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EFFECT OF CHANGES IN DAILY PRICES ON THE MOVEMENT OF FARM PRODUCE TO TERMINAL MARKETS

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PRICE is generally considered only as a resultant of the interaction of supply and demand forces. Until recently very little emphasis has been placed on price as a causal factor. However, more and more attention is being given the fact that price itself is an important factor governing future supply. Fluctuations in the supply volume of a product, both produced and offered for sale, are partially attributable to variations in the price.

The responses which are made to price stimuli may be classified as either production or marketing responses. The former are reflected in changes in the acreage of crops planted, numbers of animals bred, fertilizing practices followed, and the like. The latter consist of decisions which are made after the product has been produced and is ready for sale. Fluctuations in shipments to the local or central market and changes in the movement of products out of and into storage, are examples.

This paper is limited to some considerations of marketing responses to price. Because of the data available on daily prices and market receipts as well as the limited storage of the product at the market, hogs at Chicago were used in the analysis.

Measurements of the effect of changes in the price of hogs from one day to the next on the number of hogs received at Chicago on subsequent days were made. The hog cycle, seasonal variations, and wide differences in the number of hogs received on different days of the week complicated the problem.

The methodology adopted was briefly as follows (table 1): On the two occasions when the price of hogs declined 40 cents per hundredweight from Saturday to Monday, the number received on Monday was 134,300, and on Thursday 44,300. Thursday's receipts were 33 per cent of Monday's receipts. Similarly, when the price advanced 40 cents, receipts on Thursday were 105 per cent of those on Monday.

For the entire eight-year period, 1921-28, Thursday's receipts averaged 68.2 per cent of Monday's receipts. Assuming this as the normal relationship, receipts of hogs on Thursday were 48

per cent of normal when the price declined 40 cents from Saturday to Monday and 154 per cent of normal when it advanced 40 cents. Or, to put it in other words, Thursday's receipts were 52 per cent below normal in the first case and 54 per cent above normal in the latter.

Plottings of these percentages revealed that the relationships were approximately linear (figure 1). Accordingly, straight lines

Table 1. Effect of Changes in the Price of Hogs from Saturday to Monday on the Receipts the following Thursday at Chicago, 1921-1928

Change in the price from Saturday to Monday (cents)	Number of changes	Total number of hogs received		Percentage changes in the number of hogs received on Thursday		
				Ratio of Thursday's receipts to Monday's receipts	Average ratio for the entire period = 100	Average ratios expressed as deviations from 100
		Monday	Thursday			
-40.....	2	134,300	44,300	33.0	48.3	-51.7
-35.....	5	289,100	143,800	49.7	72.8	-27.2
-30.....	9	528,700	279,200	52.8	77.3	-22.7
-25.....	10	587,500	303,600	51.7	75.7	-24.3
-20.....	22	1,406,000	673,100	47.9	70.1	-29.9
-15.....	28	1,590,400	867,200	54.5	79.8	-20.2
-10.....	36	2,060,400	1,207,000	58.6	85.8	-14.2
-5.....	38	1,952,100	1,283,400	65.7	96.2	-3.8
0.....	27	1,376,100	926,900	67.4	98.7	-1.3
+5.....	30	1,424,800	1,061,700	74.5	109.1	+9.1
+10.....	40	1,867,700	1,398,700	74.9	109.7	+9.7
+15.....	42	1,790,600	1,694,600	94.6	138.5	+38.5
+20.....	27	1,089,400	886,800	81.4	119.2	+19.2
+25.....	20	677,300	604,900	89.3	130.7	+30.7
+30.....	11	420,200	317,700	75.6	110.7	+10.7
+35.....	6	251,400	211,600	84.2	123.3	+23.3
+40.....	2	78,400	82,600	105.4	154.3	+54.3
Averages for the entire period		49,000	33,400	68.2	100.0	0.0

were fitted to the data by the method of least squares. In addition, an assumption was made that no change in the receipts should correspond with no change in the price. Adjustments were made to meet this assumption.

The relative slopes of the straight lines so fitted indicate the average percentage change in the receipts corresponding to a given absolute change in the price. Thus, for example, Tuesday's receipts changed 2.08 per cent; Wednesday's receipts, 4.39 per cent; and Thursday's receipts, 5.63 per cent following a change of five cents in the price from Saturday to Monday (table 2).

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For a 40 cent change in the price the percentages were 16.64, 35.12, and 45.04 respectively.

Per cent change
in Receipts

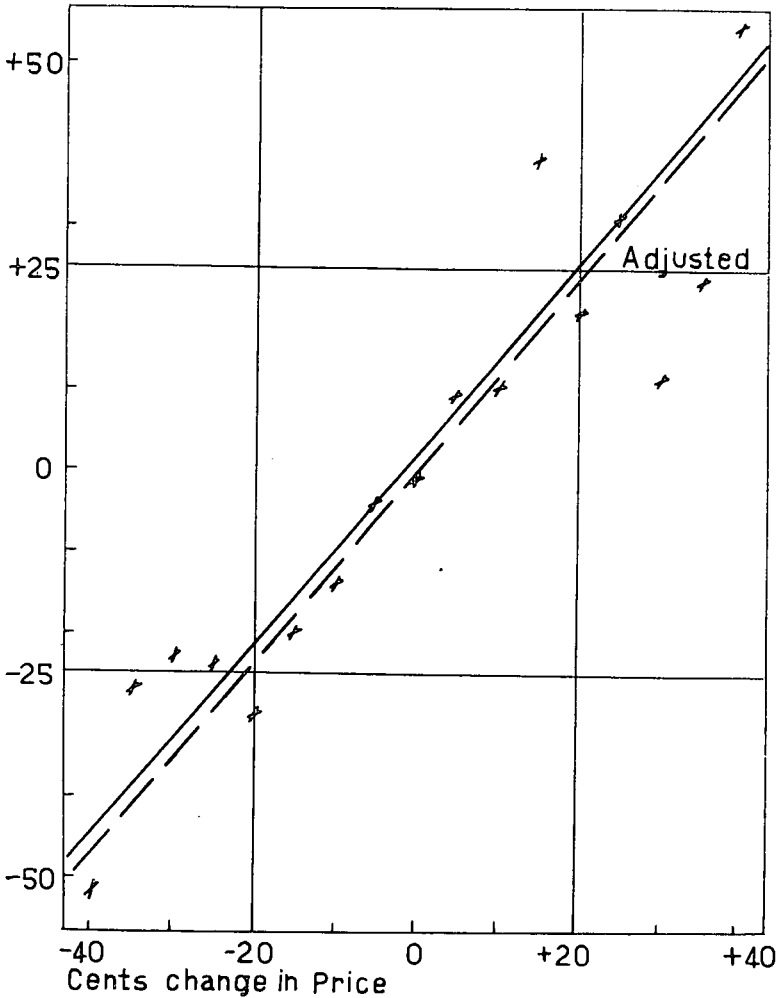


FIGURE 1. EFFECT OF CHANGES IN THE PRICE OF HOGS FROM SATURDAY TO MONDAY ON THE RECEIPTS THE FOLLOWING THURSDAY AT CHICAGO, 1921-1928

Note that the greatest effect of the change in the price was on receipts Thursday, three days later. This time lag maintained for all price changes with the exception of those taking place from

Friday to Saturday. A change of 40 cents, for example, in the price from Monday to Tuesday was followed by a change of 14 per cent in Wednesday's, 31 per cent in Thursday's, and 51 per cent in Friday's receipts.

The reasons for the lack of effectiveness of changes in price from Friday to Saturday are obvious. During this period only 3.5 per cent of the weekly receipts of hogs arrived on Saturday. From the standpoint of prices received, Saturday was typically a poor market. The necessity for cleaning up the supplies for the week-end was an important factor. As a consequence, changes in the prices paid for hogs from Friday to Saturday were not

Table 2. Effect of Daily Changes in the "Average" Price of Hogs on Later Receipts at Chicago, 1921-1928

A change of five cents in the price	Per cent change in receipts					
	One day later	Two days later	Three days later	Four days later	Five days later	Six days later
Saturday to Monday.....	2.08	4.39	5.63	3.44	1.80	3.10
Monday to Tuesday.....	1.71	3.93	6.22	5.31	3.93	1.86
Tuesday to Wednesday.....	1.31	4.36	7.58	4.10	3.00	4.36
Wednesday to Thursday.....	1.23	5.39	5.40	4.47	3.20	3.95
Thursday to Friday.....	0.48	3.85	5.74	3.71	3.43	3.88
Friday to Saturday.....	1.22	2.54	2.61	3.18	3.92	3.71

considered indicative of the general market condition of the coming week.

The effect of changes in the price of hogs on later receipts varied with the season of the year, the phase of the hog cycle, the trend of prices, and other factors. Were this not the case, rather distinct periodic variations similar to cycles of over- and under-production of livestock would be clearly evident.

During the pre-war period, 1910-13, a change of five cents in the price of hogs from Saturday to Monday was followed by a change of 9.9 per cent in Thursday's receipts (table 3). A similar change in the price after the war, during a comparable period, 1921-24, was followed by a change of only 5.4 per cent. The effect in the earlier years was almost twice as great as in the latter. Let it be noted, however, that hog prices fluctuated from day to day one-half as violently before the war as after.

During the four-year period, 1921-24, the number of hogs re-

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ceived at Chicago was large and prices were low. In the year 1923 a record total of nearly ten and a half million hogs was officially received at the yards. During the four years, 1925-28, prices were much higher as a consequence of lighter receipts. The first period included the trough of the hog price cycle and the second period, the peak.

Table 3. Relative Effect of Changes in the Price of Hogs from Saturday to Monday on Receipts Tuesday, Wednesday and Thursday at Chicago.

A change of five cents in the price	Per cent change in receipts		
	Tuesday	Wednesday	Thursday
"Average" prices, 1921-28.....	2.08	4.39	5.63
"Top" prices, 1921-28.....	2.35	4.47	5.84
"Average" prices, 1910-13.....	7.72	8.82	9.92
"Average" prices, 1921-24.....	1.56	4.02	5.42
"Average" prices, 1925-28.....	2.94	4.91	5.89
"Average" prices, winter months.....	2.95	4.75	6.54
"Average" prices, summer months.....	2.77	4.32	5.78
"Average" prices, prices falling.....	2.63	4.28	6.01
"Average" prices, prices rising.....	2.61	5.23	6.01
"Average" prices, advances during rising and declines during falling prices.....	2.38	3.90	5.27
"Average" prices, advances during falling and declines during rising prices.....	3.18	5.90	7.61
"Average" prices, large spread ¹	2.41	4.06	4.66
"Average" prices, small spread ²	4.25	6.16	8.74
"Top" prices, large spread ¹	2.47	4.99	6.03
"Top" prices, small spread ²	2.83	5.28	7.32
"Average" prices, following price changes in the opposite direction from Friday to Saturday.....	2.87	5.03	6.84
"Average" prices, following price changes in the same direction from Friday to Saturday.....	2.73	7.74	10.60
"Average" prices, following price changes in the same direction for two or more days.....	4.88	5.26	5.11

¹ Difference between "top" and "average" prices 60 cents or more.

² Difference between "top" and "average" prices less than 60 cents.

At the top of the cycle, a change of five cents in the price from Saturday to Monday was followed by a change of 5.9 per cent in the receipts of hogs on Thursday. At the bottom of the cycle, when prices were low, the percentage was 5.4. Price changes were slightly more effective at the top of the cycle than at the bottom. This difference is somewhat more significant when the fact that a five-cent change in the price at an eleven dollar level is smaller in percentage terms, than the same absolute change at an eight dollar level, is considered.

During the winter months, October through March, a five-cent

change in the price of hogs from Saturday to Monday was followed by a change of 6.5 per cent in receipts on Thursday. During the summer, the corresponding percentage was 5.8. The greater influence during the winter than during the summer is attributable to several factors. Of these, an important one is the conflict with farm work in the summer which does not permit the shipment of hogs to market in response to the price factor alone.

The spread between the daily "average" and "top" or highest prices of hogs is a rough measure of variations in their quality. During the off-season of the year when a relatively small number of hogs are marketed and those vary in quality from low-grade breeding stock to good choice hogs, this spread is very large. During the regular marketing season, the differential is much less because the quality of hogs then marketed is fairly uniform.

When the spread between the two prices was small, a change of five cents in the price from Saturday to Monday was followed by a change of 8.7 per cent in Thursday's receipts. When the spread was large the percentage was 4.7. This difference is highly significant. It indicates that the market is followed more closely by producers of a high quality product than by producers of a low quality product. Or, perhaps better, producers generally follow the market more closely when they are marketing a high quality product than when they are marketing one of low quality.

Undoubtedly this spread factor contributes to an explanation of the difference in the effect of price changes on later receipts in the summer and winter, for the months of largest spreads are summer months.

During periods of falling prices, as measured by the net change in the six preceding market days, a change of five cents in the price from Saturday to Monday was followed by a change of 6 per cent in the receipts on Thursday. During periods of rising prices, similarly measured, the effect was exactly the same.

If, however, price advances when the trend is downward and declines when the trend is upward, are taken together, the results are very different. Price changes in the direction opposite that of the trend of prices at the time, were more effective than price changes in the same direction. Price advances stimulated receipts more when the trend of prices was downward than when it was upward. Similarly, declines retarded the movement more when prices were rising than when they were falling.

Changes in the price of hogs on the days immediately preceding the changes under consideration greatly influenced the relationships. When the price changed five cents from Saturday to Monday following changes in the opposite direction from Friday to Saturday, receipts on Thursday changed 6.8 per cent. When the five-cent change followed changes in the same direction from Friday to Saturday, the percentage change in Thursday's receipts was 10.6 per cent. In other words, two successive price changes in the same direction were more effective than single movements.

A change of five cents in the price from Saturday to Monday following changes in the same direction for two or more days was followed by a change of only 5.1 per cent in Thursday's receipts. Whereas two successive price changes in the same direction were more effective than one, three or more were less effective than either two or one. When the price advances rapidly there is some holding back of stocks for further rises. When it declines rapidly there is some shipment to the market for sale before further declines.

In concluding this paper, I wish to emphasize the desirability of a better understanding of the effects of daily changes in prices, on the movement of farm produce to terminal markets. The analysis here presented is but a meager beginning in that direction. More refined analyses of wider application should be made.

Alternate under-supplied and over-stocked or glutted markets with violently fluctuating prices are not favorable to a satisfactory marketing of farm produce. Upward trends in the direct marketing of livestock and in f.o.b. sales of fruits and vegetables are surface evidences of a desire on the part of producers to escape fluctuating short-time market prices.