and Year
	1	2	3	4	5	6	7	8	9	Total	1	2	3	4	5	6	7	8	9	
Austin																				Austin
1927	95	41	21	8	2	3	1	—	—	307	31	27	21	10	3	6	2	—	—	1927
1928	113	52	16	9	—	—	1	—	—	308	37	34	15	12	—	—	—	—	—	1928
1929	119	42	22	6	1	1	—	—	—	304	39	27	22	8	2	2	—	—	—	1929
Mason City																				Mason City
1927	67	44	12	6	5	5	2	2	1	309	22	28	12	8	8	10	4	5	3	1927
1928	79	31	8	13	2	2	—	—	—	239	34	26	10	21	4	5	—	—	—	1928
1929	131	43	15	9	1	—	—	—	—	303	43	28	15	12	2	—	—	—	—	1929
Des Moines																				Des Moines
1927	128	38	17	8	1	2	—	—	—	304	42	25	17	10	2	4	—	—	—	1927
1928	126	48	12	7	1	1	—	—	—	297	43	32	12	9	2	2	—	—	—	1928
1929	163	34	8	8	1	1	—	—	—	298	55	23	8	10	2	2	—	—	—	1929
Ottumwa																				Ottumwa
1927	168	36	14	1	1	—	—	—	—	291	58	25	14	1	2	—	—	—	—	1927
1928	173	38	8	4	—	—	—	—	—	289	60	26	8	6	—	—	—	—	—	1928
1929	187	37	10	2	—	—	—	—	—	299	63	25	10	2	—	—	—	—	—	1929

II. Terminal Markets

Chicago																				Chicago
1927	218	33	5	2	—	—	—	—	—	307	71	21	5	3	—	—	—	—	—	1927
1928	237	35	—	—	—	—	—	—	—	307	77	23	—	—	—	—	—	—	—	1928
1929	255	22	3	—	—	—	—	—	—	308	83	14	3	—	—	—	—	—	—	1929
Omaha																				Omaha
1927	249	24	3	1	—	—	—	—	—	310	80	16	3	1	—	—	—	—	—	1927
1928	253	23	3	—	—	—	—	—	—	308	82	15	3	—	—	—	—	—	—	1928
1929	260	24	—	—	—	—	—	—	—	308	84	16	—	—	—	—	—	—	—	1929
Kansas City																				Kansas City
1927	199	43	8	—	—	—	—	—	—	309	64	28	8	—	—	—	—	—	—	1927
1928	236	28	4	1	—	—	—	—	—	308	77	18	4	1	—	—	—	—	—	1928
1929	247	29	—	1	—	—	—	—	—	309	80	19	—	1	—	—	—	—	—	1929

\* Data for January and February are not included.

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strictly comparable with the price at another because the grade classifications used were not uniform. The following hog classifications used by certain interior markets show the rather wide variation:<sup>5</sup>

*Des Moines*

Prime heavies  
Prime mediums  
Prime lights  
Good packers

(Price was quoted as a range.)

*Mason City*

Sorted lights, 180-230 pounds  
Medium weight butchers, 240-260 pounds  
Heavy butchers, 270-300 pounds  
Prime heavy butchers, 320-360 pounds  
Packing sows, smooth, 300-350 pounds  
Heavy sows, smooth, 360-400 pounds  
Big heavy sows, smooth, 450-500 pounds  
Thin, rough, and heavy, 200-600 pounds  
Lights, fair to good, 140-160 pounds  
Common to good, 110-130 pounds  
Poor to good

(Hogs not up to grade were priced accordingly. Single price was quoted for some grades and range for others.)

*Ottumwa*

120-140 pounds  
140-160 pounds  
160-180 pounds  
180-240 pounds  
240-300 pounds  
300-350 pounds  
Over 300 pounds  
Good packers  
Fair packers

(Single price was quoted for each grade.)

<sup>5</sup> All classifications were taken from the *Des Moines Register* except those for Austin, which were taken from daily price cards there.

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*Waterloo*

Prime hogs, 180-225 pounds  
Prime hogs, 225-260 pounds  
Prime hogs, 260-300 pounds  
Good packers under 300 pounds  
Good packers, 350-500 pounds

(Prices quoted were as a range for wagon-load delivered at plant.)

*Austin*

Choice lights, 140-160 pounds  
Choice lights, 170-190 pounds  
Choice medium, 200-220 pounds  
Choice medium, 230-250 pounds  
Choice butchers, 260-280 pounds  
Choice heavy butchers, 290-310 pounds  
Choice heavy butchers, 320-340 pounds  
Choice heavy butchers, 350 and up  
Pigs, 130 and under  
Choice packers, 300 down  
Choice packers, 310-350 pounds  
Choice packers, 360-400 pounds  
Choice packers, 410-450 pounds  
Choice packers, 460 and up  
Rough packers and thin sows  
Stags

(Hogs not grading choice were priced according to quality. Price was quoted as a range.)

*Boone*

Prime hogs, 180-250 pounds  
Prime hogs, 250-300 pounds  
Good packers under 400 pounds  
Good packers, 400-450 pounds

(Single price was quoted on all grades except the heavy packer grade where a range of price was given.)

*Iowa City*

Hogs, 170 and up  
Packers

(Single price was quoted.)

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*Peoria*

Tops  
Lights  
Mediums  
Heavies  
Packers  
Stags

(Price was quoted as a range.)

*Cedar Rapids*

Prime hogs, 180-200 pounds  
Prime hogs, 200-300 pounds  
Prime hogs, 300-350 pounds  
Good packers under 400 pounds  
Good packers, 400-500 pounds  
Prime hogs, 160-180 pounds  
Prime hogs, 140-160 pounds  
Fair packers  
Rough, heavy, and thin

"Prime hogs" were barrows and sows that had not raised pigs. Stags, common hogs, and pigs under 140 pounds were priced according to quality. All sales by wire or telephone had to be received before 5:00 P. M.

(Price was quoted as a range.)

*Muscatine*

Prime butchers, 180-200 pounds  
Prime butchers, 200-280 pounds  
Extremely heavy butchers  
Butcher packers  
Heavy packers

(Single price was quoted for some grades and range given for others.)

An examination of the quotations given above shows that grades were usually based on both quality and weight differences. The number and the character of these grades were variable. Des Moines quoted prices on only 4, while Mason City used 11, and Austin 16. To pick the grades that were most nearly comparable at the various markets was to a considerable extent a

matter of judgment. It was much more difficult, therefore, to compare prices at interior markets than it was at terminal markets where uniform classifications were used.

Another complicating factor was that the classifications at most of these interior markets changed several times during the year. The data given below illustrate the frequency and nature of change at some interior points. The changes usually affected practically all grades; but only those within the medium weight group are listed.

*Des Moines*

The same grades are retained consistently throughout the year at this market. The grades, specified as Prime Heavies, Prime Mediums, Prime Lights, and Good Packers, are very indefinite since they do not designate weight ranges applicable to each. Since these grades are not rigidly defined it is likely that they do not mean the same at all periods of the year.

*Mason City*

June 10, 1927.....	Best mixed, 180-260 pounds
October 11, 1927....	Best mixed, 180-300 pounds
October 21, 1927....	Best mixed, 190-300 pounds
October 28, 1927....	Best mixed, 200-300 pounds
November 12, 1927..	Best mixed, 200-320 pounds
December 2, 1927....	Best mixed, 200-300 pounds
December 22, 1927..	Best mixed, 190-300 pounds
December 26, 1927..	Best mixed, 190-320 pounds
February 20, 1928...	Best mixed, 170-260 pounds
April 19, 1928.....	Best mixed, 170-280 pounds
June 16, 1928.....	Best mixed, 180-300 pounds
September 15, 1928..	Selected lights, 180-240 pounds
September 22, 1928..	Selected lights, 180-230 pounds
October 15, 1928....	Medium and butchers, 180-280 pounds
October 15, 1928....	Medium and butchers, 180-300 pounds
May 8, 1929.....	Sorted lights and butchers, 180-260 pounds



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*Ottumwa*

January 2, 1927.....	180-240 pounds
February 19, 1927.....	160-250 pounds
July 15, 1927.....	220-260 pounds
September 8, 1927.....	190-250 pounds
November 1, 1927.....	190-230 pounds

*Cedar Rapids*

January 2, 1929.....	180-250 pounds
April 28, 1929.....	180-300 pounds
May 10, 1929.....	180-250 pounds
July 10, 1929.....	220-250 pounds
September 15, 1929.....	180-250 pounds
October 12, 1929.....	200-250 pounds
October 18, 1929.....	200-300 pounds
October 31, 1929.....	180-300 pounds
November 6, 1929.....	200-300 pounds

*Austin*

January 2, 1927.....	180-250 pounds
February 23, 1927.....	210-290 pounds
April 20, 1927.....	170-240 pounds
August 4, 1927.....	170-220 pounds
September 12, 1927.....	170-250 pounds
September 30, 1927.....	190-250 pounds
October 10, 1927.....	170-250 pounds
October 31, 1927.....	210-300 pounds
January 31, 1928.....	170-220 pounds

More recently, Austin has maintained the same classification of hogs throughout the year based on weight differences, and this classification provides for narrow and uniform weight ranges for each grade. The refinement of grades should improve market quotations. This, however, is not as significant as it appears on the surface because the same price is quoted for more than one grade, which shows that as far as price is concerned, the actual classification is not different from that followed where the weight range was wider. In fact, when the extreme range is taken of the grades quoted at the same price we find it is not very different from the changes made at Austin under the old classification. The same price was quoted during the given

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periods on the grades included in the following weight ranges (which contained medium weight hogs) :

August 16, 1928–December 6, 1928...Choice, 170–250 pounds  
December 7, 1928–May 9, 1929.....Choice, 170–280 pounds  
May 10, 1929–July 18, 1929.....Choice, 170–250 pounds  
July 19, 1929–October 15, 1929.....Choice, 170–220 pounds  
October 16, 1929–.....Choice, 170–250 pounds

The grades choice, 170–190 pounds and choice, 200–220 pounds were always quoted the same. For a considerable time the grade choice, 230–250 pounds was included with these two, and for a part of the time the grade choice, 260–280 pounds was also quoted at the same price.

Assuming it were possible to select comparable grades from the published quotations at the various interior markets, and to take proper account of changes in classifications, we would still find it difficult to make a reliable comparison of the prices paid for a given grade at these points because the prices paid may have been different from the prices quoted. These differences usually covered a considerable range at each market and were dependent largely upon the condition of the hogs when they arrived.

The condition of hogs offered for sale is more variable at interior than at terminal markets. At terminal markets the shrinkage caused by long-distance shipping is, in considerable measure, compensated by rest, feed, and water before the hogs are offered for sale. This, although a wasteful practice, does serve to put all lots of hogs on a more nearly uniform basis. Quotations at terminal markets are based upon the prices at which hogs are sold together with offers and bids on unsold lots, a large proportion of all hogs offered for sale on a given day being taken into account by the market reporters who issue the quotations.

The procedure at interior markets is different. Here, hogs are sold as they arrive, without being fed and watered. Those brought from a long distance and

having been on the road for a long time therefore stand considerably greater shrinkage than those brought from close by. Hogs are sometimes bought f.o.b. loading point or at the farm and trucked to market by the purchaser. The packer has to take shrinkage and fill into account in pricing such animals as he is interested in the carcass yield and not in live weight. Although this is a reasonable procedure for a buyer at interior points, it complicates a price comparison between markets because the scale of packers' price adjustments is different at the various interior points. Quotations are based on hogs that arrive in a certain condition (characteristically on hogs trucked a short distance to market). Price adjustments are made for hogs coming from longer distances and thus having greater shrinkage. These, however, are not reflected in the quotations issued. The bases upon which a few of the important interior packers pay for hogs are given below:

*Packing Company A*

This packing company has a zoning system for both truck and rail hogs. There are three zones upon which prices on trucked hogs are based. Zone 1 comprises all but two small corners of one county. The prices quoted on the company's daily price cards are applied to this zone. Zone 2 includes three counties and parts of two others. The price in this zone is five cents per hundredweight above the price in Zone 1. Zone 3 takes in the remainder of the company's territory and there the price is ten cents higher than in Zone 1.

The same base price (20 cents per hundredweight above the price for Zone 1 trucked hogs, which are the hogs upon which quotations are given on the daily cards) is paid for all hogs received by rail. Two kinds of adjustments are made, each based upon the distance of shipment: (a) As distance increases an arbitrary allowance of from 100 to 300 pounds per car for shrinkage is paid for at the regular

price. (b) As freight increases, the packer increases his bid. This is in addition to the shrinkage allowance referred to above. As a result, many hogs are obtained from distances of 100 to 200 miles or more from the plant.

This packing company has recently developed track buying of hogs. Agents are located at a large number of points at considerable distance from the plant.

*Packing Company B*

This company bases its quotations upon hogs trucked from the nearest zone. A premium of as much as 10 cents per hundredweight above the base price is paid for hogs coming from greater distances by truck. A premium of 20 cents per hundredweight is paid for hogs shipped by rail. This packing company has no fixed zones but it adjusts its prices to the appearance of the hogs and the importance of the seller. It allows for added shrinkage on the basis of the length of time on the road. It also buys on contract over the telephone for delivery the following day.

*Packing Company C*

Packing Company C uses the price on trucked hogs as a basis upon which quotations are made. No zones are provided for trucked hogs. Rail hogs are bought at 25 cents above the basic price quoted on the daily cards. It zones the rail hogs and allows from 1 to 3.5 per cent for shrinkage, depending upon the distance shipped and the time in transit.

*Packing Company D*

This company buys all weights of hogs on the basis of the average weight in the load, with only the heaviest packers and the very lightest butchers taken out. These "cut-outs" are not weighed separately, but their weights are estimated by the buyer. The remainder of the load is then priced according to the prevailing quotation on the average weight of the load.

The price quoted on the daily card is based on trucked hogs. No defined zoning system is in operation, but if the

hogs are brought from a considerable distance, some allowance is made through increased price. Rail hogs are bought at 15 cents per hundredweight above the card quotation.

This packing company often pays today's prices, or tomorrow's, whichever are higher for hogs arriving after the market closes in the afternoon.

*Packing Company E*

This is a comparatively small packing plant. It bases its prices on the condition of the hogs as they arrive, taking into account the fill and the distance transported. Because of the small business, it knows most of its shippers fairly well, singles out the ones that give their hogs an undue fill before bringing them to market, and discounts the price paid accordingly. Aside from the amount of fill, it bases its prices on the distance hogs have come.

*Packing Company F*

Packing Company F does a comparatively good job of grading. It sorts out of each load all packers and light hogs, and if necessary sorts the remainder of the load into fairly uniform weight grades. Packers are usually sorted into at least two grades. All grades, both butchers and packers, are priced according to the quotations on the price card.

For rail hogs it pays 30 cents per hundredweight above the card quotation for trucked hogs. It adds 5 cents a hundredweight for rail hogs that have been from four to six hours on the road, 10 cents for those that have been from six to nine hours on the road, and 15 cents for those that have been from nine to twelve hours on the road.

A second adjustment in price is made on the basis of shrinkage. Hogs that have been from three to four hours on the road are allowed 100 pounds shrinkage per car, and 50 pounds more for every additional hour. The price paid for this shrinkage is about halfway between that for butchers and packers and so is lower than the average price paid for the typical carload of hogs.

The company pays up to 20 cents per hundredweight premium for purebred or cross-bred Hampshire or Yorkshire hogs.

Sales for "future delivery" are permitted. Shippers in the country may telephone to the plant and sell several carloads of hogs at stated prices, for delivery within from three to five days. The price paid for these hogs may differ materially from the price paid for hogs arriving on the same day which have not been previously contracted for.<sup>6</sup>

The outstanding significance in the above analysis is that the price quotations at interior markets are much less dependable than those at terminal markets. At interior points the quotations by grades are based on hogs brought by truck from within a short distance. Hogs undergo different degrees of shrinkage after they leave the farm, largely due to varying distances transported and time in transit. The price paid for the different lots is adjusted to take account of this shrinkage and of fill, which affects the dressing yield of the animals. The adjustments made are not uniform at the different interior points. Moreover, the grade classifications upon which prices are quoted differ from market to market and from time to time during the year. These factors considerably complicate the price comparisons between interior markets.

Before concluding this discussion attention should be called to the expansion of the work of the Bureau of Agricultural Economics of the United States Department of Agriculture to provide market reporting service at a group of interior markets in the heaviest producing areas of the country.<sup>7</sup> The federal reporting

<sup>6</sup> This material was adapted from information obtained from D. A. FitzGerald, Agricultural Extension Service, Iowa State College, Ames, Iowa.

<sup>7</sup> The reporting at these markets was begun on Aug. 1, 1930. The service covers numerous packing plants and concentration points in Iowa and southern Minnesota.

service at these interior points provides for the following uniform grade classification upon which price quotations are given:

Light light.....	140-160 pounds,	good and choice
Light weight.....	{160-180 pounds}	} good and choice
	{180-200 pounds}	
Medium weight.....	{200-220 pounds}	} good and choice
	{220-250 pounds}	
Heavy weight.....	{250-290 pounds}	} good and choice
	{290-350 pounds}	
Packing sows.....	275-500 pounds,	medium and good
Slaughter pigs.....	100-130 pounds,	good and choice
Feeder and stocker pigs..	70-130 pounds,	good and choice

(Soft or oily hogs and roasting pigs are excluded from classification. Each price is quoted as a range.)<sup>8</sup>

The federal reporting agency issues a composite price for the Iowa-Minnesota group of interior markets, giving the price range by grades. Since each individual point is usually represented by a single packer or concentration point operator, the agency does not feel justified in reporting individual markets as this would reveal the business of specific concerns. Because of this fact, the service is not as useful to producers and other shippers of livestock as it could be were it feasible to report markets individually. Nevertheless, the establishment of an official reporting service at interior points is distinctly a step in the right direction. It is hoped that the service will be instrumental in inducing operators at interior markets to adopt the federal grade classification in issuing their private market reports. It is reasonable to expect that the federal service will sooner or later be extended to other interior points, and that at least some of the

<sup>8</sup>This is the same classification now used by the Bureau of Agricultural Economics of the U. S. Department of Agriculture at terminal markets. It was adopted for use there on June 30, 1930, and represents a refinement of the light, medium, and heavy butcher grades formerly used.

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interior markets outside the heavy producing area will find it advantageous to adopt the uniform grade classification used by markets co-operating with the federal Bureau of Agricultural Economics. The uniform classification of hog grades and weights will aid materially in making price comparisons between interior markets more significant.



## APPENDIX C

### RELATIONSHIP BETWEEN DIRECT PURCHASES OF HOGS AND THE LEVEL OF HOG PRICES<sup>1</sup>

The practice among packers of buying a considerable proportion of their hogs direct from producers or producers' organizations in the country was discussed in Chapter XI. Although this method of buying has increased greatly in recent years, it is by no means new. Local packers in the producing areas have always found it desirable to acquire a large part of their hog supply direct from farmers rather than from central markets. This has been true also of terminal packers whose plants were not located in direct contact with the stockyards. Eastern packers have secured a certain proportion of their hogs through concentration stations established at strategic points in areas of heavy production. Both local and terminal packers have also maintained country buying stations for hogs.

In 1923 the number of hogs bought direct—that is, outside of public markets—amounted to 24 per cent of all federally-inspected hogs slaughtered in the United States (see Table I on page 428). There was a drop to 22 per cent in 1924, but a return to the 1923 figure in 1925. Since then there has been a rather steady increase so that the percentage of hogs bought direct in 1929 amounted to 40 per cent of the total. The same proportion was maintained in 1930.

The proportion of direct purchases was not constant throughout the year. Although monthly variations did not show a distinct seasonal characteristic, it was usual for the proportion of hogs bought direct to increase during the late fall and early winter, and to

<sup>1</sup> This appendix was prepared by Knute Bjorka.

show something of a decrease during the summer. (See Chart 1 on page 429.)

The growth in the number of hogs bought direct has caused central market traders much concern. Although part of the increase in direct buying since 1926 has been due to the expansion in business enjoyed by interior packers, the major portion of it must be credited to the new policy of some of the large terminal packers of going into the producing area for a portion

I. HOGS BOUGHT DIRECT AS A PERCENTAGE OF ALL HOGS  
SLAUGHTERED UNDER FEDERAL INSPECTION, 1923-1930 \*

Year	Percentage	Total Number Slaughtered under Federal Inspection
1923.....	24.0	53,334,000
1924.....	22.0	52,873,000
1925.....	24.0	43,043,000
1926.....	27.1	40,636,000
1927.....	32.6	43,633,000
1928.....	35.4	49,795,000
1929.....	40.2	48,445,000
1930.....	40.1	44,266,000

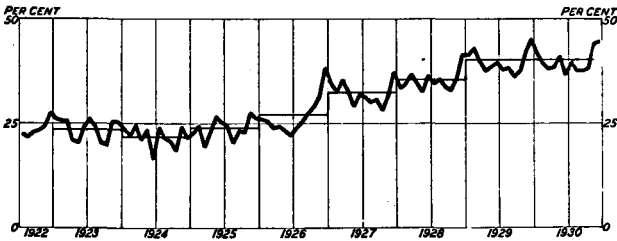
\* U. S. Department of Agriculture *Yearbook*, 1923, pp. 931-32; and *Crops and Markets*, Feb. 30, 1931, pp. 54, 59.

of their supply, dealing with farmers or with co-operative shipping associations. Such procedure is vigorously opposed by terminal market traders and has caused direct buying to become a burning issue.

As pointed out in Chapters XI, XIV, and XVI, the practice of direct buying has been opposed because of its unfavorable effect on the earnings of commission firms, stockyards companies, and other agencies engaged in handling livestock at the terminal, and also on the ground that methods of dealing at interior points where competition is weak and regulatory agencies absent result in settlements which offer no benefit to the producer. The major argument against

country buying of hogs, however, has been that it adversely affects the whole price level. It is contended that, since country buying reduces the amount of purchases at the central markets, it decreases competition, which in turn results in depressed prices at these markets. Since prices paid in the country are quoted nominally on the basis of the central market to which the local area is tributary, it is argued that the lowering of the terminal price will be reflected in lower prices at country points as well.

1. MONTHLY AND ANNUAL RATIO OF HOGS BOUGHT DIRECT TO ALL HOGS SLAUGHTERED UNDER FEDERAL INSPECTION  
JULY, 1922-DECEMBER, 1930



This argument proceeds along two lines: (1) Some hold that meat prices have been maintained but that hog prices have been reduced, thereby permitting the packers to increase their margin of profit. (2) Others contend that the spread between hog prices and hog product prices has not been affected, but that packers have favored the consumer to the detriment of the producer. They hold that direct buying of hogs is responsible for the depression of both hog and pork product prices below the point where they would have been if a larger proportion of the hogs had been traded in on the public markets. Unfortunately it is not possible to devise objective measurements which will give a conclusive answer to these contentions. However, in the present study we hope to throw some light on

the question by subjecting the problem to statistical analysis.

### I. PRICES OF HOGS AND OF HOG PRODUCTS

In order to ascertain whether there has been a change in the spread between the price of hogs and the price of hog products it is first necessary to obtain a satisfactory price series for pork products. There is no existing price series on hog carcasses. It is necessary, therefore, to resort to prices on specific cuts for which reliable quotations are available. Among important pork products for which satisfactory prices are collected by the Bureau of Agricultural Economics are hams, loins, shoulders, spareribs, and lard. The prices of these various products are used and are combined by being weighted on the basis of their relative importance in an average 250-pound dressed carcass.<sup>2</sup> Their corresponding weights are as follows:

Hams (12-16 pounds).....	17.7 per cent
Loins (10-12 pounds).....	12.9 " "
Shoulders, skinned.....	12.6 " "
Spareribs (half sheets).....	1.7 " "
Lard, pure (tierces).....	12.2 " "
	57.1 " "

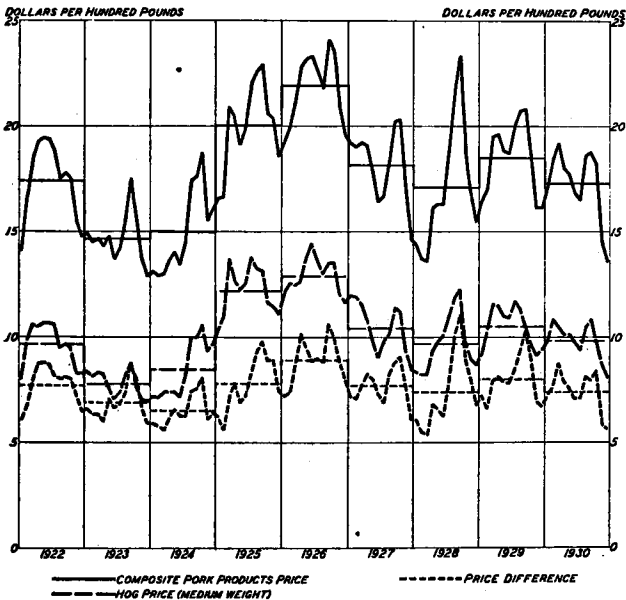
These prices are all based on fresh rather than cured products. Although hams and shoulders generally move into the consumer market as cured products, there is sufficient trading in the fresh cuts to establish a market, and fresh product prices are available. It would have been desirable to include the price on bellies from which bacon is derived, thereby accounting for an additional 16 per cent of the carcass, but there is no comparable price series on this cut. The price of cured bacon might have been included in place of bellies, but this price series by the Bureau of Agricultural Economics is not comparable for the entire period

<sup>2</sup> Weights are based on data presented by Rudolf Clemen in *American Livestock and Meat Industry*, p. 351.

since 1922. The bacon cut, therefore, is not taken into account.

It is the price difference between hogs and hog products that we are primarily interested in at this point. Chart 2 on this page gives the price of medium weight hogs (220-250 pounds) and a composite pork product

2. MONTHLY AND ANNUAL HOG PRICES COMPARED WITH COMPOSITE PORK PRODUCT PRICES AT CHICAGO, 1922-1930



price for the years 1922-1930 at Chicago. The difference between the price per hundredweight of hogs and the price of one hundred pounds of composite pork products is shown by the broken line on the same chart. It can be readily observed that the spread between the price of hogs and the price of products was not constant over this period (see also Table II on page 432). On the other hand, it tended to increase as the prices

of hogs and pork products advanced and to decrease as prices fell. This was true seasonally as well as cyclically, as was to be expected. High hog prices occur when the supply of hogs is small. When supply is light slaughtering establishments as well as distributing agencies have higher overhead per unit of product than when the supply is heavy. This is reflected in the selling price of the product. Therefore, when

II. RELATION OF PRICE OF HOGS AND OF PORK PRODUCTS  
AT CHICAGO, 1922-1930

(Average price per hundredweight)

Year	Hog Price	Composite Pork Product Price	Difference between Price of Hogs and Price of Pork Products	<i>Hog Price as a Percentage of Pork Product Price</i>
1922.....	\$9.67	\$17.38	\$7.71	55.6
1923.....	7.83	14.72	6.89	53.2
1924.....	8.47	14.99	6.52	56.5
1925.....	12.23	20.05	7.82	61.0
4-year average	\$9.55	\$16.79	\$7.24	56.9
1926.....	\$12.94	\$21.87	\$8.93	59.2
1927.....	10.45	18.15	7.70	57.6
1928.....	9.69	17.12	7.43	56.6
1929.....	10.52	18.54	8.02	56.7
1930.....	9.85	17.27	7.42	57.0
5-year average	\$10.69	\$18.59	\$7.90	57.5

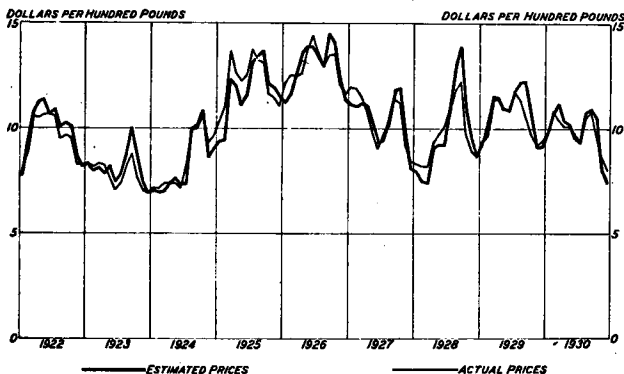
the supply is low the price is high, and the differential between hog prices and product prices widens.

In order to ascertain the constancy of the ratios between them, the percentage that hog prices were of pork product prices was computed for the years 1922-1930. (See the last column in Table II on this page.) It may be noted that the percentage usually increased as prices rose and decreased as they fell. This was to be expected. Direct costs incident to slaughtering and disposing of the product do not fluctuate with the price of hogs but may be assumed to be more nearly proportionate to the products handled.

A decrease in the volume of hogs increases hog prices, but the increased cost per unit of product handled is not proportionate to the increase in hog prices.

A comparison of the relationship of the price of hogs and of pork products for the period 1922-1925 with the period 1926-1930 (in which there was increased direct buying) has been made in Table II on page 432. It shows that the price of hogs was \$1.14 higher in the latter period than in the former, the price of pork products \$1.80 higher, the difference between hog

3. CORRESPONDENCE OF ACTUAL HOG PRICES WITH ESTIMATES BASED ON PORK PRODUCT PRICES, 1922-1930 \*



\* Method of estimating is explained on pp. 433-34.

prices and pork product prices 66 cents greater, and the proportion that hog prices were of pork product prices increased by .6 per cent.

This relationship has been studied further by methods of correlation. Taking the monthly price series of medium weight hogs and the composite pork product price which we have already employed (see page 431) for the period 1922-1925 inclusive, we secure a correlation coefficient of  $+0.951 \pm 0.009$ . From this measure of relationship we derive the following estimated formula with  $P$  representing the com-

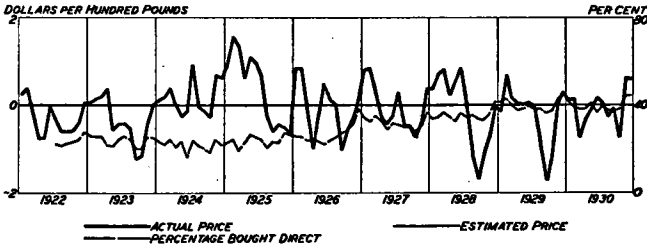
posite price of pork products for the period 1922-1925 inclusive:

$$\text{Estimated hog price} = .673 P - 174$$

This formula is then used to estimate monthly prices for the entire period. The curve derived from the estimated formula, therefore, represents the price of pork products, but is reduced proportionately so as to be directly comparable to hog prices. The estimated curve is plotted in Chart 3 on page 433.

The object in projecting the estimated price is to ascertain whether changes have taken place in the

#### 4. DEVIATION OF ACTUAL HOG PRICES FROM ESTIMATED PRICES, AND PERCENTAGE OF HOGS BOUGHT DIRECT, 1922-1930



relationship between pork product and hog prices. If the contention that the price of pork products has been maintained and the price of hogs has been depressed is correct, the estimated price for the latter period should exceed the actual price and the amount of the discrepancy would be revealed. In Chart 3 actual price follows estimated price reasonably closely, but it is desirable to examine precisely how the two curves differ. This is facilitated by reducing the estimated price to a straight line and plotting the actual price fluctuations above and below it as a base (see Chart 4 on this page). The actual price constantly fluctuates above and below the estimated price. Comparison on the basis of yearly average price of hogs with yearly estimated price may be made by referring



to Table III given below. The actual hog price was 29 cents below the estimated price during 1922 and 34 cents below in 1923, but it was 17 cents and 47 cents respectively above the estimated price during 1924 and 1925.

Turning to the period 1926-1930 inclusive—the years in which we are especially interested—we find that actual prices ran below estimated prices by 5 cents

III. ACTUAL HOG PRICES COMPARED WITH ESTIMATES BASED ON PORK PRODUCT PRICES, 1922-1930

Year	Actual Price	Estimated Price Based on Composite Pork Product Price	Actual Compared with Estimated
1922.....	\$9.67	\$9.96	\$ -.29
1923.....	7.83	8.17	-.34
1924.....	8.47	8.30	+.17
1925.....	12.23	11.76	+.47
4-year average..	\$9.55	\$9.55	—
1926.....	\$12.94	\$12.99	\$ -.05
1927.....	10.45	10.48	-.03
1928.....	9.69	9.79	-.10
1929.....	10.52	10.74	-.22
1930.....	9.85	9.89	-.04
5-year average..	\$10.69	\$10.78	\$ -.09

per hundredweight in 1926, 3 cents in 1927, 10 cents in 1928, 22 cents in 1929, and 4 cents in 1930. Insofar as this indicates anything with reference to the course of prices, it suggests the presence of a slightly depressive influence in recent years.<sup>3</sup> However, this is within the range of error of estimate, which is 41 cents.

<sup>3</sup> It should be borne in mind, however, that even in these years there were periods of several months in which the actual price ran above the estimated price, and the coefficient of correlation between actual price and estimated price throughout the whole of the period 1926-1930 was  $+0.938 \pm 0.010$  as compared with a coefficient of  $+0.951 \pm 0.009$  for 1922-1925. For discussion of the seasonal aspect of the problem, see pp. 436-37.

As we get further away from the period upon which the estimating formula is based, changing conditions in the industry may have modified the relationship between pork product prices and hog prices. However, since the estimating formula applies nearly as well during the later period as during the earlier, there is no statistical evidence that the relationship between pork product prices and hog prices has been modified since 1926, when direct buying of hogs showed marked increase.

It has been pointed out that the spread between pork product prices and hog prices widens when we operate on a higher price level for hogs and products and narrows when we operate on a lower level. The fact that we operated on a higher price level for hogs during the latter period need not concern us at this point because the influence of the changes in the price level for hogs and products was not removed in the correlation analysis, and was consequently taken account of in the estimating formula. On the other hand, this assumes that the same factors affecting hog prices during 1922-1925 would prevail to the same degree during 1926-1930, except that the increase in direct buying of hogs is the new factor in the situation.

Furthermore, it will be noted from Chart 4 on page 434 that, even though the actual price for a given year averaged less than the estimated price, there were certain periods in each year in which the actual price ran above the estimated price; and these periods in which the relationship was comparatively favorable seemed to coincide with high points in the curve showing the percentage of hogs bought direct rather than with low points. Actual price varies above and below estimated price with some degree of seasonal regularity. During December, January, February, and March it is characteristic for the price of hogs to be above the estimated price, while for August, September, October, and November the price falls below estimated price quite

consistently. The price during the other months shows more variation.

We are interested in seeing whether there is any relationship between the seasonal variation in the proportion of hogs bought direct and the strength of the price of hogs in comparison to the estimated price. If an increase in direct purchases has a depressing effect on the price of hogs seasonally, the two curves will move in opposite directions. They do not do so. There is more of a tendency for a small proportion purchased direct to be associated with low relative prices, and with increased proportions of direct purchases to be associated with a strengthened price for hogs. This was particularly so during the period since the summer of 1926 when the proportion of hogs bought direct increased substantially.

It appears from Chart 4 on page 434 that the proportion of hogs bought direct to all hogs slaughtered under federal inspection in the United States shows a seasonal (month-to-month) change. Furthermore, the seasonal variation seems to synchronize somewhat with the seasonal change of the actual price of hogs as it varies about the estimated price. It is desirable to make a more careful examination of the relationship of these curves. In order to bring the seasonal characteristic of the curve of directs into greater relief, it is advisable to remove the trend of the series. The trend has been distinctly upward since 1926, but it remained fairly horizontal prior to that time. It therefore is determined for the entire period, and actual values are measured as deviations from it.<sup>4</sup>

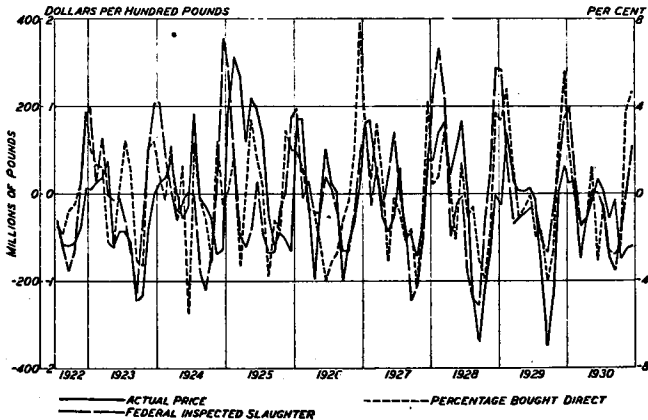
The adjusted curve for hogs purchased direct and the curve of actual price as it varies from estimated price are shown in Chart 5 on page 438. It is evident from the diagram that the two curves tend to move similarly. This is particularly true during the latter

<sup>4</sup>The trend is determined by a 12-month moving average, centered.

part of 1928 and during 1929 and 1930. The movement seems to be less uniform during the period 1922-1925 inclusive than during the period since 1926.

The general appearance of the curves giving the proportion of all hogs bought direct and the actual price of hogs as it varied about estimated price is not unlike the seasonal curve for the entire hog supply.

5. SEASONAL MOVEMENTS OF DIRECT PURCHASES, VARIATION OF ACTUAL FROM ESTIMATED PRICE, AND SLAUGHTER UNDER FEDERAL INSPECTION, 1922-1930



We will use federally-inspected slaughter to represent hog supply.<sup>5</sup> The trend has been removed from the federally-inspected slaughter series also and monthly values are measured from the trend.<sup>6</sup> The adjusted curve is also plotted in Chart 5. There is a direct relationship between this and the other two curves, and they all move together with considerable regularity.

<sup>5</sup> The data represent pork produced for food under federal inspection instead of the number of hogs slaughtered under federal inspection. Slaughter data were originally supplied by the Bureau of Animal Industry.

<sup>6</sup> This trend is also determined by a 12-month moving average, centered.

The hog supply curve also coincides more closely with the other two curves during the period 1926-1930 than during the earlier period.

By applying a statistical measure of the relationship of the curves presented in Chart 5 we find a verification of the conclusions drawn from an inspection of the graph. A correlation between the percentage of all hogs bought direct (measured from trend) and the difference between actual price and estimated price gives a coefficient of  $+0.340 \pm 0.092$  for the years 1922 to 1925 inclusive,<sup>7</sup> and a coefficient of  $+0.543 \pm 0.061$  for the period 1926-1930 inclusive. The correlation coefficient between the percentage of all hogs bought direct and federally-inspected slaughter, representing supply (also measured from trend), is  $+0.395 \pm 0.088$  for the earlier period and  $+0.608 \pm 0.055$  for the later period. The difference of actual price measured from estimated price correlated with federally-inspected slaughter with a coefficient of  $+0.211 \pm 0.099$  for the earlier period and  $+0.574 \pm 0.058$  for the period 1926-1930. This shows that the correlation between each pair of series is measurably higher for the period 1926-1930 than for the earlier period, and that the degree of relationship between the different pairs of variables for each period is substantially the same.

We are not justified in assuming any particular causal sequence in the change of these factors. But the facts that the price of hogs is high relative to pork product prices during the same months that the proportion of hogs bought direct is relatively high, and that low price of hogs as compared to the price of products tends to be associated with a relatively small percentage of hogs bought direct, are established. Furthermore, these factors tend to increase when the

<sup>7</sup> Data on the percentage of total hogs bought direct were first collected for July, 1922. The period from 1922 to 1925 inclusive is therefore 42 months.

hog supply is high and tend to decrease when the hog supply is low.

The foregoing analysis does not support the contention that direct marketing has caused the price of hogs to decline. The actual spread in price between hogs and hog products has widened during the period 1926-1930 as compared to the relationship that existed during the period 1922-1925, but because the price of hogs and of products was on a higher level during the latter than during the former period. The actual spread tended to increase as price rose and to decrease as price fell. The price of hogs in fact was a higher proportion of the price of pork products during the period 1926-1930 than during the previous period.

The actual price of hogs averaged below estimated price each year since 1926, the spread widening during 1928 and 1929 as compared to 1926 and 1927. However, for 1930 actual price was only four cents below estimated price. This is distinctly within the range of probable error.

The estimating formula based on the relationship that prevailed between hog prices and pork product prices during the period 1922-1925 applies practically as well to the period 1926-1930 as it does to its own period. A high hog price as compared to the estimated price tends to be associated with high total market receipts and a low relative price with low total market receipts.

The fact that a high price for hogs in relation to the price of products, the percentage of hogs bought direct, and the total market supply of hogs are related directly does not justify an assumption of causal connection between these series. On the other hand, the most logical explanation of this relationship seems to be about as follows: Direct buying of hogs increases rapidly as the seasonal marketable supply increases. This is not only true of the total volume of hogs bought direct, but the proportion of the total also increases.

Competition for hogs in the country increases during the heavy packing season and consequently a smaller proportion of the supply is consigned to public markets. With the increased supplies at all points (at public markets as well as country points) each buyer can handle a larger volume, thus decreasing the expense per unit. Reduced buying expense for hogs, together with more economical use of packing equipment, reduces the unit cost of producing the finished product. Because of competition for hogs, these savings in operation, instead of accruing entirely as profits to the packers, will at least in part be reflected in the payment of a higher price to producers. The expense of handling products at the season of heavy supply is not affected in the same manner. Pork products move into consumption at a more uniform rate throughout the year; thus a portion of the products produced during periods of heavy marketing needs to be held over to be disposed of during seasons when the hog supply is low. That is, the cost of handling products tends to be proportionate to the volume sold, while the expense of acquiring hogs, operating the packing plant, and processing tends to decrease as volume increases and increase as volume decreases; and the reduced unit cost is reflected in an increased price to producer because of competition. The price of hogs relative to products increases, therefore, when the supply of hogs is high and decreases when the supply of hogs is low, as does the percentage of hogs bought direct.

## II. HAS DIRECT BUYING DEPRESSED BOTH HOG AND HOG PRODUCT PRICES?<sup>8</sup>

It was concluded from the analysis in Section I that no measurable change in the relationship between the price of hogs and the price of hog products has taken place as a result of an increase in direct buying. To test whether the price levels of both hogs and products

<sup>8</sup> The author acknowledges helpful suggestions and criticism from Max Sasuly in the preparation of this section.

have been affected is more difficult. The close relationship between the price of hogs and the price of pork products has been established. Consequently, we can drop one of these series in our present problem. Since it is the price of hogs we are concerned about, that series will be retained. We propose to replace the pork product price series with series of some other factors which are assumed to be responsible for the price of pork products. These series will be used as independent variables in a multiple correlation problem and their individual and joint influences upon hog prices will be determined. An estimating formula, based on the relative influence of the individual factors will be computed and the estimated price of hogs will be determined for each month. The four years, 1922-1925 will be used as the base period and the analysis will be, in general, the same as that followed in the problem in Section I.

The following factors are used in the multiple correlation problem:

A. Inspected slaughter, in millions of pounds.<sup>9</sup> This is adjusted to uniform 30-day months. A slight smoothing of the data is made by taking a weighted three-month moving average, centered, the weights being 1-2-1.

B. Storage holdings of pork and lard<sup>10</sup> measured as percentage variations from normal holdings, the normal being established for the nine years 1921-1929.

C. The price per pound of prime summer yellow cottonseed oil, in barrels, New York.<sup>11</sup>

D. The Standard Statistics index of business,<sup>12</sup> corrected for seasonal changes but not for trend.

X. The price of medium weight hogs at Chicago.<sup>13</sup>

<sup>9</sup> *Statistical Bulletin* No. 18, U. S. Department of Agriculture, pp. 74-75 and issues of *Crops and Markets*.

<sup>10</sup> *Ibid.*, pp. 103-4, and issues of *Crops and Markets*.

<sup>11</sup> U. S. Department of Agriculture *Yearbook*, 1930, p. 693.

<sup>12</sup> *Standard Statistical Bulletin*, 1930-31, Base Book Issue, p. 126.

<sup>13</sup> *Statistical Bulletin* No. 18, U. S. Department of Agriculture, pp. 132-33, and U. S. Department of Agriculture *Yearbooks*.



Variables *A*, *B*, *C*, and *D* are the independent variables and *X* the dependent variable. Variables *A* and *B* are supply factors. Inspected slaughter accounts for the current supply, and storage holdings, measured from normal holdings, account for larger or smaller stocks than usual. Cottonseed oil (*C*) represents a competing article for lard. The index of business (*D*) serves as a measure of consumers' ability to make purchases. It was originally planned to include a price series of beef since this is a competing article for pork, but when tested it did not show a significant relationship with the price of hogs for the base period 1922-1925, and was therefore omitted.<sup>14</sup>

The gross relationship between each of the independent variables and hog prices is measured by the following coefficients:

$$XA = -0.634 \pm 0.058$$

$$XB = -0.420 \pm 0.080$$

$$XC = +0.102 \pm 0.096$$

$$XD = +0.123 \pm 0.096$$

A multiple correlation of monthly data between *A*, *B*, *C*, and *D* as independent variables, and *X* as the dependent variable gives a coefficient (*R*) of  $0.738 \pm 0.044$  for the base period 1922-1925. An estimating formula is computed on the basis of the existing relationship for this period<sup>15</sup> and an estimated monthly price based on the formula is derived for the period

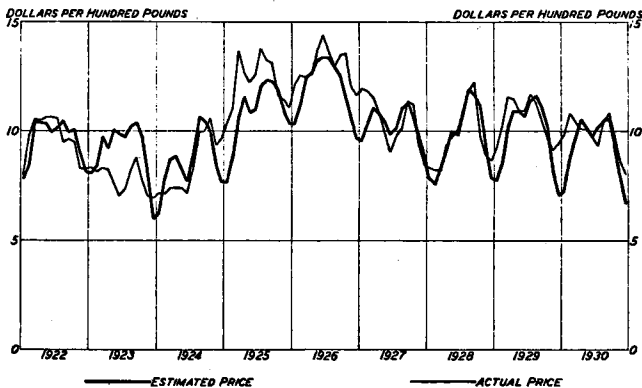
<sup>14</sup>A simple correlation between beef prices and hog prices for this period gave a coefficient of  $-0.386 \pm 0.083$ . Though the month-to-month changes in beef prices and hog prices, measured from their respective cyclical trends, correlated directly, the fact that the period 1922-1925 covered different phases of the cycles of the two series accounted for the gross negative relationship. Since in our problem it is desirable to retain the effect of the cycle it was deemed advisable not to include the beef price series in the multiple correlation problem.

<sup>15</sup>The following is the estimated formula: Estimated Hog Price =  $-.8626A - 3.9236B + .2758C + 6.9636D + 880$ .

1926-1930 as well as for the period for which the formula is derived.

The actual price and the estimated price of hogs for the nine-year period 1922-1930 are given in Chart 6 on this page. The relationship between these two curves has considerable irregularity for the earlier period but their movements synchronize more closely during the period from 1926 to 1930 inclusive.<sup>16</sup>

6. ACTUAL HOG PRICES COMPARED WITH "LINEAR"  
ESTIMATES, 1922-1930 \*



\* Estimated prices are based upon linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices.

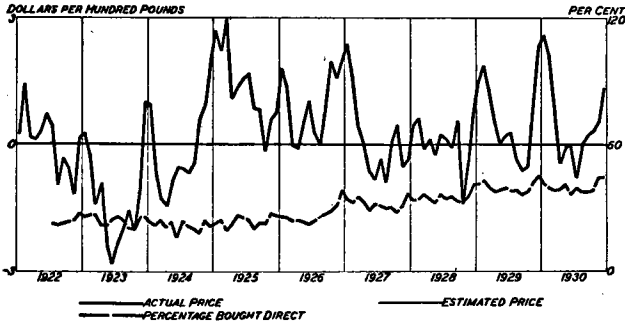
The variation between actual and estimated prices may be seen more clearly in Chart 7 on page 445 where the residuals of the price of hogs measured from estimated price, designated as a horizontal zero base, are shown. An examination of the relationship of the two curves reveals that, in general, they vary directly with the hog price cycle. That is, the actual price tends to be below estimated price when the hog price

<sup>16</sup> The relationship between actual and estimated prices for the period 1926-1930 gives a correlation coefficient of  $+0.845 \pm 0.028$ . This compares with a coefficient of  $+0.738 \pm 0.044$  for the period 1922-1925.

cycle is low, and above estimated price when the hog cycle is high.

On the basis of the relationship that existed between the four independent variables and the price of hogs during the base period 1922-1925, we find that actual prices were on the average above estimated prices every year during the period 1926-1930, although the reverse was true some months every year. The rela-

7. DEVIATIONS OF ACTUAL HOG PRICES FROM "LINEAR" ESTIMATES, 1922-1930 <sup>a</sup>



<sup>a</sup> Estimated prices are based upon linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices.

tionship between actual and estimated prices by years is shown in Table IV on page 446. During the base period, actual price was above estimated price for 1922 and 1925, but the reverse was true for 1923 and 1924. During the latter period, actual price exceeded estimated price every year, ranging from 7 cents above in 1928 to 96 cents above in 1926, with an average of 47 cents above for the five-year period.

If we assume the independent variables *A*, *B*, *C*, and *D* in this study to have the same influence upon the price of hogs (*X*) during 1926-1930 as they had during

the base period 1922-1925,<sup>17</sup> do we find that the rapid increase in direct buying of hogs since the summer of 1926 has had a depressing effect upon the price of hogs? If this were true, the actual price of hogs as compared to the estimated price would be related inversely to changes in the proportion of hogs marketed direct. That is, as the proportion of directs

IV. ACTUAL HOG PRICES COMPARED WITH "LINEAR" ESTIMATES,  
1922-1930 \*  
(Average price per hundredweight)

Year	Actual Price	Estimated Price	Actual as Compared With Estimated Price
1922.....	\$9.67	\$9.62	\$ + .05
1923.....	7.83	9.11	- 1.28
1924.....	8.47	8.63	- .16
1925.....	12.23	10.85	+ 1.38
4-year average....	\$9.55	\$9.55	—
1926.....	\$12.94	\$11.98	\$ + .96
1927.....	10.45	10.33	+ .12
1928.....	9.69	9.62	+ .07
1929.....	10.52	9.89	+ .63
1930.....	9.85	9.30	+ .55
5-year average....	\$10.69	\$10.22	\$ + .47

\* Estimated prices are based upon linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices. The estimating formula is based upon the relationship existing during the period 1922-1925.

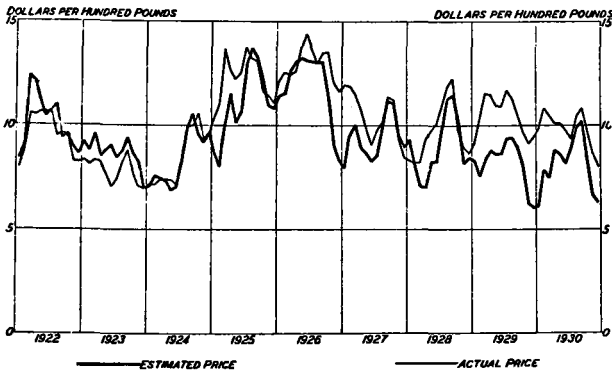
continued to increase during the latter period, the actual price of hogs compared to the estimated price would continue to decline. This did not take place. On the contrary, actual price compared to estimated price was strengthened during the period 1926-1930 over the earlier period. The curve giving the proportion of hogs bought direct to all hogs slaughtered under

<sup>17</sup> This is the same procedure followed in the analysis of the relationship between the price of pork products and the price of hogs presented in Section I.

federal inspection is shown in Chart 7 on page 445.

The difference between actual price and estimated price as shown in this chart may be because of a non-linearity in the relationship between the independent variables *A*, *B*, *C*, and *D* and the dependent variable *X* for the period 1922–1925. Furthermore, it appears that the relationship of actual price to estimated price is of a seasonal character. The possibility of the presence of a non-linear relationship

8. ACTUAL HOG PRICES COMPARED WITH "NON-LINEAR" ESTIMATES, 1922–1930 <sup>a</sup>



<sup>a</sup> Estimated prices are based upon non-linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices.

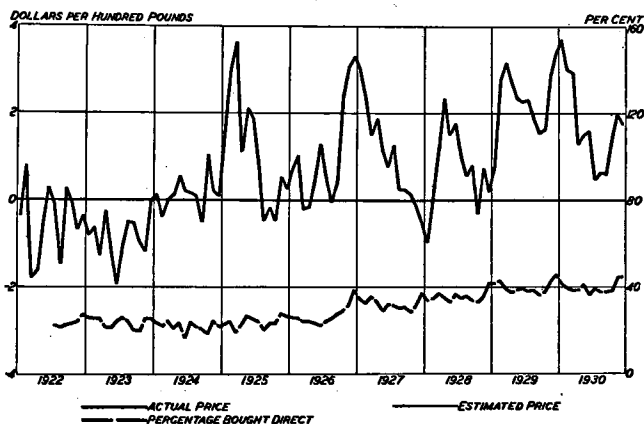
between each of the independent variables and the price of hogs, and the changing relationship seasonally were examined and are discussed below.

The curves of actual price and of estimated price based on a non-linear relationship of each of the variables, *A*, *B*, *C*, and *D*, with *X*, with seasonal characteristics taken into account, are shown in Chart 8 on this page.<sup>18</sup> The estimated curve shown here differs slightly

<sup>18</sup> The graphic non-linear multiple correlation method used quite extensively by research workers in the U. S. Department of Agriculture, and for which L. H. Bean is largely responsible, was employed.

from the estimated curve shown in Chart 6 where it is based upon linear relationships between the independent variables and the price of hogs and which takes no account of seasonality. The residuals between the curve of actual price and the curve of estimated price are shown in Chart 9 given below, where the estimated price is designated as a horizontal

9. DEVIATIONS OF ACTUAL HOG PRICES FROM NON-LINEAR ESTIMATES, 1922-1930 <sup>a</sup>



<sup>a</sup> Estimated prices are based upon non-linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices.

zero base, and the actual price as varying above and below it. This shows that actual price varied less from estimated price during the period 1922-1925 when taking account of non-linearity of the independent factor than when assuming linearity which was the case in Chart 7. The multiple correlation coefficient between the four independent variables and the dependent variable, hog price, when taking into consideration non-linearity and seasonal characteristics for the period 1922-1925, is  $0.829 \pm 0.030$  as compared to

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0.738 ± 0.044 when non-linearity and seasonality are not accounted for.<sup>19</sup>

A comparison of actual price and estimated price by years for the period 1922-1930 inclusive is given in Table V on this page. The actual price was below the estimated price for 1922 and 1923, but above for 1924 and 1925. During the period 1926-1930, actual price exceeded estimated price every year, ranging from 74 cents above in 1928 to \$2.40 above in 1929, an average of \$1.39 for the five-year period.

**V. ACTUAL HOG PRICES COMPARED WITH "NON-LINEAR"  
ESTIMATES, 1922-1930 \***  
(Average price per hundredweight)

Year	Actual Price	Estimated Price	Actual as Compared With Estimated Price
1922.....	\$9.67	\$10.14	\$ - .47
1923.....	7.83	8.67	- .84
1924.....	8.47	8.32	+ .15
1925.....	12.23	11.07	+ 1.16
4-year average....	\$9.55	\$9.55	—
1926.....	\$12.94	\$11.89	\$ + 1.05
1927.....	10.45	9.45	+ 1.00
1928.....	9.69	8.95	+ .74
1929.....	10.52	8.12	+ 2.40
1930.....	9.85	8.11	+ 1.74
5-year average....	\$10.69	\$9.30	\$ + 1.39

\* Estimated prices are based upon non-linear relationship of inspected slaughter, storage holdings, cottonseed oil price, and the Standard Statistics index of hog prices.

By taking account of non-linearity and seasonality, the estimated price for the latter period, based on the four independent factors used, is less than when assuming linear relationships, which accounts for the actual price appearing more favorable.

<sup>19</sup> This reduces the probable error of estimate to 74 cents as compared to 89 cents when non-linearity and seasonality are not taken account of.

It should be recalled that the purpose of this analysis was to ascertain whether the increase in the proportion of hogs bought direct has been responsible for the depression of the price of hogs and of pork products. Since direct marketing of hogs has increased considerably since 1926 it is the relationship between actual and estimated prices during the period 1926-1930 that is of especial interest. It is seen above that the actual price of hogs was higher during the period 1926-1930 than the price as estimated by both the linear and non-linear relationships between hog prices and the composite index of inspected slaughter of hogs, storage holdings of pork and lard, the price of cottonseed oil, and the Standard Statistics index of business during the period 1922-1925.

We are not justified in drawing the conclusion that the higher price of hogs (and consequently of pork products) as compared to estimated price during the period 1926-1930 was due to the increase in the proportion of hogs bought direct. Other factors may have been responsible. It must be concluded, however, that this study yields no statistical evidence to show that the increase in direct marketing of hogs has had a depressing effect upon the level of hog prices and the price of pork products.



APPENDIX D

CERTIFICATE OF INCORPORATION  
AND CODE OF BY-LAWS  
OF THE  
NATIONAL LIVESTOCK  
MARKETING ASSOCIATION

CERTIFICATE OF INCORPORATION

We, the undersigned, in order to form a corporation for the purposes hereinafter stated, under and pursuant to the provisions of an Act of the Legislature of the state of Delaware, entitled "An Act Providing a General Corporation Law," (approved March 10, 1899) and the acts amendatory thereof, and supplemental thereto, do hereby certify as follows:

I. The corporate name is—

NATIONAL LIVESTOCK MARKETING ASSOCIATION

II. The location of the principal office in Delaware of the corporation is 7 West Tenth Street, in the city of Wilmington, county of New Castle; and The Corporation Trust Company, 7 West Tenth Street, Wilmington, Delaware, is designated as the statutory agent therein, in charge thereof, and upon whom process against the corporation may be served.

III. The nature of the corporation's business and the objects and purposes to be transacted are all or any of the following:

To market, handle and sell for its stockholders and others, livestock and the products of livestock upon a commission or other basis; to handle, market and sell to its members and others, supplies, equipment and other property necessary or useful in connection with the production, handling and marketing of livestock; to engage in any activity involving or related to the

handling, and /or killing of livestock, and the marketing, processing, packing and curing of meats and the by-products thereof; to provide facilities, finances and services for standardizing, improving and maintaining the organization, management and business methods of its stockholders and of their stockholders and members; to engage in any activity tending to promote or aid in any way the more efficient production of and the handling and marketing of the livestock and the products of livestock of its stockholders, or tending to promote the general welfare of its stockholders; to provide methods and means for the marketing of the livestock of its stockholders and the livestock of others, and for the financing of its operations and the operations of its stockholders; to buy, own, hold, sell, pledge, endorse, guarantee, discount, dispose of and deal in the stocks, bonds, notes and securities of corporations and associations engaged in any activity related to or connected with the marketing, selling, purchasing, financing, or handling of livestock or engaged in any activity related or similar to the purposes for which this corporation is organized. The corporation shall have power to hold, purchase, mortgage, lease and convey real and personal property within and without the state of Delaware, and may have one or more offices without said state. Nothing herein contained shall limit or restrict the powers and rights conferred upon the corporation by the laws of the state of Delaware.

The corporation is organized and shall be operated upon a co-operative basis for the mutual benefit of its stockholders and their stockholders and members as producers of livestock and agricultural products. The corporation shall not deal in the products of persons not owners of stock in the corporation to an amount greater in value than such as are handled by the corporation for its stockholders, and the aggregate value of services rendered to its stockholders and the aggre-

gate value of the products marketed, sold and handled by the corporation to and for its stockholders in every calendar year from January 1 to December 31, inclusive, shall exceed the aggregate value of all services rendered to and products marketed, handled and sold for persons, firms and corporations not owners and holders of its capital stock.

The corporation shall have no power to engage in the business of banking.

Any of the foregoing businesses may be carried on in any part of the world by the corporation alone or in association with others.

IV. The total authorized capital stock of the corporation shall be fifty thousand (50,000) shares of common stock of the par value of ten dollars (\$10) per share, and five thousand (5,000) shares of preferred stock of the par value of one hundred dollars (\$100) per share, amounting in the aggregate to one million dollars (\$1,000,000). The minimum amount of capital with which the corporation will commence business is one thousand dollars (\$1,000).

The preferred stock shall be entitled and limited to dividends, when and as declared by the board of directors, at the rate of five per cent (5%) per annum, based upon the par value thereof, which shall be cumulative as of the date of issue. In case of dissolution of the corporation the holders of preferred stock shall be entitled and limited to receive the par value of their shares and any accumulated and unpaid dividends before any distribution is made to the holders of the common stock. The preferred stock outstanding may be retired in whole or in part by the corporation at any dividend date upon paying to its holders one hundred dollars (\$100) per share and any accrued dividends, and the corporation may select what particular shares of preferred stock it will so retire. Stock of both classes shall be paid in, either in money or property, at such times and in such manner as the

by-laws may prescribe. Both classes of stock shall have voting rights and powers.

No dividends of any kind shall ever be paid upon the common stock, but the net earnings of the corporation, after the payment of dividends upon the preferred stock and after setting aside such reserves and amounts for working capital as the board of directors may, from time to time, determine, shall be refunded to the stockholders and patrons of the corporation on a patronage basis, all in accordance with the by-laws of the corporation.

Amounts set aside for reserves or working capital from business done in any year shall be allocated on the books of the corporation on a patronage basis for that year, or in lieu thereof, the books and records of the corporation shall afford a means for doing so at any time so that in the event of dissolution or earlier if deemed advisable, in the sole discretion of the board of directors, such reserves or working capital or any part of them may be returned to stockholders in accordance with their contributions thereto.

No person shall be entitled to hold or own any part of the capital stock of this corporation except co-operative livestock marketing agencies meeting the conditions of the Act of Congress approved February 18, 1922, entitled "Act to Authorize Association of Producers of Agricultural Products" and which agencies in the calendar year from January 1 to December 31, inclusive, immediately preceding that in which stock is issued to, or acquired by, them, actually marketed for producers of livestock not less than twenty-five hundred single-deck carloads (or the equivalent) of livestock and/or which are otherwise found eligible and acceptable by the board of directors hereof.

In the event any stockholder of this corporation ceases to be eligible to own stock in this corporation, or in case any stockholder shall violate or fail to comply with any contract entered into with this corporation,

then such stockholder shall have no right to vote in any meeting of the corporation or to participate in any way in the affairs or business of the corporation.

At all elections of directors of the corporation each stockholder shall be entitled to as many votes as shall equal the number of its shares of stock multiplied by the number of directors to be elected, and it may cast all such votes for a single director or may distribute them among the number to be voted for or any two or more of them, as it may see fit.

V. The name and place of residence of each of the Incorporators are:

NAME	ADDRESS
Joseph R. Fulkerson	Jerseyville, Illinois
Elmer A. Beamer	Blissfield, Michigan
Ortho O. Wolf	Ottawa, Kansas

VI. The corporation is to have perpetual existence.

VII. The private property of the stockholders shall not be subject to the payment of corporate debts.

VIII. The board of directors of the corporation by the affirmative vote of three-fourths ( $\frac{3}{4}$ ) or more of the entire board of directors is authorized to make and alter the by-laws.

Both stockholders and directors shall have power, if the by-laws so provide, to hold their meetings, have offices and keep the books of the corporation outside the state of Delaware, except as otherwise provided by statute.

IN WITNESS WHEREOF, we, the undersigned, being all of the incorporators of said corporation, have signed and sealed this Certificate, and hereby declare and certify that the facts herein stated are truly set forth, this seventh day of May, 1930.

#### CODE OF BY-LAWS

We, the undersigned, constituting and being all the directors of the National Livestock Marketing Associa-

tion, do hereby adopt the following code of by-laws for said corporation.

#### ARTICLE I. NAME AND LOCATION

*Section 1. Name.* The name of this corporation shall be—

##### NATIONAL LIVESTOCK MARKETING ASSOCIATION

*Section 2. Delaware Office.* The principal office in the state of Delaware is to be located at 7 West Tenth Street, in the city of Wilmington, county of New Castle.

*Section 3. Other Offices.* Other offices for the transaction of business shall be located at such places as the board of directors may from time to time determine.

#### ARTICLE II. CAPITAL STOCK

*Section 1. Authorized Capital.* The total authorized capital stock of the corporation shall be fifty thousand (50,000) shares of common stock of the par value of ten dollars (\$10) per share, and five thousand (5,000) shares of preferred stock of the par value of one hundred dollars (\$100) per share, amounting in the aggregate to one million dollars (\$1,000,000). The minimum amount of capital with which the corporation will commence business is one thousand dollars (\$1,000).

*Section 2. Rights of Preferred Stock.* The preferred stock shall be entitled and limited to dividends, when and as declared by the board of directors, at the rate of five per cent (5%) per annum, based upon the par value thereof, which shall be cumulative as of the date of issue. In case of dissolution of the corporation the holders of the preferred stock shall be entitled and limited to receive the par value of their shares and any accrued dividends before any distribution is made to the holders of common stock. The preferred stock outstanding may be retired in whole or in part by the corporation at any dividend date upon paying to its

holders one hundred dollars (\$100) per share and any accrued dividends, and the corporation may select what particular shares of preferred stock it will so retire.

*Section 3. Terms of Purchase of Stock.* All stock subscribed for by each eligible co-operative livestock marketing agency may be paid for in cash, or twenty-five per cent (25%) in cash at the time of subscription and the balance in three (3) annual installments of twenty-five per cent (25%) each with interest at six per cent (6%) per annum until the full amount shall have been paid. No certificates of stock shall be issued and delivered until the full purchase price thereof shall have been paid. Both classes of stock shall have voting rights and powers.

*Section 4. Rights of Common Stock.* No dividends of any kind shall ever be paid upon the common stock, but the net earnings of the corporation after the payment of dividends upon preferred stock and after setting aside such reserves and amounts for working capital as the board of directors may, from time to time, determine, shall be refunded to the stockholders and patrons of the corporation on a patronage basis; all in accordance with the by-laws of the corporation.

*Section 5. Annual Allocation of Reserve Account.* Amounts set aside for reserves or working capital from business done in any year shall be allocated on the books of the corporation on a patronage basis for that year, or in lieu thereof, the books and records of the corporation shall afford the means for doing so at any time so that in the event of dissolution or earlier if deemed advisable, in the sole discretion of the board of directors, such reserves or working capital or any part of them may be returned to stockholders in accordance with their contribution thereto.

*Section 6. Qualifications of Common Stock Shareholders.* No person shall be entitled to hold or own any part of the capital stock of this corporation except

co-operative livestock marketing agencies meeting the conditions of the Act of Congress approved February 18, 1922, entitled "Act to Authorize Association of Producers of Agricultural Products," and which agencies in the calendar year from January 1 to December 31, inclusive, immediately preceding that in which stock is issued to, or acquired by, them actually marketed for producers of livestock not less than twenty-five hundred single-deck carloads (or the equivalent) of livestock and/or which are otherwise found eligible and acceptable by the board of directors hereof.

*Section 7. Execution of Stock Certificates.* All certificates of stock shall be signed by the president and the secretary and shall be sealed with the corporate seal of this corporation.

*Section 8. Treasury Stock.* Treasury Stock shall be held by the corporation subject to the disposal of the board of directors and shall neither vote nor participate in the dividends.

*Section 9. Liens on Stock.* The corporation shall have a first lien upon all shares of its capital stock and upon all dividends declared upon the same for any indebtedness of the respective holders thereof to the corporation.

*Section 10. Transfers of Stock.* Transfers of stock shall be made only on the books of the corporation, and the old certificate, properly endorsed, shall be surrendered and cancelled before a new certificate is issued. The stock books of this corporation, shall be closed against transfers for a period of twenty (20) days before the day of payment of a dividend and before each annual meeting of stockholders.

*Section 11. Obligation of Amount of Stock.* Co-operative marketing agencies eligible to own stock in the corporation and desiring to acquire stock therein shall first execute an agreement with the corporation in the form prescribed by the corporation. Every stockholder shall be required to take and pay for one share of com-



mon stock for each ten (10) single-decks (or its equivalent) of livestock handled by it during the calendar year immediately preceding that in which it acquires, subscribes for or purchases stock (fractions of less than five single-decks shall be deemed to be ten decks). In the event the applicant for or holder of stock was not engaged in business for one full calendar year preceding its subscription for or acquisition of stock the board of directors shall determine the amount of stock it shall be required to take.

*Section 12. Annual Readjustment of Stock Holding.* At least once every year, at such time as may be determined by the board of directors, there shall be a reappointment of common stock among the stockholders of the corporation on the basis of the volume of business and each stockholder shall be required to take and pay for additional common stock or to deliver to the corporation a portion of its common stock, depending upon whether its business has increased or decreased during said period, all in accordance with the provisions of the contract between the corporation and the stockholder.

*Section 13. Qualification of Preferred Stock Shareholders.* Preferred stock of the corporation shall be sold only to owners of common stock of the corporation each of whom shall whenever preferred stock is issued by the corporation, purchase and pay in cash for at least one share of preferred stock for each one hundred (100) shares of common stock owned by it (fractions of less than fifty shares of common stock to be disregarded and fractions in excess of fifty shares to be treated as one hundred shares).

*Section 14. Restrictions on Sale of Capital Stock.* No stockholder shall transfer or dispose of its stock without first offering the same for sale to the corporation. Upon receiving written notice from a stockholder of its intention to transfer, sell or otherwise dispose of its stock, the corporation shall have thirty

(30) days thereafter within which to purchase and pay for the same. If within said period the corporation shall offer to the holder of such stock an amount equal to the par value thereof, plus accrued dividends upon preferred stock, such stock shall thereupon become the property of the corporation. Should the corporation fail to offer such amount to the stockholder within said period the stockholder serving such notice shall thereupon be free to dispose of the stock without restriction, except that no stock shall be transferred or sold to any person or corporation other than a co-operative livestock marketing agency eligible to hold or own stock in the corporation as herein elsewhere provided.

*Section 15. By-Laws Obligation on Stockholder.* Should any stockholder at any time knowingly and intentionally violate the provisions of these by-laws, or any provision or condition of the contract between the corporation and the stockholder, or any rule or regulation promulgated by the board of directors of the corporation, or should any stockholder fail to pay the dues hereinafter specified at the time specified, upon the affirmative vote of  $\frac{2}{3}$  of the entire board of directors, its stock certificate or certificates may be canceled and upon payment to it by the corporation of the par value of such certificate or certificates, plus accrued dividends upon preferred stock, they shall be surrendered to the corporation. The provisions of this section shall apply to both preferred and common stockholders.

### ARTICLE III. ASSOCIATE MEMBERS

*Section 1. Associate Members.* All members and stockholders of associations owning stock in the corporation shall be deemed to be associate members. Associate members shall have the right to attend annual and special meetings of the stockholders of the corporation and to take part in the discussion of matters under consideration at such meetings. They shall

have no voting right or other rights or powers and notices of meetings shall not be given to them.

#### ARTICLE IV. STOCKHOLDERS MEETINGS

*Section 1. Annual Meeting.* The annual meeting of the stockholders of the corporation shall be held at its place of business in the city of Chicago, Illinois, on the fourth Wednesday of March each year, at ten o'clock in the forenoon, unless a different [time] shall be designated by the board of directors, and if said day fall on a legal holiday the meeting shall be held on the next succeeding business day.

*Section 2. Special Meetings.* Special meetings of the stockholders shall be held at the same place as the annual meeting or at such other place as may be designated by the board of directors, and may be called at any time by the president, or in his absence by the vice-president, on vote of a majority of the board of directors. It shall be the duty of the president to call such meetings whenever requested in writing by stockholders holding ten per cent (10%) or more of the capital stock of the corporation. In such case notice of the meeting shall be issued within ten days and the meeting held within thirty days of the receipt by the president of such request.

*Section 3. Notices of Meetings.* Notice of the time and place of all annual and special meetings shall be mailed by the secretary to each stockholder at its last known post office address not less than fifteen (15) nor more than thirty (30) days before the date thereof. In case of special meetings the notice shall state the time, place and purpose of the meeting.

*Section 4. Chairman of Meetings.* The president, or in his absence the vice-president, shall preside at all such meetings.

*Section 5. Stock Transfers and Lists.* At every meeting each stockholder shall be entitled to cast one vote for each share of stock owned by it. Stockholders may vote in person or by proxy duly authorized in

writing, provided the instrument creating such proxy shall be delivered to and filed with the secretary before the same shall be recognized. No stock shall be voted at any election which has been transferred on books of the corporation within twenty (20) days next preceding such election. It shall be the duty of the secretary to prepare, at least ten (10) days before election, a complete list of stockholders entitled to vote, arranged in alphabetical order. Said list shall be open at the place where the election is to be held for the said ten days to the examination of any stockholder, and shall be produced and kept at the time and place of election during the whole time thereof, subject to the inspection of any stockholder who may be present.

*Section 6. Cumulative Voting.* At all elections of directors of the corporation each stockholder shall be entitled to as many votes as shall equal the number of its shares of stock multiplied by the number of directors to be elected, and it may cast all such votes for a single director or may distribute them among the number to be voted for any two or more of them, as it may see fit.

*Section 7. Quorum.* A quorum for the transaction of business at any regular or special meeting shall consist of at least fifty per cent (50%) of the total number of stockholders in the corporation.

#### ARTICLE V. BOARD OF DIRECTORS

*Section 1. Number and Nomination of Directors.* There shall be as many directors of this corporation as there are stockholders who during the preceding year marketed not less than twenty-five hundred single-deck carloads or the equivalent of livestock, or have the equivalent amount of livestock under contract to be marketed through the corporation during the current year.

In the election of directors each stockholder shall have the right to nominate one or more of its officers or directors for election as a director or directors of

this corporation. At least one director shall be elected from each stockholder member handling not less than twenty-five hundred single-deck carloads or the equivalent of livestock.

In addition to the foregoing number of directors there shall be four (4) directors who shall be elected at large, and insofar as practicable, one from a nomination made by the American Farm Bureau Federation; one from a nomination made by the National Grange, Patrons of Husbandry; one from a nomination made by the Farmers Educational and Co-operative Union of America; and one from a nomination made by the American National Livestock Association.

*Section 2. Voting Power of Directors.* On all matters coming before the board of directors at any regular or special meeting, each director shall have one vote, and each director elected from a stockholder member handling during the preceding calendar year or having under contract to be marketed during the current year a minimum of seventy-five hundred single-deck carloads or the equivalent of livestock as determined and fixed at the annual meeting, shall be entitled to one additional vote, and in further addition thereto such director shall be entitled to one additional vote for each and every additional five thousand single-deck carloads or the equivalent of livestock over such minimum of seventy-five hundred carloads.

*Section 3. Election by Ballot.* The members of the board of directors shall be elected by ballot annually at the regular annual meeting of the stockholders, and shall hold office until the next regular annual meeting of the stockholders and until their successors are elected and qualified.

*Section 4. Regular Meetings.* The regular annual meetings of the board of directors shall be held immediately after the annual meetings of the stockholders and at the same place.

In addition to the annual meetings of the board of directors, the board shall hold at least two other regular meetings, the first to be held during the first six months of the calendar year, and the second during the last six months of the calendar year; each to be held at the time and place to be designated by the board of directors. One representative to each stockholder may attend any meeting of the board of directors and may take part in the discussion of matters under consideration at such meetings, but shall have no voting or other rights or powers and no notice of directors' meetings need be given to stockholders.

*Section 5. Special Meetings.* Special meetings of the board of directors, to be held in the place of business of the corporation in the city of Chicago, Illinois, or such other place as the executive committee shall designate, may be called by the president, and in his absence by the vice-president or a majority of the members of the board. Notice of all regular and special meetings (save the annual meeting) shall be given to each director by mailing the same at least ten (10) days, or by telegraphing or delivering the same at least five (5) days, before such meeting to the last known address of the director, but such notice may be waived by any director. At any meeting at which every director shall be present even though without notice any business may be transacted.

*Section 6. Quorum.* A majority of the directors shall constitute a quorum for the transaction of business, but a majority of those present at any regular or special meeting shall have power to adjourn the meeting to a future time.

*Section 7. Vacancies.* Vacancies occurring in the board or in any office of the corporation between the regular annual meetings of the board may be filled by the remaining members of the board of directors at any regular or special meeting. In the event that a vacancy in the board of directors is caused by the death

or resignation of a member of the board, who when elected to the board was an officer or member of the board of directors of a stockholder of this corporation, the person appointed by the board of directors to succeed him in accordance with the provisions of this paragraphs shall be chosen from the officers and board of directors of such stockholder corporation or association.

*Section 8. Place of Records.* The books and records of the corporation may be kept without the state of Delaware, as directed by the board of directors.

*Section 9. Executive Committee.* During the interim between meetings of the board, the business of the corporation shall be managed by an executive committee, which shall be composed of seven (7) directors, one of whom shall be the president and one the vice-president of the corporation. The remaining five members shall be chosen by the board of directors at its annual meeting, except that such five members of the first executive committee need not be chosen by the board of directors at an annual meeting. Regular meetings of the executive committee shall be held at least monthly. The chairman of the committee shall be the president of this corporation.

*Section 10. Annual Audit.* Previous to each annual stockholders meeting the board of directors shall have the books and accounts of the association carefully audited and the report of such audit, together with a statement of the business done during the previous year, the general financial condition of the corporation and the condition of its tangible property shall be submitted to the stockholders at the annual meeting.

*Section 11. Bonds.* The board of directors shall require the general manager and other officers, agents and employees having the custody of any of its funds or property, to give to the corporation a bond conditioned for the faithful discharge of the duties of such person and in such amount and with such company as

surety as the board of directors shall require. The cost of such bonds shall be borne by the corporation.

*Section 12. Rules and Regulations.* The board of directors may from time to time prescribe and promulgate such rules and regulations for the conduct of the business and for transacting of business with the corporation by its stockholders and patrons as it deems advisable, and every stockholder shall at all times comply with such rules and regulations.

*Section 13. Per Diem and Expenses.* The directors shall be paid for attendance at meetings and time spent upon corporate business fifteen dollars (\$15) per day and all actual and necessary expenses.

#### ARTICLE VI. OFFICERS

*Section 1. Officers.* The officers of the corporation shall be a president, a vice-president, a secretary and a treasurer. They shall be elected by the board of directors for the term of one year, and each shall hold office until his successor is duly elected and qualified. The offices of secretary and treasurer may be held by one person, in which event such person shall be termed "Secretary-Treasurer." Any officer may be removed at any time with or without cause by a majority vote of all the members of the board of directors.

*Section 2. Duties of President.* The president shall preside at all meetings of the stockholders and directors; shall have general supervision over the affairs of the corporation and over the other officers; shall sign all contracts, deeds, documents requiring the corporate seal and shall perform such other duties as are incidental to his office, or as may be from time to time prescribed by the board of directors.

*Section 3. Duties of Vice-President.* The vice-president shall, in the absence of the president or his inability to act, have all the powers and perform all the duties of the president.

*Section 4. Duties of Secretary.* The secretary shall keep a record of the proceedings of all meetings of the



stockholders and board of directors, and shall attest the same by his signature. He shall be responsible for the safekeeping of all papers and documents of the corporation which properly belong to his office, and of the corporate seal, and all the same shall be kept at the Chicago, Illinois, office of the corporation unless otherwise authorized by the board of directors. He shall attest certificates of stock and all instruments requiring the corporate seal, and shall affix the seal thereto, and shall issue notices of meetings as required by the by-laws.

*Section 5. Duties of Treasurer.* The treasurer shall safely keep and account for all money, funds and other property which may come into his hands, and shall have the books and accounts of the corporation audited from time to time. He shall keep all moneys of the corporation in such bank or banks as the board of directors shall prescribe. All checks, promissory notes, bills of exchange and other instruments calling for the payment of money which shall be issued by the corporation shall be signed by such officers and employees as the board may from time to time designate.

*Section 6. Delegation of Duties.* In case of the absence or inability of the secretary or treasurer to act, the duties of such officers shall be devolved upon and performed by such persons as the board of directors may prescribe.

*Section 7.* The board of directors may employ a general manager and such other officers as may be deemed advisable, who shall have such power and authority and perform such duties as may be determined by the board of directors.

#### ARTICLE VII. DUES

*Section 1. Per Car Dues.* Each stockholder shall pay to the corporation dues amounting to fifty cents (50¢) per single-deck and seventy-five cents (75¢) per double-deck of livestock handled or marketed by

it, and where livestock is shipped or received by truck or other than by railroad twenty-five (25) cattle, seventy-five (75) calves, seventy (70) hogs, or one hundred fifteen (115) sheep shall be deemed to be a single-deck of livestock. Dues shall be paid to the corporation within fifteen (15) days after the end of each calendar month for all livestock handled and/or marketed during each calendar month.

#### ARTICLE VIII. CONTRACTS

*Section 1. Contracts.* The board of directors shall cause to be prepared a form of contract between the corporation and its stockholders, and no corporation or association shall become a stockholder in the corporation unless and until it shall have executed and delivered to the corporation such contract.

#### ARTICLE IX. DIVIDENDS AND FINANCE

*Section 1. Distribution of Earnings.* The net earnings of the corporations shall be distributed at the expiration of each fiscal year or oftener if the board of directors shall so order, as follows:

(a) There shall first be set aside out of the net earnings such sum as the board of directors shall determine, for the purpose of accumulating and maintaining a reasonable reserve for depreciation or possible losses; a reasonable reserve to provide for the erection of buildings and facilities or for the purchase and installation of machinery and equipment, or to retire indebtedness, or as may in the discretion of the board be deemed necessary for working capital, and such other reserves as may be required by law or deemed necessary or desirable by the board of directors. The board of directors shall fix from time to time the reasonable aggregate amount of such reserves and shall provide how moneys in the same shall be invested.

(b) If sufficient net earnings in the opinion of the board of directors are available a dividend not exceeding five per cent (5%) in any year, which shall [be]

cumulative, may then be paid upon the outstanding preferred stock of the corporation. The remaining net earnings of the corporation shall be distributed to the members and patrons of the corporation equally in proportion to the volume of business done by each member or patron respectively with the corporation during the period in question, provided that no such distribution shall be made until the reserves of the corporation shall equal the total of the authorized capital.

*Section 2. Depositories.* The funds of the corporations shall be deposited in such bank or banks as the directors shall designate and shall be withdrawn only upon the check or order of officers or employees designated by the board of directors.

**ARTICLE X. CERTIFICATES OF STOCK**

*Section 1. Certificates of Stock.* The certificates of stock of this corporation shall be in substantially the following form, common stock and preferred stock being specifically so designated on the certificates:

No..... Shares  
NATIONAL LIVESTOCK MARKETING ASSOCIATION  
Incorporated under the laws of the state of Delaware  
Certificate of.....Stock  
Capital Stock \$1,000,000. Share \$.....Each

THIS CERTIFIES THAT.....  
is owner and holder of.....shares of the  
.....capital stock of the  
NATIONAL LIVESTOCK MARKETING ASSOCIATION,  
a corporation transferable on books of the corporation only,  
on surrender of this certificate, in accordance with the by-  
laws of the corporation.

The transfer of this stock, and the persons who may own it, and the conditions of ownership, are fixed and limited by the certificate of incorporation and by-laws of the corporation, to which reference is made for more definite information. The corporation has a lien upon this stock for any indebtedness of the stockholder to it.

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IN WITNESS WHEREOF the said corporation has caused this certificate to be signed by its duly authorized officers and its corporate seal to be hereunto affixed, this..... day of ....., A. D. 19...

.....  
*President*

.....  
*Secretary*

(Corporate Seal)

In addition to the foregoing the certificates for preferred stock shall contain upon their face the following provision:

This stock is entitled and limited to dividends at the rate of five per cent (5%) per annum which shall be cumulative. In case of dissolution, the holder of this stock shall be entitled and limited to receive the par value of the shares represented by the certificate and any accrued dividends before any distribution is made to the holders of the common stock. The shares of stock represented by this certificate may be retired in whole or in part by the corporation at any dividend date upon paying to the holder thereof one hundred (100) dollars per share and any accrued dividends and the corporation may select what particular shares of preferred stock it will retire.

The certificates of common stock shall contain upon their face the following provisions:

No dividends of any kind will be paid upon the shares of stock represented by this certificate.

Whenever the holder hereof, upon thirty (30) days' notice by the corporation, shall be called upon to surrender and cancel this certificate and receive in lieu thereof a new certificate or certificates, pursuant to the provisions of Article II, Section 12, of the by-laws of the corporation, holder shall surrender and cancel same and accept such new certificate or certificates for the purpose of effecting the obligations set forth in said sections of the by-laws.

**ARTICLE XI. CONDUCT OF BUSINESS**

*Section 1. Conduct of Business.* The board of directors shall establish a sales board which shall con-

sist of the president of the National Livestock Marketing Association, the general manager of that association, and the general manager of the National Feeder and Finance Corporation. It shall be the duty of the board to secure the most authoritative information relative to the supply and demand situation with respect to livestock and livestock products and, with this information as a basis, prepare and transmit reports to the co-operative livestock sales agencies early each business day, and during the trading hours, for their direction. When deemed advisable, the board of directors shall establish the following departments and such other departments as it deems desirable:

(a) A transportation department, which shall represent the corporation at all rate hearings affecting it or in which it may be interested, and which shall endeavor to improve transportation service at terminal and country points and perform such other functions and duties as the board of directors may determine.

(b) A publicity department, which shall handle all news releases and perform such other functions and duties as may be determined by the board of directors.

(c) An advertising department, which shall perform such functions and duties as may be determined by the board of directors.

(d) A research department, which shall furnish statistical and other information to the stockholders of the corporation concerning livestock prices and the supply and demand for livestock and livestock products; conduct business surveys for stockholders which might be of service to them in securing new business or outlets for livestock; standardize office systems and accounting records and statements, and generally aid stockholders in the elimination of waste and inefficiency; and which shall perform such other functions and duties as the board of directors may determine.

(e) A legal department, which shall care for all legal questions and matters affecting the corporation.

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(f) A public relations department, which shall endeavor to create good-will and promote the general welfare of the corporation and its stockholders; manage the stockholder relations work of the corporation; and perform such other functions and duties as the board of directors may determine.

(g) A department of livestock and meats, which shall work with federal and state agencies in promulgating the standardization and grading of livestock and meats, and shall engage in other such activities as the board of directors may prescribe.

*Section 2. Qualification of Employees.* Experienced men shall be employed to head the various departments of the corporation and they shall be paid such compensation for their services as may be fixed by the board of directors.

### ARTICLE XII. SEAL

*Section 1. Seal.* The seal of the corporation shall be in a circular die, in the center of which shall appear the words "Corporate Seal" and around the edge of which shall appear the words "National Livestock Marketing Association, Chicago, Illinois." An imprint of such seal is affixed to this sheet.

### ARTICLE XIII. AMENDMENTS

*Section 1. By-Law Amendments.* The board of directors of the corporation by the affirmative vote of three-fourths or more of the entire board of directors are authorized to alter these by-laws.

APPENDIX E

CERTIFICATE OF INCORPORATION  
AND CODE OF BY-LAWS  
OF THE  
NATIONAL FEEDER AND  
FINANCE CORPORATION

CERTIFICATE OF INCORPORATION

We, the undersigned, in order to form a corporation for the purposes hereinafter stated, under and pursuant to the provisions of an Act of the legislature of the state of Delaware, entitled "An Act Providing a General Corporation Law," (approved March 10, 1899) and the acts amendatory thereof, and supplemental thereto, do hereby certify as follows:

I. The corporate name is—

NATIONAL FEEDER AND FINANCE CORPORATION

II. The location of the principal office in Delaware of the corporation is 7 West Tenth Street, in the city of Wilmington, county of New Castle; and The Corporation Trust Company, 7 West Tenth Street, Wilmington, Delaware, is designated as the statutory agent therein, in charge thereof, and upon whom process against the corporation may be served.

III. The nature of the business and the objects and purposes proposed to be transacted, promoted and carried on are to do any or all of the following things as fully and to the same extent as natural persons might or could do: To buy, sell, and deal in stocker and feeder livestock both on the terminal livestock markets and elsewhere; to make, execute, endorse, guarantee or otherwise secure notes, mortgages, deeds of trust, or other obligations of itself or any corporation or

co-operative association engaged in the livestock industry or any related activity; to form, organize and acquire the common stock of credit or finance corporations concerned with the making of loans or the extension of credit on or for the production, feeding, raising, holding, or fattening of livestock; to borrow money for any of the purposes of this Corporation without limitation, and to evidence and secure the same in any manner deemed advisable; to hold, purchase, mortgage, lease, and convey such real or personal property of any character as may be deemed advisable for the conduct and operation of this Corporation; to do any or all of the things herein set forth to the same extent as natural persons might or could do in any part of the world as principal, agent, contractor, trustee, or otherwise, alone or with others; and in addition to all the powers herein enumerated this Corporation may perform any and all other functions deemed to further the livestock business herein authorized. The foregoing shall be construed as both objects and powers, and the enumeration herein shall not be held to limit or restrict in any manner the general powers conferred on this Corporation by the laws of the state of Delaware, all of which are hereby expressly claimed.

IV. The total authorized capital stock of the Corporation shall be fifty thousand (50,000) shares of common stock of the par value of one hundred (\$100) dollars per share. Stock in this Corporation may be acquired and held only by a Delaware corporation known as the National Livestock Marketing Association. The minimum amount of capital with which the Corporation will commence business is one thousand (\$1,000) dollars.

V. The stockholders and directors shall have power to hold their meetings, to have an office or offices, and to keep the books of this Corporation subject to the provisions of the law of Delaware outside the state and at such places as may be deemed advisable.



VI. This Corporation is to have perpetual existence. The private property of stockholders shall not be subject to the payment of corporate debts to any extent whatever.

VII. The board of directors of the Corporation by the affirmative vote of three-fourths or more directors are authorized to make and alter the by-laws.

VIII. The name and place of residence of each of the incorporators are as follows:

NAME	RESIDENCE
Joseph R. Fulkerson	Jerseyville, Illinois
Elmer A. Beamer	Blissfield, Michigan
Ortho O. Wolf	Ottawa, Kansas

We, THE UNDERSIGNED, being all the incorporators, for the purpose of forming a corporation in pursuance of an Act of the Legislature of the state of Delaware, entitled "An Act Providing A General Corporation Law," (approved March 10, 1899) and the acts amendatory thereof and supplemental thereto, do make and file this Certificate of Incorporation hereby declaring and certifying that the facts herein stated are true, and accordingly hereunto have set our respective hands and seals, this seventh day of May, 1930.

#### CODE OF BY-LAWS

The undersigned, constituting and being all the directors of the National Feeder and Finance Corporation, do hereby adopt the following code of by-laws for said Corporation.

#### ARTICLE I. POWERS

*Section 1.* The powers of this Corporation shall be those stated in its Certificate of Incorporation.

#### ARTICLE II. MEETINGS OF STOCKHOLDERS

*Section 1.* The annual meeting of the stockholders of this Corporation shall be held at its principal office

in Chicago, Illinois, at 2:00 o'clock P. M. on the fourth Wednesday of March of each year.

*Section 2.* Any corporation holding stock in this Corporation may vote the same through any person or persons authorized in writing by the board of directors thereof to do so.

*Section 3.* Special meetings of this Corporation may be called by the President, or by a majority of the directors, for the transaction of any business thereof.

### ARTICLE III. BOARD OF DIRECTORS

*Section 1.* This Corporation shall have seven directors, who shall be elected at the annual meeting of the stockholders and who shall hold office for one year or until the election and qualification of their successors.

*Section 2.* The directors shall meet at such times and places within or without the state of Delaware as they may agree upon. Special meetings may be called by the President by giving three days' notice thereof to each director. A majority of the directors shall constitute a quorum for the transaction of any business of the Corporation.

### ARTICLE IV. COMPENSATION OF DIRECTORS AND OFFICERS

*Section 1.* Directors as such shall not receive any stated salary for their services and by resolution of the board may be allowed not to exceed \$15.00 per day and expenses for attending each regular or special meeting of the board or for performing other special services under instructions of the board of directors; provided that nothing herein contained shall be construed to prevent any director from serving the Corporation in any other capacity and receiving compensation therefor. No director shall be paid per diem and expenses by this Corporation if he receives per diem and expenses from the National Livestock Marketing Association or a subsidiary thereof for the

same period. Salaries of officers shall be fixed by the board of directors.

#### ARTICLE V. OFFICERS

*Section 1.* This Corporation shall have a president, vice-president, and secretary-treasurer.

*Section 2.* The President, if present, shall preside at all meetings of the directors and stockholders, and shall have general control of the affairs of the Corporation, subject to the directions and instructions of the board of directors. In the absence of the President or at his request, the Vice-President is authorized to perform the duties and functions of the President.

*Section 3.* The Secretary-Treasurer shall have general charge of the books, records, and money of the Corporation, subject to the directions and instructions of the board of directors.

*Section 4.* Checks, contracts, or other instruments of this Corporation may be signed by such person or persons as shall be authorized to do so by the board of directors.

*Section 5.* The board of directors may authorize the appointment or employment of such persons and agents as may be deemed advisable.

*Section 6.* In case of the absence or disability of any officer of this Corporation the board of directors may designate another person to act in his stead.

#### ARTICLE VI. VACANCIES

*Section 1.* In case of death, disability, resignation, or otherwise, of one or more of the officers or directors of this Corporation, the remaining directors, although less than a quorum, shall fill the vacancies for the unexpired term.

#### ARTICLE VII. SEAL

*Section 1.* The seal of this corporation shall be a circular die, in the center of which shall appear the

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words, "Corporate Seal Delaware" and around the edge of which shall appear the words, "National Feeder and Finance Corporation." An imprint of such seal is affixed to this sheet. (SEAL)

**ARTICLE VIII. AMENDMENT OF BY-LAWS**

*Section 1.* These by-laws may be changed or amended by the affirmative vote of three-fourths or more of the board of directors of this corporation.

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