Forecasting Farm Turkey Prices In and Out of the Main Marketing Period

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TURKEY PRODUCERS need to be able to forecast turkey prices with a high degree of accuracy if they are to make sound and profitable production and marketing decisions. For instance, good price forecasts can help a producer decide (1) whether to market his birds at light weights as fryer-roasters or to carry them to maturity for later marketing, (2) whether to sell his birds live or to have them custom processed and stored for later sale in ready-to-cook form, or (3) whether to contract to grow turkeys for a price specified in advance.

The object of this study is to provide equations for more accurately forecasting the price of turkeys to producers in and out of the heavy marketing period. These equations can be used for forecasting prices only when the level of poultry supplies is known in advance. Supplies can be estimated 3 to 6 months in advance from cold storage holdings, the number of poults and chicks hatched, and the number of eggs in incubators. If price forecasts further into the future are needed, as they would be for production planning, then some method of forecasting supplies for the corresponding period would be needed.

Turkey is traditionally a holiday bird. Consumption reaches seasonal peaks at Thanksgiving and Christmas. Because of this and because conditions are most favorable for producing turkeys with spring-hatched poults, a large proportion of turkey production is geared for marketing in the last few months of the year. Turkey marketings begin the year at a very low level and increase steadily to a high in the fourth quarter. They begin exceeding consumption around midyear. Cold storage holdings of turkey build up from midyear to a peak in November to provide maximum supplies for the holiday period.

In the last 5 years, a rapidly increasing proportion of turkey meat has been used in the production of convenience foods such as turkey roasts and rolls, reaching about 15 percent in 1964. To date this development has had no material effect on seasonal patterns of marketings but its continuance could reduce the seasonal pattern.

Despite the highly seasonal production and consumption pattern, the few statistical studies designed to measure turkey demand and the factors influencing turkey prices have employed annual time series data.[1] This approach implies that the impact of factors influencing changes in the demand for turkey from one year to the next, such as population growth, competition from other foods, and per capita disposable income, is distributed throughout each year in roughly the same way. Analysts were aware that the demand might be somewhat different in different periods of the year. However, data were not available for measuring these differences.

Because of the large proportion of the crop marketed in September-December, turkey prices during this period usually average rather close to the annual average (fig. 1). Thus, price forecasts from analyses using annual data would be expected to be better indicators of prices in the main marketing season than in the January-August period.

However, in recent years new data have become available which make it possible to develop analyses for periods of less than a year (tables 1 and 2). This report presents results from a study using these new data to evaluate and measure separately turkey demand in the periods of heavy and light marketings. Analyses for shorter periods might have been more useful for indicating the best time for marketing

[1] Karl A. Fox, "The Analysis of Demand for Farm Products," U.S. Dept. Agr., Tech. Bul. 1081, 90 pp., 1953. G. E. Brandow, "Interrelations Among Demands for Farm Products and Implications for Control of Market Supply," Pa. Agr. Expt. Sta., Bul. 680, 124 pp., 1961. Dennis Lee Bawden, "Interregional Models of the United States Turkey Industry," Ph.D. diss., Univ. Calif., 1964. Olan D. Folker, "The 1965 Turkey Outlook," speech presented at Natl. Turkey Fed. Conv., Des Moines, Iowa, 13 pp., 1965.

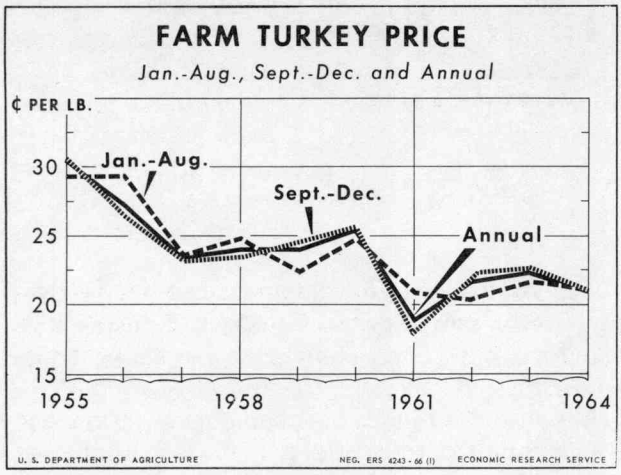

Figure 1

Table 1.--Data for January-August analyses[1]

Year	Per capita supplies available for domestic consumption in Jan.-Aug.[2]		Per capita red meat consumption in Jan.-Sept.	Per capita disposable income in Jan.-Sept.	Consumer price index in Jan.-Aug. (1957-59 = 100)	Weighted farm turkey price per pound in Jan.-Aug. deflated by CPI
	Chicken C_{J-A}	Turkey T_{J-A}	M_{J-S}	Y_{J-S}		P_{J-A}
	Pounds	*Pounds*	*Pounds*	*Dollars*	*Index*	*Cents*
1955....	14.1	1.9	119.1	1,644	93.2	31.4
1956....	16.0	2.0	123.8	1,729	94.2	31.1
1957....	17.0	2.8	118.0	1,803	97.5	24.3
1958....	19.0	2.6	111.9	1,817	100.5	24.7
1959....	20.4	2.8	117.0	1,890	101.2	22.1
1960....	19.2	2.8	120.4	1,934	102.8	24.0
1961....	21.2	3.7	118.9	1,971	104.0	20.1
1962....	20.7	3.5	121.2	2,054	105.1	19.2
1963....	21.3	3.2	124.9	2,113	106.4	20.3
1964....	21.8	3.4	129.1	2,234	107.9	19.5
1965[3]...	22.8	3.4	124.7	2,371	109.5	18.7

[1] Data in analyses were estimates as of mid-1965. [2] Estimated production in January-August plus beginning stocks minus exports. [3] Estimates based on preliminary data available in January 1966.

Table 2.--Data for September-December analyses[1]

Year	Per capita supply of turkey available for domestic consumption in Sept.-Dec.		Change in per capita consumption of chicken and turkey in Jan.-Aug. from a year earlier	Per capita red meat consumption in Oct.-Dec.	Time (1955 = 1)	Consumer price index in Sept.-Dec. (1957-59 = 100)	Per capita disposable income in Oct.-Dec. deflated by CPI	Weighted farm turkey price per pound in Sept.-Dec. deflated by CPI	Per capita turkey consumption from commercial sources in Sept.-Dec.
	Total A_{S-D}	From commercial sources T_{S-D}	ΔQ_{J-A}	M_{O-D}	X		Y_{O-D}	P_{S-D}	U_{S-D}
	Pounds	*Pounds*	*Pounds*	*Pounds*		*Index*	*Dollars*	*Cents*	*Pounds*
1955.....	4.1	4.1	-1.1	43.7	01	93.6	1,816	32.6	3.5
1956.....	4.6	4.4	1.8	42.9	02	95.9	1,848	27.5	3.5
1957.....	4.8	4.8	1.9	40.7	03	98.9	1,824	23.6	3.7
1958.....	4.9	4.8	1.5	39.7	04	100.8	1,836	23.2	3.8
1959.....	4.9	4.8	1.6	42.5	05	102.2	1,869	24.0	3.9
1960.....	4.9	4.8	-1.2	40.4	06	103.7	1,873	24.7	3.9
1961.....	6.3	5.9	2.4	41.6	07	104.6	1,934	17.1	4.5
1962.....	5.6	5.4	-.5	41.9	08	106.0	1,961	20.9	4.3
1963.....	5.6	5.4	.5	44.4	09	107.3	2,012	21.1	4.2
1964.....	5.8	5.5	.5	44.9	10	108.6	2,108	19.4	4.4
1965[2].....	6.0	5.8	1.1	42.3	11	110.6	2,214	17.7	4.7

[1] Data in analyses were estimates as of mid-1965.
[2] Estimates based on preliminary data available in January 1966.

birds. However, estimates of supply for shorter periods, a necessary variable in the analyses, would be considerably less reliable. The study provides statistical formulas for predicting turkey prices in and out of the main marketing period and for the year as a whole. It seeks to provide answers to such questions as these: Are the factors affecting turkey prices in September-December the same as those in January-August? Do changes in turkey supplies affect turkey prices more when marketings are seasonally heavy or light? Does the lateness of the turkey crop, that is, changes in the proportion of the crop marketed in September-December, affect the annual average turkey price?

Major Findings

The demand for turkey at the farm level is elastic during January-August but inelastic in

September-December.[2] The study showed that during the last decade (1955-64) the elasticity of demand in January-August approached -2.0 while during the main marketing period it averaged around -0.5. For the year as a whole price elasticity of demand averaged around -0.7. Elasticities computed with 1964 values were about 30 percent lower in January-August, and 10 to 15 percent lower in September-December and for the year as a whole, than those computed with 1955-64 average values. These seasonal differences confirm that outside the holiday period turkey has to compete much more directly with chicken and other high-protein foods.

Because of these differences in demand, prices in the main marketing period were considerably more responsive to changes in supplies than prices outside the main marketing period. In September-December, turkey prices (in constant dollars) were found to be measurably influenced by only two factors--per capita turkey supplies and change from a year earlier in per capita poultry consumption in January-August. It was found that, other things being equal, an increase of 5 percent in per capita turkey supplies from commercial sources (total supplies excluding USDA purchases) during this period was followed, on the average, by a 10 percent decrease in the turkey price. It was most interesting that year-to-year changes in per capita poultry supplies (including chicken) prior to the main marketing season were significant factors in affecting the September-December price while the absolute level of per capita chicken supplies during this heavy marketing period was not. This strongly suggests that heavy per capita use of poultry in January-August relative to a year earlier tends to weaken demand for turkey in the holiday season.

In January-August, the per capita supply of chicken was the only variable, besides per capita supplies of turkey, to measurably affect deflated turkey prices. During this period a 10 percent increase in the per capita supplies of turkeys resulted in about a 5 percent drop in the deflated price of farm turkeys. A 10 percent increase in chicken supplies depressed turkey prices by about the same amount.

The statistical relations measuring the effect on turkey price of the several supply factors were evaluated as to their adequacy for estimating the price of turkeys. During the period of fit (1955-64) the statistical equation for September-December gave price estimates for each of the 10 years that were within 1 cent of the actual price.[3] For the January-August period, the price estimate deviated from the observed price by more than 1 cent in only 3 of the 10 years, the largest deviation being 1.7 cents. Comparisons were also made to determine whether the annual average price could be estimated more accurately by combining the results from the two regressions for the separate periods or by using a single regression equation fitted with annual data. When using the combined results, it was possible to obtain price estimates within 0.7 cent or less of the observed price. However, the use of the equation based on annual data gave price estimates in 2 of the 10 years that deviated from the observed value by more than 1 cent.

The Model

The main objective of the study was to develop relationships for forecasting farm turkey prices in the January-August period, in the September-December period, and for the year as a whole. A secondary aim was to measure the responsiveness of consumption to changes in prices.

The basic mathematical models developed to forecast prices were essentially of the form

$$(1)\quad P = f(T, C, M, Y)$$

where P is the farm turkey price, T the supply of turkeys, C the supply of other poultry, M the supply of red meat, and Y consumer income. Quantities and income were converted to a per capita basis so population would not

[2] Even though the major objective of this study was to estimate turkey prices, demand elasticities were computed from these statistical relations to provide comparisons. These elasticities are not necessarily the same as those that would be derived from a statistical model designed to obtain statistical demand coefficients. However, we feel that they are probably not far from such coefficients.

[3] The true test of an estimating equation is how well it will predict future prices.

have to be treated as a separate variable in the analysis. Price and income data were deflated by the consumer price index.

Graphic analysis indicated that January-August relationships appeared to be linear while those for September-December appeared to be nonlinear. For this reason, a semilogarithmic function was used for the September-December period and for the year as a whole.

The mathematical models were fitted by the least-squares method using data for 1955-64.[4] Data for periods of less than a year were not available prior to 1955.

January-August Regressions

The major variables investigated in the analysis of the period of light turkey marketings are defined below:

P_{J-A} = Weighted U.S. farm turkey price, deflated by CPI (cents per pound).

T_{J-A} = Per capita turkey supply available for domestic consumption (pounds).

C_{J-A} = Per capita chicken supply available for domestic consumption (pounds).

M_{J-S} = Per capita red meat consumption (pounds).

Y_{J-S} = Per capita disposable income deflated by CPI (dollars).

All of the data were for January-August, except per capita red meat consumption and per capita disposable income which were for January-September.

The investigation revealed that per capita chicken supplies and per capita turkey supplies explained 96 percent of the variation in the deflated farm turkey price in January-August 1955-64. When red meat, disposable income, and time were included as additional explanatory factors, the relationship was not materially improved. The relevant price estimating equation obtained is equation (2):

$$(2)\quad \underset{J-A}{P} = 50.315 \underset{-3.3}{-} 4.21\, \underset{J-A}{T} \underset{-2.6}{-} 0.76\, \underset{J-A}{C}$$

$$R^2 = 0.96 \qquad D.W. = 2.64 \qquad S.E. = 1.014$$

The numbers under the regression coefficients are the "t" statistics.[5] Both coefficients as indicated by their "t" values are significant at the 5 percent confidence level. The standard error of estimate of P_{J-A} is 1.0 cent. The Durbin-Watson statistic (D.W. = 2.64) reveals that probably little autocorrelation exists in the residuals.

The results of the analysis seem reasonable. Turkey supplies in January-August are small both in absolute terms and in relation to other high-protein supplies; therefore, it might be expected that only chicken, the closest substitute for turkey, would affect turkey prices enough to be clearly measurable. Then too, the impact of income on turkey prices probably might be diluted and hard to identify specifically, since turkey makes up such a small part of the total poultry supply in January-August.

Price flexibilities computed from equation (2) indicate that a 10 percent change in per capita turkey supplies available for domestic consumption in January-August from commercial sources, all other things being equal, was followed by only about a 5 percent change in deflated farm turkey prices in the opposite direction. However, if the price flexibility is computed with data using 1964 values rather than the average values of the variables for the period, a 10 percent change in supplies results in a 7 percent change in prices. The reciprocals of these price flexibility coefficients are 2.0 and 1.4, respectively. They imply a direct price elasticity of demand for turkey that is greater than one. It is logical to believe that demand for turkey in January-August is elastic because turkey supplies are small and turkey is a close substitute for many different high-protein foods.

In January-August, a 5 1/2-pound change in chicken supplies has about the same effect on turkey prices as a 1-pound change in turkey supplies. However, when changes in supplies are measured in percentage terms, chicken has

[4] The use of a single equation rather than a system of simultaneous equations appears to be valid for price forecasting since the supplies of turkey, chicken, and red meat are determined prior to the marketing period and are not influenced much by the current farm turkey price.

[5] The "t" value is the ratio of the regression coefficient to its standard error and is used to ascertain whether or not the coefficient differs significantly from zero.

about the same impact on prices as turkey. This is not too surprising when one considers that chicken supplies in January-August in recent years have been 6 to 8 times as large as turkey supplies. In the last decade, a 10 percent change in chicken supplies was, on the average, associated inversely with a 6 percent change in turkey prices. When 1964 values rather than the average values for the period were used, the computed price flexibility increased to -0.8.

September-December Regressions

Price-supply relationships for this period, because of the larger marketings, are perhaps of greater interest than those for the January-August period. The variables studied during this main turkey marketing period included:

A_{S-D} = Per capita turkey supply available for domestic consumption from all sources, September-December (pounds).

T_{S-D} = Per capita turkey supply available for domestic consumption from commercial sources, September-December (pounds).

ΔQ_{J-A} = Change in per capita consumption of chicken and turkey from a year earlier, January-August (pounds).

M_{O-D} = Per capita red meat consumption, October-December (pounds).

X = Time (1955=1).

Y_{O-D} = Per capita disposable income deflated by CPI, October-December (dollars).

P_{S-D} = Weighted farm turkey price deflated by CPI, September-December (cents per pound).

U_{S-D} = Per capita turkey consumption from commercial sources, September-December (pounds).

Using these variables for 1955-64, the following price-estimating equations were statistically developed.

(3) $\text{Log } P_{S-D} = 1.947 - \underset{-12.2}{0.112}\ A_{S-D} - \underset{-1.7}{0.008}\ \Delta Q_{J-A}$

$R^2 = 0.96$ D.W. = 1.66
S.E. = 0.0174 (in logarithms)

(4) $\text{Log } P_{S-D} = 2.042 - \underset{-17.6}{0.135}\ T_{S-D} - \underset{-2.8}{0.009}\ \Delta Q_{J-A}$

$R^2 = 0.98$ D.W. = 1.86
S.E. = 0.0122 (in logarithms)

(5) $\text{Log } P_{S-D} = 1.736 - \underset{-5.3}{0.115}\ T_{S-D} - \underset{-2.7}{0.012}\ \Delta Q_{J-A} - \underset{-1.3}{0.0073}\ X + \underset{1.1}{0.0013}\ Y_{S-D}$

$R^2 = 0.99$ D.W. = 2.50
S.E. = 0.0125 (in logarithms)

In contrast to the January-August analysis, the September-December analysis considers two separate supply variables--supplies available for domestic consumption from all sources, and supplies available for domestic consumption from commercial sources (excluding USDA purchases). The USDA has purchased turkeys during most of the years used in the analysis. These purchases always have been timed to affect prices in the main marketing period.

The use of per capita turkey supplies available for domestic consumption from commercial sources in the analysis appeared to give a better fit than when supplies from all sources were used--for example, equation (4) versus equation (3). These supplies and the year-to-year change in per capita chicken and turkey consumption in January-August, T_{S-D} and ΔQ_{J-A}, alone explained 98 percent of the variation in deflated turkey prices (equation 4) during the period under investigation. In addition, the regression coefficients associated with these two variables remained stable and highly significant even when other explanatory variables were added to the regressions. Analysis

revealed that the absolute level of per capita chicken consumption in September-December had little measurable effect on turkey prices. The Durbin-Watson statistic (D.W.) for equations (3) and (4) indicates no serial correlation exists.

When "demand shifters"--per capita disposable income and time--were introduced, the percentage of the explained variation in the dependent variable increased somewhat, but neither of the coefficients associated with these two "shifter" variables were significant at the 5 percent confidence level (equation 5).

Some regressions were also run with per capita consumption of turkey from commercial sources as the dependent variable to permit direct estimating of elasticity of demand.[6]

$$(7)\quad \text{Log } U_{S\text{-}D} = 0.827 - \underset{-3.0}{0.011}\ \Delta Q_{J\text{-}A} - \underset{-9.2}{0.010}\ P_{S\text{-}D}$$

$R^2 = 0.92$ D.W. = 2.22
S.E. = 0.124 (in logarithms) E = 0.57

$$(8)\quad \text{Log } U_{S\text{-}D} = 0.631 - \underset{-2.0}{0.008}\ \Delta Q_{J\text{-}A} - \underset{-5.0}{0.0080}\ P_{S\text{-}D} + \underset{1.2}{0.00008}\ Y_{O\text{-}D}$$

$R^2 = 0.94$ D.W. = 2.16
S.E. = 0.0119 (in logarithms) E = 0.43

[6]Since retail turkey prices were not available, farm prices (prices paid by processors, rather than prices paid by consumers) were used for this purpose. Dealer demand may be used to represent consumer demand if a relatively fixed relationship between farm and retail prices can be assumed, or if a separate shift variable is used to represent marketing activity. The relation between farm and retail prices does appear to be fairly stable. In nearly all of the January-August period, freshly killed turkeys compete directly with turkeys being taken out of cold storage for sale to consumers. And nearly all of the turkeys slaughtered in September-December are consumed during that period. In any year, processors may misjudge consumer demand in the fall and pay too much or too little to farmers. Also, retailers may misjudge consumer demand. Even so, there probably might be as much tendency to err on the high side as on the low side and thus the average relationship between farm and retail prices for a period of years might not be affected much.

Demand during the main marketing season is indicated to be inelastic as would be expected. When the average values of the economic variables are used, the price elasticity of demand is about -0.5.[7] That is, a change in per capita turkey consumption from commercial sources of about 5 percent is associated with a 10 percent change in deflated farm turkey prices in the opposite direction. The elasticity dropped to -0.4 when 1964 values were used in computing the elasticity coefficient.

Annual Regressions

Time series relationships for the year as a whole were fitted to provide a basis of comparison for the January-August and September-December analyses.

The variables analyzed included (see table 3):

A = Total per capita turkey supplies available for domestic consumption (pounds).

T = Per capita turkey supplies available for domestic consumption from commercial sources (pounds).

ΔC = Change from a year earlier in per capita chicken consumption (pounds).

[7]The formula for obtaining the price elasticity of demand for a semilog function of the form

$$(1)\quad \text{Log}_{10}\ q = bp$$

where q is consumption and p is price, can be derived as follows:

The general formula for elasticity is

$$(2)\quad E = \frac{dq}{dp} \cdot \frac{p}{q}$$

Differentiating equation (1) with respect to q, we get

$$(3)\quad \frac{dq}{dp} = bq \log_e 10$$

$$(4)\quad \frac{dq}{dp} = 2.3026\ bq$$

and substituting in (2):

$$(5)\quad E = 2.3026\ bq \cdot \frac{p}{q} = 2.3026\ bp$$

M = Per capita red meat consumption (pounds).

X = Time (1955=1).

Y = Per capita disposable income deflated by CPI (dollars).

P = Weighted farm turkey price deflated by CPI (cents per pound).

U = Per capita consumption of turkey from commercial sources (pounds).

Two variables, T (per capita turkey supplies for the year as a whole) and ΔC (change from a year earlier in per capita chicken consumption), were found to influence the deflated annual farm turkey price. The regression follows:

$$(9)\quad \text{Log } P = \underset{}{1.966} - \underset{-21.9}{0.082}\ T - \underset{-2.3}{0.005}\ \Delta C$$

$R^2 = 0.99$ D.W. = 1.28
S.E. = 0.0103 (in logarithms)

Per capita turkey supplies excluding USDA purchases, as in the September-December analyses, gave a much better fit than total per capita supplies available for domestic consumption. The addition of income, time, and meat as explanatory variables did not improve the relationship as was true for the September-December analysis.

When per capita consumption of turkey from commercial sources was treated as the dependent variable, the deflated farm turkey price, P, and the change from a year earlier in per capita chicken consumption proved to be the only significant independent variables. The Durbin-Watson test reveals no serial correlation in the residuals.

$$(10)\quad \text{Log } T = \underset{}{1.087} - \underset{-6.2}{0.009}\ \Delta C - \underset{-26.7}{0.013}\ P$$

$R^2 = 0.99$ D.W. = 2.18
S.E. = 0.0060 (in logarithms)

During the period under study, about a 7 percent change in the annual per capita turkey consumption from commercial sources was associated with a 10 percent change in deflated farm turkey prices in the opposite direction. The elasticity computed for 1964 was -0.6. Thus, the demand for turkey in the year as a whole is less elastic than in January-August and almost as inelastic as in September-December, as would be expected.

Table 3.--Data for annual analyses, 1955-65[1]

Year	Per capita supply of turkey available for domestic consumption		Change in per capita chicken consumption from a year earlier	Per capita red meat consumption	Time (1955 = 1)	Consumer price index (1957-59 =100)	Per capita disposable income deflated by CPI	Weighted farm turkey price deflated by CPI	Per capita turkey consumption from commercial sources[4,5]
	Total[2] A	From commercial sources[3] T	ΔC	M	X		Y	P	U
	Pounds	*Pounds*	*Pounds*	*Pounds*		*Index*	*Dollars*	*Cents*	*Pounds*
1955.....	5.7	5.7	-1.5	162.8	01	93.3	1,779	32.4	5.0
1956.....	6.3	6.1	3.1	166.7	02	94.7	1,839	28.7	5.0
1957.....	7.0	7.0	1.1	158.7	03	98.0	1,840	23.9	5.9
1958.....	6.9	6.8	2.6	151.6	04	100.7	1,813	23.7	5.8
1959.....	7.2	7.1	.8	159.5	05	101.5	1,876	23.5	6.1
1960.....	7.1	7.0	-.8	160.8	06	103.1	1,878	24.6	6.0
1961.....	8.9	8.6	2.1	160.5	07	104.2	1,904	18.1	7.1
1962.....	8.2	8.0	-.2	163.1	08	105.4	1,954	20.5	6.8
1963.....	8.0	7.8	.8	169.3	09	106.7	1,992	20.9	6.5
1964.....	8.4	8.1	.4	174.6	10	108.1	2,082	19.4	6.9
1965[6].....	8.6	8.4	2.2	168.5	11	109.9	2,232	18.5	7.2

[1] Data in analyses were estimates as of mid-1965.
[2] Production plus beginning stocks less exports.
[3] Total supply available for domestic consumption minus USDA purchases.
[4] Civilian disappearance estimated from production, stock changes, exports and military use.
[5] Civilian disappearance minus USDA purchases.
[6] Estimates based on preliminary data available in January 1966.

Estimating Turkey Prices

Turkey prices in the period of heavy and light marketings have differed considerably in some of the years in the last decade. Figure 1 shows weighted average turkey prices for three periods, January-August, September-December, and the year as a whole. A much closer relationship exists between September-December prices and annual prices than between January-August prices and prices in the other two periods. Because of this, price-estimating equations from studies with annual aggregates in the past have been used for estimating changes in the September-December price. However, such September-December price estimates have an estimating error inherent in the equations themselves as well as an additional error arising from price variation within the year.

Table 4 and figures 2 and 3 compare the price estimates obtained from the price-estimating equation with the observed prices during September-December and January-August for 1955-64. With equation (4) it was possible to estimate prices for September-December that came within 0.9 cent of the observed price in each of the 10 years and within 0.5 cent of it in 7 years. Less accurate price estimates were made for January-August. The estimated price for this period deviated from the observed price by more than 1 cent in 3 years, the largest deviation being 1.7 cents in 1961.

Table 4.--January-August and September-December farm turkey price, reported and estimated, 1955-65

Year	January-August price			September-December price		
	Reported weighted average	Estimated by equation (2)[1]	Deviation	Reported weighted average	Estimated by equation (4)[2]	Deviation
	Cents	*Cents*	*Cents*	*Cents*	*Cents*	*Cents*
1955....	29.3	29.4	0.1	30.5	29.6	-0.9
1956....	29.3	28.0	-1.3	26.4	26.0	-.4
1957....	23.7	24.9	1.2	23.3	23.6	.3
1958....	24.8	25.0	.2	23.4	24.3	.9
1959....	22.4	23.2	.8	24.5	24.5	0
1960....	24.7	24.6	-.1	25.6	25.4	-.2
1961....	20.9	19.2	-1.7	17.9	17.6	-.3
1962....	20.2	20.8	.6	22.2	22.2	0
1963....	21.6	21.9	.3	22.6	21.9	-.7
1964....	21.0	20.9	-.1	21.1	21.4	.3
1965[3]...	22.4	20.5	-1.9	22.1	19.6	-2.5

[1] Equation (2): $P_{J-A} = 50.315 - 4.21\ T_{J-A} - 0.76\ C_{J-A}$

[2] Equation (4): $\text{Log}\ P_{S-D} = 2.042 - 0.135\ T_{S-D} - 0.009\ \Delta Q_{J-A}$

[3] Based on preliminary data available in January 1966.

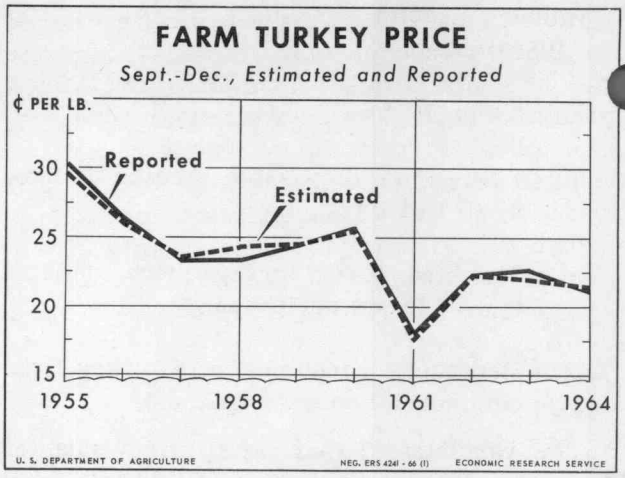

Figure 2

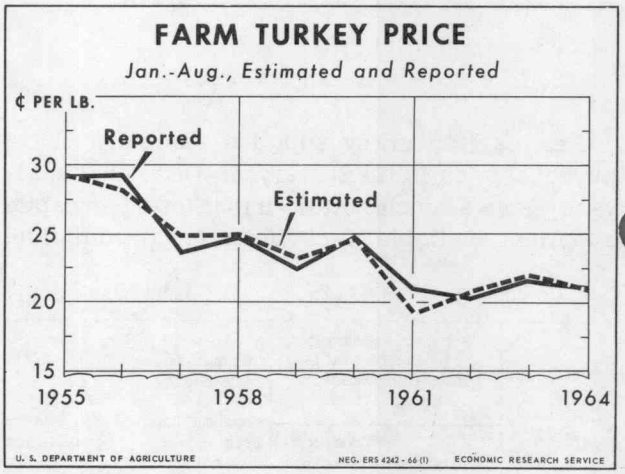

Figure 3

Table 5 shows that estimates of the annual average farm turkey price made by weighting the January-August and September-December price estimates obtained from equations (2) and (4) were better than annual estimates made directly from equation (9) which was based on annual data. Estimated prices based on the two equations deviated from observed prices by 0.7 cent or less in each of the years in the study and by less than 0.5 cent in 5 years. Equation (9) yielded estimates that deviated from observations by more than 1 cent in 2 years.

Tables 4 and 5 also show how prices estimated for 1965 by equations (2), (4), and (9) compare with reported prices. Estimated prices are much too high. The overestimates appear to have resulted from the substantially reduced supplies of red meat, especially pork. In addition, there was a large increase in consumer income in 1965. Normally, most of the year-to-year price variation can be explained without allowing for the effect of these two factors. However, in 1965, both worked in the same direction and their combined effect appears to explain why prices were above those predicted by the equations.

Table 5.--Annual farm turkey price, reported and estimated, 1955-65

Year	Reported weighted average price	Estimated by equation (9)[1]		Estimated by weighting estimates from equations (2) and (4)	
		Price	Deviation	Price	Deviation
	Cents	*Cents*	*Cents*	*Cents*	*Cents*
1955.....	30.2	29.6	-0.6	29.5	-0.7
1956.....	27.2	25.9	-1.3	26.5	-.7
1957.....	23.4	24.2	.8	24.0	.6
1958.....	23.9	25.0	1.1	24.5	.6
1959.....	23.9	24.3	.4	24.1	.2
1960.....	25.4	25.5	.1	25.1	-.3
1961.....	18.9	18.3	-.6	18.2	-.7
1962.....	21.6	21.4	-.2	21.8	.2
1963.....	22.3	22.2	-.1	21.9	-.4
1964.....	21.0	21.1	.1	21.2	.2
1965[2].....	22.2	20.3	-1.9	19.9	-2.3

[1] Equation (9): Log P = 1.966 - 0.082 T - 0.005 (ΔC)
[2] Based on preliminary data available in January 1966.