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## STAFF PAPER 11

# UNIT VALUE PRICING OF PRICES RECEIVED BY FARMERS

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Prices collected for the Index of Prices Received by Farmers are also used in the development of estimates of gross and net income. The prices requested from the voluntary reporters are average prices per unit of commodity sold, rather than the prices received for a particular grade or quality of the commodity. The U.S. Department of Agriculture has pointed out the nature and use of the prices in incomes estimation as follows: <sup>1</sup>

. . . the term "prices received by farmers" has come to apply to the concept of an all-inclusive price—a price for what the farmer sells where he sells it, which reflects the impact of supply and demand relationships upon a commodity in total—in short, the average price for all grades and classes being sold by farmers at a given time.

Closely related to this characteristic of the average price concept are the important uses made of the price data in estimating cash receipts by farmers on a monthly basis, and in deriving season average prices by weighting monthly prices by monthly sales.

Thus, insofar as unit value prices are reported, the Index of Prices Received by Farmers reflects not only changes in prices of the individual grades or qualities of each commodity, but also changes in the proportion of such grades and qualities within each commodity. If we were to extend the definition of a "commodity" to the component grades or qualities within that commodity, the present Index of Prices Received by Farmers overstates the price level when quality increases from the base period, and understates the price level when quality deteriorates. Problems of quality change in relation to price indexes are investigated in Staff Papers 2 and 3.

The focus in this paper is on the relation of the reported price to the requested average price. It may well be doubted that many buyers take the trouble to add total purchases and divide this sum by the total physical units purchased to arrive at a weighted average price. If the commodity has a basic grade for which the trade normally quotes prices as a basis for transactions or to indicate the price level, the reporters may respond with this price. Or the response may be mixed, with some reporting an average price and others a price for a basic grade. In any event, there is some uncertainty concerning the nature of the prices reported. At one time it was the practice to round down-

<sup>1</sup> United States Department of Agriculture, Major Statistical Series of the U.S. Department of Agriculture, *Agricultural Handbook* No. 118, Volume 1, *Agricultural Prices and Parity*, 1957, p. 4.

ward to compensate for reporters failing to consider lower quality marketings.<sup>2</sup> Although there is a review and editing process, the questionnaire returns comprise the basic data and, as such, play a key role in determining the quality of the price and income series.<sup>3</sup>

In the following sections, we examine the nature of the prices reported for corn, hogs, and eggs in selected areas of Illinois. Since secondary data are employed, the results are only suggestive of some of the general properties of the reported prices. A conclusive appraisal of the quality of the prices reported would, of course, require an appropriately designed sampling procedure and personal interviews of buyers.

### CORN PRICES

Corn produced in the corn belt is marketed during the entire year and is usually stored on the farm until it is sold. The grade of corn is determined by maximum limits of percentages of moisture, cracked corn and foreign material, and damaged kernels as well as a minimum test weight per bushel.<sup>4</sup> During the early part of the marketing season (October to May), moisture discounts are usually the effective factor determining grade. Since natural drying normally reduces the moisture content below the maximum limit for No. 2 corn (15.5 percent) by May, any discounts in the latter part of the season are apt to be due to damage.<sup>5</sup>

As previously mentioned, the corn price requested by the voluntary reporters is the *average* price received by farmers. The questionnaire used in Ohio, Indiana, Illinois, Michigan, and Wisconsin for field corps (C.E. 5-84, C, 1/1/60) states:

Please report average prices being received by farmers on or about the fifteenth of the month, considering all grades and qualities being sold; the reported prices should reflect premiums and discounts for test weight and moisture for grains, and other quality factors for each commodity for which you report a price.

To determine accurately this type of an average price requires that the local grain dealer (and he is the only one with the basic information) divide the value of his total purchases by the number of bushels purchased during some "sample" period prior to making the report. Since it may not be likely that the reporter would take the trouble to make the necessary calculations, one might expect that either the price for a standard grade be reported, or that some rather arbitrary adjustment would be made from this price to reflect the character of current marketings.

To investigate the nature of the reported average price, a comparison was made between the reported average price and a price for No. 2 corn quoted by a dealer purchasing from local elevators in east-central Illinois. This latter price is quoted as a net trackside

<sup>2</sup> Charles F. Sarle, *Reliability and Adequacy of Farm Price Data*, Department Bulletin No. 1480, U.S. Department of Agriculture, March 1927, p. 4.

<sup>3</sup> For a description of the review process see: United States Department of Agriculture, Agricultural Estimating and Reporting Services, *Miscellaneous Publication* No. 703, 1949, pp. 116-117.

<sup>4</sup> L. J. Norton, *When to Market Grain*, Department of Agricultural Economics, University of Illinois College of Agriculture Circular 711, 1953, p. 12.

<sup>5</sup> E. J. Muttl and Max Langham, *Effects of Moisture Losses on Costs of Storing Ear Corn*, Department of Agricultural Economics, University of Illinois Agricultural Experiment Station Bulletin 653, 1960, p. 8.

price each afternoon on market days and is valid until the opening of trade the following market day. For purposes of comparison the price quotations for the fifteenth of the month were taken (valid until the opening of trade on the following market day); if the fifteenth was not a market day, the price for the previous market day was used.

Two hypotheses are of interest. First, if the reporters respond to the questionnaire with the standard grade price quotation, we should expect to find the margin between the price reported as being received by the farmer and that received by the local grain dealer for the standard grade to be independent of fluctuations in moisture and damage. Second, if the reporters actually follow instructions, this margin will be related to moisture or damage in the manner in which dealers discount for such factors.

To test these hypotheses concerning differences between the reported average price and the quoted price for a specific grade, monthly data from the official inspection certificates on corn shipments from two local grain dealers were related to the calculated price differences.\*

Moisture and damage data for shipments from the Peotone Farmers' Elevator Association were assumed to be representative of sales in the Northeast Crop Reporting District of Illinois, while data from the Fisher Farmers' Grain and Coal Company represent the East Crop Reporting District. Of the total 1957-58 Illinois corn production, the Northeast district and the East district each produced 16 percent. In terms of total United States production, each district produced 2.2 percent during the two years, 1957-58. The present weight (1953-57 base) of corn in the Index of Prices Received is 5.5 percent.

The period from October 1950 to September 1957 was studied. Each annual marketing period was divided into a seven-month period (October through April), when moisture discounts are apt to be dominant, and the remaining period in which damaged discounts, if any, tend to be more important than moisture in affecting grade.

#### MOISTURE DISCOUNTS

During the October to April period the corn shipped from the two local elevators consistently tested above the maximum moisture content of 15.5 percent for No. 2 corn. The following regression equations were fitted:

#### Northeast Crop Reporting District

$$y = -4.34 + 0.45m \quad n = 56$$

(0.13)       $\bar{y} = 4.09$  cents  
 $\bar{m} = 18.7$  percent

#### East Crop Reporting District

$$y = -7.92 + 0.69m \quad n = 55$$

(0.12)       $\bar{y} = 3.83$  cents  
 $= 17.0$  cents

\* Moisture data were obtained from Muttli and Langham, *op. cit.* Damage data are reported by Langham and Muttli, "Relation of Moisture Content of Corn Stored at Harvest to Subsequent Damage," *Illinois Agricultural Economics*, 1, 25-31, January 1961.

$y$ : Quoted net trackside price for No. 2 corn minus "average" price reported by Crop Reporting Service (fifteenth of month prices).  
 $m$ : Percent moisture in shipments for month corresponding to price difference observation.

The standard errors of regression coefficients appear in parentheses under their respective coefficients.

As mentioned above, two hypotheses are of interest. The first is that the reporters uniformly respond with the price of a specific grade. To test this hypothesis, the regression coefficients should be compared with zero. The margin per bushel between the price paid by the local elevator and the price for which the corn is sold by the local elevator is assumed to be independent of the moisture content. Consequently, only the slope of the regression line is of interest. Since the following  $t$ -values are both significant at the 1-percent level, we may reject the hypothesis that reporters in these areas responded with a standard grade quotation:

Northeast district  $t=3.46$  d.f. 54  
 East district  $t=5.75$  d.f. 53

This indicates that, in the aggregate, the reporters do indeed make an effort to reflect the price discount effect of moisture content. Whether such effort is adequate is tested with the second hypothesis.

Testing the second hypothesis requires a comparison of the regression coefficients with the relevant discount schedules. Moisture discounts that prevailed during this period were as follows:

- a. Three cents per bushel for each percent moisture in excess of 15.5 percent up to 20 percent.
- b. Four cents per bushel additional discount for each percent moisture from 20 percent to 23 percent.

This suggests that the form of the function fitted should permit the difference between the reported average price and the No. 2 net trackside price to increase at an increasing rate with respect to moisture. Second degree polynomials were fitted but provided no significant improvement in fit over the linear functions presented above.

The discount schedule in force during this period means that the value of the coefficient appropriate to test the second hypothesis for the September–April period lies between 3 and 4. About one-third of the observations in the Northeast district are above 20 percent moisture, while less than 10 percent are above 20 percent in the East district. Using the lower discount rate of three cents per bushel for the test, the highly significant  $t$ -values presented below suggest that the reporters inadequately reflect the moisture variations in reporting the average price received by farmers:

Northeast district  $t=19.61$  d.f. 54  
 East district  $t=17.58$  d.f. 53

The  $t$ -values would, of course, be even higher under the hypothesis that the coefficient lies between three cents and four cents per bushel. Thus, the evidence indicates that the reported average price is significantly different from *both* the price for a specific grade and the average price as calculated from the prevailing moisture discount schedule.

An example will clarify the relation of the reported average price to the appropriately discounted price. Suppose that the price quoted by the local elevator to the farmer for No. 2 corn is \$1.30 per bushel. If the moisture content is 20 percent, the discount schedule in effect during the period studied would result in a discount of 13.5 cents per bushel or a price of \$1.65. If the reporters discount according to the relation estimated from sample data for the Northeast district, the discount would be only about two cents per bushel (4.5 percentage points times 0.45 cent per percent). Thus, the reported price of \$1.28 would be about nine percent too high.

#### DAMAGE DISCOUNTS

Discounts for damage are much less frequent than those for moisture. During the eight-year period studied, samples of carloads indicated that damage was the effective factor in determining discount in only 14 of the months in the Northeast district. In the East district, damage exceeded 5 percent (the maximum permissible for No. 2 corn) in only one month. Consequently, only data from the Northeast district were analyzed. The following regression was fitted:

$$y = -0.59 + 0.23d \quad n=14$$

$$(0.11) \quad \bar{y}=1.43 \text{ cents}$$

$$\quad \quad \quad \bar{d}=8.8 \text{ percent}$$

$y$ : Quoted net trackside price for No. 2 corn minus "average" price reported by Crop Reporting Service (fifteenth of month prices).  
 $d$ : Percent damage in shipments for month corresponding to price difference observation.

Again, two hypotheses are tested. The hypothesis that the reporters respond with a specific grade means that the coefficient 0.23 is to be tested against zero. The  $t$ -value of 2.09 ( $d.f.=12$ ) is significant at the 50-percent level suggesting that reporters do reflect discounts for damage in their average price.

The discount for damage during the period studied was one cent per bushel for each percent damage in excess of 5 percent. Thus, the appropriate hypothesis for accurate discounting is that the regression coefficient equal one. The  $t$ -value of 7.0 is significant at the 1-percent level. As in the case of moisture discounts, the evidence from this sample indicates that the reporters understate the amount of the discount.

#### HOG PRICES

Hogs are sold almost exclusively on a liveweight basis in the north-central states.<sup>7</sup> The questionnaire (C. E. 5-230, F, 1/1/60) for the north-central states soliciting prices for hogs requests that the price per hundred pounds be given for "Hogs, including sows and feeders as well as butchers, average price for all classes, liveweight." This request is probably more difficult to fulfill than in certain other commodities. This is due to the fact that the various classes of hogs are more likely to follow different marketing channels. For example, the terminal market in Chicago receives a relatively larger number of

<sup>7</sup> Richard R. Newberg, *Livestock Marketing in the North-Central States*, pt. I, "Where Farmers and Ranchers Buy and Sell," North Central Regional Publication No. 104, 1959.

sows than do local dealers. Thus, any single market outlet is not apt to get a representative sample of all hog marketings.

In the absence of a local price for a specific weight or other classification, a comparison is made between the average price paid to farmers reported by the Illinois Cooperative Crop Reporting Service, and a terminal market price, in this case, Chicago. Since the Northeast Crop Reporting District includes Chicago, average prices received by farmers for hogs in this district were believed to be closely enough related to the Chicago market to furnish a meaningful comparison. Chicago is the only terminal market located in the Northeast district and although data are not available on market outlets for this particular district, a survey in 1956 indicated that 51 percent of the slaughter hogs sold by Illinois farmers went to terminal markets.<sup>8</sup> The Northeast district in 1957 and 1958 produced about 27 percent of the total production in Illinois, or about 3.5 percent of the total U.S. production. The present weight (1953-57 base) of hogs in the Index of Prices Received by Farmers is 10.3 percent.

As in most areas of commercial hog production, there is a seasonal pattern of production. Despite a decline in the seasonality of production, the larger fraction of the total number of sows farrowing continues to be in the spring (Table 1). This means that there will also be a seasonal fluctuation in the size distribution of marketings on a weight per animal basis. Even if one considers only barrows and gilts there is evidence of a definite seasonal pattern in the percentage mix of the weight groups.

TABLE 1.—Percent of Sows Farrowing in Spring Season, Northeast Crop Reporting District of Illinois, 1950-59<sup>1</sup>

Year	Percent	Year	Percent
1950.....	69.1	1955.....	64.1
1951.....	68.8	1956.....	63.3
1952.....	67.6	1957.....	60.1
1953.....	67.7	1958.....	58.0
1954.....	64.8	1959.....	57.5

<sup>1</sup> Illinois Agriculture Statistics.

Since difference in hog prices per hundred pounds are chiefly based on the weight of the animal (Table 2), this seasonal fluctuation in consist should affect the month-to-month *difference* between an average price per pound for all hogs and the price for a specific weight. Thus, our interest is not in the seasonal pattern of consist proper, but in the fact that its existence permits testing the hypothesis that reporters when asked for an average price respond with a price for a specific grade.

<sup>8</sup> *Ibid.*, p. 51.

TABLE 2.—Average Hog Price Per 100 Pounds, Chicago, 1946-50<sup>1</sup>

Weight.....	Good and choice barrows and gilts					Good and choice sows (pounds)	Good sows (pounds)
	160-180	180-200	200-220	220-240	240-270	330-360	400-450
Dollars per 100 pounds							
Average price.....	21.40	21.81	21.89	21.78	21.46	19.10	18.28

<sup>1</sup> *Livestock and Meat Statistics, 1957*, United States Department of Agriculture, Statistical Bulletin No. 230, 1958, p. 240.

The Livestock Market News Service publishes weekly average prices for the various classes of slaughter hogs sold in terminal markets. In lieu of explicit averaging by the voluntary price reporter, it might be hypothesized that he would report an average price for all barrows and gilts or perhaps the price for a common weight bracket, 200 to 220 pounds. Consequently, differences between the reported average price for the Northeast district and the Chicago price for all barrows and gilts as well as the Chicago price for 200- to 220-pound barrows and gilts were calculated. Since the marketing charge per 100 pounds is not likely to be affected by the season, it need not be considered. The midpoint of each weight range in the Chicago data was taken. For comparison, the price for the week including the fifteenth of the month was chosen. If the fifteenth were on a Sunday, the average for the previous week was taken. Data for the ten-year period, January 1950 through December 1959, were examined. The ten-year average differences by months are reported in Table 3. The expected pattern is apparent; the biggest difference occurs in July, a month in which large numbers of sows farrowing spring litters might be expected to be sold. This would tend to depress the average price in relation to the price of barrows and gilts.

TABLE 3.—Average Difference by Months Between Chicago Price for Barrows and Gilts and Average Price Received by Farmers as Reported by Illinois Cooperative Crop Reporting Service, Northeast Crop Reporting District, 1950-59

[Dollars per hundred pounds]

Month	Chicago price for all barrows and gilts minus average price received by farmers	Chicago price for 200-220-pound barrows and gilts minus average price received by farmers	Month	Chicago price for all barrows and gilts minus average price received by farmers	Chicago price for 200-220-pound barrows and gilts minus average price received by farmers
January.....	0.35	1.05	July.....	1.42	2.00
February.....	.14	.70	August.....	.92	1.20
March.....	.20	.53	September.....	.53	.63
April.....	.32	.66	October.....	.21	.29
May.....	.35	.95	November.....	.13	.86
June.....	.82	1.48	December.....	.20	.74

Further, the analysis of variance of the price differences (Tables 4 and 5) indicates that the differences among months are significant. The analysis of variance took into account the year-to-year variation (Table 6) in price differences. The highly significant *F*-values fur-

nish evidence of a deliberate effort on the part of the price reporters to deviate from the price for a specific group when they respond to the request for a unit-value type of price.

**TABLE 4.—Analysis of Variance of Difference Between Chicago Price for All Barrows and Gilts and Average Price Received by Farmers for All Hogs**

(See Tables 3 and 6)

Source of variation	Degrees of freedom	Sum of squares	Mean square
Months.....	11	16.99	1.54
Years.....	9	2.46	.27
Error.....	99	24.68	.25
Total.....	119	44.13	-----

$$F = \frac{1.54}{0.25} = 6.16, \text{ significant at the 1 percent level.}$$

**TABLE 5.—Analysis of Variance of Differences Between Chicago Price for 200- to 220-Pound Barrows and Gilts and Average Price Received by Farmers for All Hogs**

(See Tables 3 and 6)

Source of variation	Degrees of freedom	Sum of squares	Mean square
Months.....	11	26.51	2.41
Years.....	9	3.79	0.42
Error.....	99	28.38	0.29
Total.....	119	58.68	-----

$$F = \frac{2.41}{0.29} = 8.31, \text{ significant at the 1-percent level.}$$

**TABLE 6.—Average Difference by Years Between Chicago Price for Barrows and Gilts and Average Price Received by Farmers as Reported by Illinois Cooperative Crop Reporting Service, Northeast Crop Reporting District, 1950-59**

[Dollars per hundred pounds]

Year	Chicago price for all barrows and gilts minus average price received by farmers	Chicago price for 200-220-pound barrows and gilts minus average price received by farmers	Year	Chicago price for all barrows and gilts minus average price received by farmers	Chicago price for 200-220-pound barrows and gilts minus average price received by farmers
1950.....	0.75	1.16	1955.....	0.36	0.90
1951.....	.52	.82	1956.....	.24	.64
1952.....	.25	.73	1957.....	.48	.84
1953.....	.61	.87	1958.....	.34	.69
1954.....	.59	1.21	1959.....	.41	.96

Again, we are interested not only in whether the reported "average" price deviates from a price for a specific component of the commodity, but also whether such deviation is adequate to reflect changes in the consist of marketings. Unpublished data on the weight consist of barrows and gilts in the Chicago market together with available estimates of sows marketed in midwestern markets were used to construct the estimates of consist in Table 7. Although the data refer to only one year, some insights can be gained concerning the nature of the reported average price.

TABLE 7.—*Estimated Consist of Numbers of Hogs Marketed in Northeastern Crop Reporting District, Illinois, 1958*<sup>1</sup>

Weight class (pounds)	Percentage distribution of all barrows and gilts, 160-300 pounds, and sows											
	January	February	March	April	May	June	July	August	September	October	November	December
160 to 180.....	2	4	3	3	4	4	4	6	3	2	2	2
180 to 200.....	4	6	8	7	7	9	11	16	15	8	6	5
200 to 220.....	19	27	30	26	19	21	25	32	32	30	26	24
220 to 240.....	33	30	29	30	28	24	24	19	26	31	30	27
240 to 260.....	28	20	17	20	23	18	14	12	14	19	23	26
260 to 270.....	10	8	7	6	7	6	4	3	2	3	3	8
270 to 300.....	6	5	6	8	12	18	18	12	8	7	8	8
Total.....	100	100	100	100	100	100	100	100	100	100	100	100

<sup>1</sup> Based on H. J. Tippet, "An Analysis of Western Illinois Hog Pricing, 1958," unpublished M.S. thesis, University of Illinois, 1959, Table 10, p. 49 and Table 15, p. 55.

To construct an average terminal market price for each month, the estimates of consist in Table 7 were first converted to percentages of total weight marketed. This was done by using the midpoint of each weight class as the average weight for that class and the monthly average weight for sows published by the Livestock Market News Service.

By multiplying these percentages by the midmonth prices for their respective classes, the monthly average prices were calculated. To put these terminal market prices on a farm basis, a charge of 80 cents per hundred pounds was deducted for transportation, commission, yardage, and insurance. Shrinkage was not included as a deduction from the terminal market price. In Chart 1 the constructed average price is plotted as a deviation from the average price reported by the Crop Reporting Service. The constructed average is consistently lower, the largest deviations being in May and June when the sows, with their relatively low price per pound, are at their seasonal peak in volume. With respect to the general level during the year, the reported average price more closely approximates the estimated farm price for 200-220 pound barrows and gilts. When the two "average" monthly prices used in Chart 1 are weighted by the monthly index of marketings, the constructed average farm price for 1958 is \$19.30 while the Crop Reporting Service average is \$20.14, indicating a possible overstatement of the average prices received by farmers. The simple average of the monthly prices for 200-220 pound barrows and gilts is \$20.22.

The evidence in hog price collection is similar to that in the reporting of corn prices; the reported average price lies between a price for a specific grade or quality at the higher end of the quality scale and an average price estimated from other data.

### EGG PRICES

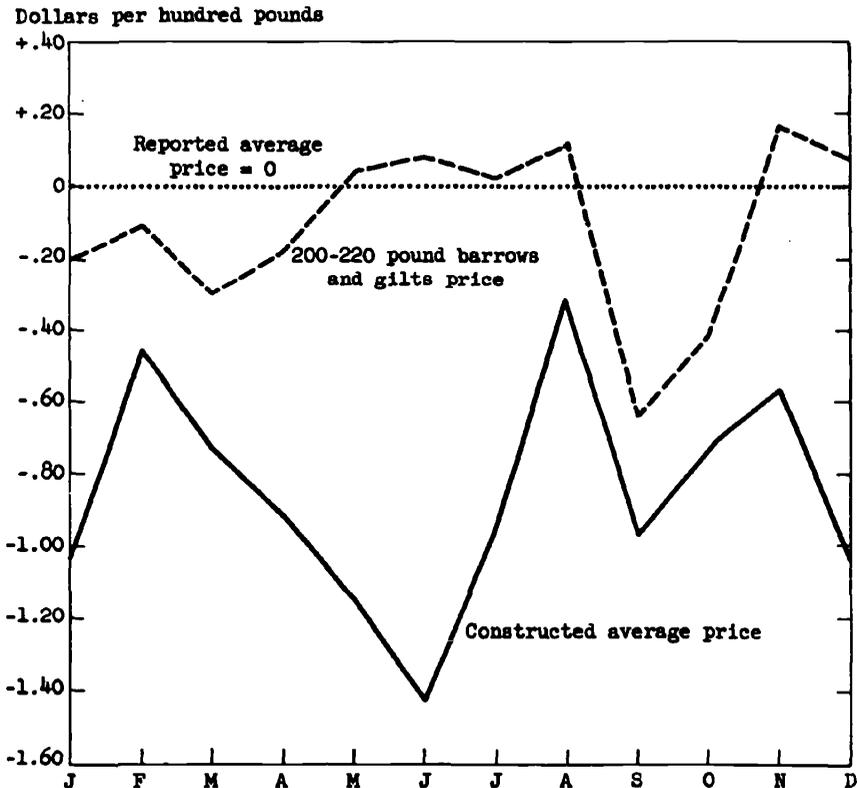
The voluntary price reporters in the north-central states responding to the mailed questionnaire (C.E. 5-230, F, 1/1/60) are asked to report the average price per dozen paid to farmers for "Eggs, all grades and sizes" on or about the fifteenth of the month. A question arises regarding the efforts of reporters to account for the seasonal change in the size and quality consist of egg marketings. It is no doubt easier to report, for example, the price for Grade A Large White (a common grade and size) than to estimate, however approximately, some type of an average reflecting the mix of current marketings.

It is well known that there is a seasonal fluctuation in the size and quality mix of egg marketings. An increase in the proportion of pullets in laying flocks in the autumn causes an increase in the proportion of smaller eggs. Similarly, seasonal temperature fluctuations may, under some conditions, affect quality. This suggests that one should expect a seasonal pattern to be evident in the *difference* between an average price per dozen for all eggs marketed (the type of price requested of voluntary reporters in price collection for the Index of Prices Received by Farmers) and a price for a specific quality and size.

For a period of time the Illinois State Department of Agriculture collected and published egg prices pertaining to local markets. (This report was discontinued in 1960.) In contrast to the unit-value prices collected by the Crop Reporting Service for the Index of Prices Re-

CHART 1

Deviation of Constructed Average Farm Price and Estimated Farm Price for 200-220 Pound Barrows and Gilts from Average Price Received by Farmers in Northeast District (Reported by Illinois Cooperative Crop Reporting Service), 1958



ceived by Farmers, these prices were collected for eggs of a specified size and quality. A comparison was made between the price quoted in these reports for Grade A Large White eggs in northern Illinois and the average price collected for the Index. The Illinois State Department report was issued semiweekly and the date selected for comparison was the price quoted for the fifteenth of the month or taken from the report immediately preceding the fifteenth if there were no report for that date. The area specified as northern Illinois is roughly comparable to the Northwest, Northeast, Central, and East Crop Reporting Districts. Consequently, the average prices reported for these districts were weighted by production data from each district to develop an average price for an area corresponding to northern Illinois. In 1957 and 1958, this area produced approximately one-half of the Illinois egg production which, in turn, represents about 5 percent of the national production. The weight for eggs in the Index of Prices Received is 6 percent.

The mean differences between the two reports for the six-year period are presented in Table 8. The very large mean differences in the fall months strongly suggest that reports do in fact reflect the changing seasonal consist. Since there was some year-to-year variability in the differences for each month, it is of interest to examine the analysis of variance in Table 9. It is seen that the variation in mean price differences among months is significantly greater than the variation in price differences within months after the year-to-year effect (Table 10) has been removed. Although the six-year period is rather short to ascertain a trend, the average differences by years (Table 10) might be interpreted as evidence of a quality improvement due to the average price approaching the Grade A Large White price.

TABLE 8.—Average Difference by Months Between Local Price for Grade A Large White Eggs as Reported by Illinois State Department of Agriculture and Average Price Received by Farmers for All Eggs as Reported by Illinois Cooperative Crop Reporting Service, Northern Illinois, 1954-59

(Grade A Large White price minus average price)

[Cents per dozen]

Month	Difference	Month	Difference
January.....	0.55	July.....	3.72
February.....	1.78	August.....	6.85
March.....	2.32	September.....	10.82
April.....	1.57	October.....	8.98
May.....	.93	November.....	5.82
June.....	2.17	December.....	1.38

TABLE 9.—Analysis of Variance of Differences Between Local Price for Grade A Large White Eggs and the Average Price Received by Farmers for All Eggs

(See Tables 8 and 10)

Source of variation	Degrees of freedom	Sum of squares	Mean square
Months.....	11	767.3	69.8
Years.....	5	101.5	20.3
Error.....	55	234.6	4.3
Total.....	71	1,103.4	

$F = \frac{69.8}{4.3} = 16.2$ , significant at the 1-percent level.

TABLE 10.—Average Difference by Years Between Local Price for Grade A Large White Eggs as Reported by Illinois State Department of Agriculture and Average Price Received by Farmers for All Eggs as Reported by Illinois Cooperative Crop Reporting Service, Northern Illinois, 1954-59

(Grade A Large White price minus average price)

[Cents per dozen]

Year	Difference	Year	Difference
1954.....	5.3	1957.....	3.9
1955.....	5.4	1958.....	3.9
1956.....	2.6	1959.....	2.3

It appears that the voluntary price reporters do make an attempt to comply with the request on the mailed questionnaire. Whether such attempt is adequate cannot, of course, be determined without considerable detail on the physical mix of marketings themselves. Given this type of data one might construct an average price to compare with the reported price.

However, obtaining quality and size data is complicated by the fact that all eggs do not go through the grading process, some being sold as "current receipts." This means several types of market outlets would need to be sampled. Further, there may be a lack of uniformity among stations in applying the grading standards, requiring a larger sample than might otherwise be necessary. At one Illinois grading station, the percent of Grade A Large in the total number of eggs graded dropped from 69.0 percent in 1947 to 50.9 percent in 1954. One of the explanations for this drop is the tightening of grade tolerances.<sup>9</sup>

#### SUMMARY AND CONCLUSIONS

The price collection system for the Index of Prices Received attempts to secure "average" prices per unit for the commodities entering the Index. The limited evidence presented here indicates that the reported prices for three commodities deviate from the price for a specific grade within that commodity thus indicating a degree of success in obtaining an average price. However, in the case of corn the reported average price, although significantly different from a No. 2 price, was estimated to be *closer* to the No. 2 price than to an estimated average price. In the hog price analysis, the reported average price was also between the price for a specific weight bracket and a constructed average price. Data were unavailable to indicate whether the significant price adjustments (from the price for a standard size and quality) made by reporters in egg prices were adequate to reflect changes in consist of marketings.

It appears that the observation of Sarle in 1927 concerning the failure of reporters to consider adequately lower quality marketings may still be correct at least for some commodities.<sup>10</sup> The accuracy of the reported average prices needs to be investigated by personal interview. Such investigation is one phase of the current Ohio Price Enumeration Project being conducted by the Agricultural Estimates Division of the Agricultural Marketing Service.

If the results of such studies indicate a general pattern of the reported average price being between a basic grade price and an average price computed with appropriate within-commodity quantity weights, then consideration should be given to asking the reporters to report *both* a specific grade price and an average or unit value. If the reporter actually attempts to find an average, he must also know the basic price which is applicable to that fraction of the marketings being sold at that price.

Since for many commodities this price is probably well known, it would require little effort to report. Further, the average price to be reported would more likely require a deliberate attempt on the part of the reporter, when reporting the average price, to deviate in the

<sup>9</sup> E. E. Broadbent, *The Evolution of Graded Egg Marketing in Illinois*, University of Illinois Agricultural Experiment Station Bulletin 619, 1957, p. 26.

<sup>10</sup> Sarle, *op. cit.*, p. 4.

correct direction and amount from the price for a specific grade. The requesting of additional information may reduce the number of responses, but this may be compensated for by an improvement in accuracy. This is an empirical question which would need to be answered by investigation. The suggestion of requesting two prices refers, of course, only to those commodities in which there is a grading system having an adequate degree of geographical uniformity. Specific prices for subclasses (not necessarily grades or qualities) of some commodities are now being collected. For example, production and sale of wheat is now estimated in terms of winter wheat, durum, and other spring wheat. Plans have been made to divide the commodity "hogs" into "barrows and gilts" and "sows" for the North Central States. In all, over half of the commodities in the Index of Prices Received by Farmers have components which are priced separately in at least some areas.

Any improvement in the accuracy of the average prices will improve income estimates and, if one accepts unit value prices for use in price indexes, also the Index of Prices Received by Farmers. Availability of a specific grade price at the farm level would also permit an analysis of the difference between the Index of Prices Received by Farmers and a price index for specific grades which does not reflect changes in quality. If the corn price analysis is indicative of a pattern in the reporting of other commodities, this difference is likely to be small as compared with the difference between income estimates based on the reported average prices and income estimates based on accurately determined average prices.