A RECURSIVE MODEL FOR FORECASTING QUARTERLY
AND MONTHLY U. S. HOG PRICES

By

Wilson Leite do Canto

A RESEARCH PAPER
Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Agricultural Economics

1972
ACKNOWLEDGMENTS

The author is greatly indebted to Dr. John Ferris who served as major professor; he supervised and oriented me during the development of this research, and without whom this work would have been impossible.

Thanks are due to Lloyd Teigen who gave freely of his time in assistance, and to Sue Tsai, from the Computer Center, who helped in our computation program.

Gratitude is also expressed to the Instituto de Economia Agrícola, Secretaria da Agricultura do Estado de São Paulo, which provided me with the opportunity to participate in the Master's program at Michigan State University, and to the Ford Foundation for providing me with a fellowship.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>ii</td>
</tr>
<tr>
<td><strong>Chapter</strong></td>
<td></td>
</tr>
<tr>
<td>I. PURPOSE OF THE STUDY</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Literature</td>
<td>2</td>
</tr>
<tr>
<td>The Problem</td>
<td>6</td>
</tr>
<tr>
<td>II. METHODS, DATA AND PROCEDURES</td>
<td>8</td>
</tr>
<tr>
<td>Recursive Models</td>
<td>8</td>
</tr>
<tr>
<td>Data Sources and Periods</td>
<td>10</td>
</tr>
<tr>
<td>Least Square Estimates</td>
<td>13</td>
</tr>
<tr>
<td>Evaluation Criteria</td>
<td>13</td>
</tr>
<tr>
<td>III. SUPPLY AND DEMAND</td>
<td>15</td>
</tr>
<tr>
<td>Production</td>
<td>15</td>
</tr>
<tr>
<td>Supply</td>
<td>26</td>
</tr>
<tr>
<td>Demand</td>
<td>35</td>
</tr>
<tr>
<td>Seasonality of Prices</td>
<td>41</td>
</tr>
<tr>
<td>IV. THE FORECAST MODEL</td>
<td>46</td>
</tr>
<tr>
<td>Description</td>
<td>46</td>
</tr>
<tr>
<td>Forecasting</td>
<td>51</td>
</tr>
<tr>
<td>V. CONCLUSIONS</td>
<td>62</td>
</tr>
<tr>
<td>LITERATURE CITED AND CONSULTED</td>
<td>63</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>66</td>
</tr>
<tr>
<td>APPENDIX B</td>
<td>75</td>
</tr>
</tbody>
</table>
CHAPTER I

PURPOSE OF THE STUDY

Introduction

Institutions such as the U. S. Department of Agriculture, universities and private firms have published regularly current and outlook information to the participants of the livestock market.

Information about short-run future tendencies in the market place is a necessary tool used in the decision making process, by hog producers, wholesalers, retailers and others operating in the hog and pork markets. The forecasting techniques which have been used range from very sophisticated ones to simple "rules of thumb" or purely guesses. Many forecasters use their own procedures and techniques developed after long experience in operating in the market, and they only get their results after much "pencil and paper" work, and frequently the techniques used are known only to the forecasters.

The present work was developed under the supervision of Dr. John N. Ferris, professor of Agricultural Marketing and specialist in livestock outlook at Michigan State University. It is an attempt to formalize his techniques and
procedures with some modifications, for predicting monthly hog prices two years in advance, using a model reasonably tailored to existing data published mainly by government sources. This research is a first step in the development of an improved model in the future.

Literature

Knowledge about the causes underlying short-run fluctuations on a monthly basis in the supply and prices of hogs and pork is vitally important as a tool for the decision making process for many participants in that sector of the economy. In recent years much effort has been devoted to the study of these fluctuations on a quarterly basis, but only a little research has been published concerning monthly fluctuations.

Crom (2) designed a recursive model for simulation and projections of the beef and pork sectors of the livestock industry using quarterly data. Commercial hog slaughter was explained as a function of pigs produced from sows farrowing two and three quarters previously; these farrowings from two quarters before would be responsible for the barrow and gilt slaughter. Hog and corn prices were not used as a ratio but in their separate components: hog price lagged one quarter and the corn price lagged one quarter. The variable pigs saved per litter enters in the model as an exogenous variable, but an equation was presented to estimate it. Imports and exports of pork were
estimated as a function of lagged price of wholesale pork products, lagged per capita supply of pork, and a trend term; increases in domestic pork prices would stimulate imports, while high domestic prices would reduce the amount of pork supplied for export. Ending stocks and prices are jointly determined from the entire supply available. Over 120 operating rules are introduced in the model based on economically logical behavioral relationships. In the opinion of the author, his model is of more value for long-run projections than in the short run.

Hayenga (9) presented a model to explain monthly fluctuations in the supply and prices of beef and pork. He used monthly average supply of pork per workday as a measure of the level of supply in the market which improved his estimates for some months. Least square methods were used in the estimation of the parameters. It is one of the few studies dealing with monthly prices and supply fluctuation.

Ferris (3) tested the hypotheses that the hog market would have cyclical tendencies and that it would be convergent. For this he used regression analysis and a method proposed by Nerlove (15). He used data from the period 1908-24, 1925-41 and 1947-58; his results confirmed the hypotheses above and a cycle of five to six years was indicated. Still, the results gave support to the idea that hog production is a function of past prices. Retail quarterly prices of pork were used as a dependent variable
as a function of: (a) disposable income; (b) supply of pork; (c) supply of competing meats; (d) time; (e) population; and (f) dummy variables for the different seasons. He estimated the price flexibilities of the demand for hogs to be respectively for the four quarters: -2.09, -1.12, -1.33 and -1.56. He combined three equations to have a complete model: a quarterly demand equation for hogs, an equation to link "spring" farrowing to "fall" supply of pork, and a supply equation.

Hacklander (7) presented a study of the monthly fluctuations in the price of beef and pork at the wholesale level. He analyzed a model for the short-run forecast of monthly beef and pork prices at the wholesale level. Beginning pork storage level proved to be inversely related to pork cut prices. Simultaneous and close correlation was found between wholesale pork prices and live hog prices. The pork quantity level did not prove to be a significant variable to explain storage levels of pork.

Harlow (8) concluded that changes in the hog-corn ratio today have come about primarily because changes in its component price of hogs, since with Government price support programs the price of corn has become much more stable, thus price of hogs alone, independent of corn, has become more important. Harlow estimated the number of "spring" farrowings as a function of: (a) price received by farmers for hogs in the period of October-December, deflated by the Consumer Price Index; (b) price received
by farmers for corn, October-December, deflated by the Consumer Price Index; (c) price received by farmers for beef cattle, October-December, deflated by the Consumer Price Index; (d) production of oats, barley, and sorghum grain. He found a supply elasticity of 0.82 using data for 1949-1960. "Fall" farrowing was explained in logarithmic form as a function of: (a) number of sows farrowing in the "spring"; (b) production of oats, barley and sorghum grain; (c) price of feeder cattle at Kansas City, April-June, deflated by the Consumer Price Index; (d) price received by farmers for corn, April-June, deflated by the Consumer Price Index. Price of hogs was explained, in logarithmic form, as determined by: (a) per capita consumption of pork; (b) per capita consumption of beef and veal; (c) per capita consumption of poultry meat; (d) deflated discretionary income per capita; (e) time. From this equation he computed the farm-level demand elasticity of -0.35.

Using data from the period 1949-1966, Myers et al. (14) estimated monthly price elasticities of demand at the retail level as being -0.73 for pork, -0.72 for beef and -1.55 for broilers. Average farm level price elasticities of demand for pork were -0.43 and -0.50 for beef. Average income elasticities were estimated to be 0.30 for pork, 1.10 for beef and 0.76 for broilers. He presented three forecast models for the hog-pork sector and evaluated the predictions on the basis of: (a) the direction of change in the endogenous variables; (b) other tests involving the
magnitude and direction of the deviations among the observed and the predicted values generated by the model.

The Problem

Hog production, like agricultural production in general, is based upon a physiological production process which takes a certain period of time to be accomplished, i.e., there is necessarily a span of time between the farmer's decision about how much to be produced and the beginning of the process until the time when the output is ready for sale. The farmer's decision today about how many sows to be bred will have a future effect on the size of the supply of barrows and gilts in the market a year later. Excessive reliance upon present market conditions as an indicator of the situation for the next period may result in very poor decisions which would determine accentuated production and price fluctuations in the free hog market via the process of adjusting the supply and demand forces. These production and price oscillations bring increased risk and uncertainty to the market participants, resulting in lower efficiency and higher costs.

More adequate forecasts would result in a better performance in the market, since hog producers and other participants in the hog and pork market, such as meat packers, speculators, hedgers, chain stores, wholesalers and others are basically interested in predicting future
prices in order to make their adjustments in time for
future conditions in the market. Decisions about when is
a good time for buying or selling, about the determination
of adequate inventory policies and promotional schedules (9),
and other decisions could be improved with the existence
of reasonable forecasts. These would serve as an extension
of the present hog market information available in the
quarterly report "Hogs and Pigs" and other information
published by the United States Department of Agriculture.
The purpose of this work is, based on the information found
in that source of publication, plus information about
exogenous variables, to forecast monthly hog prices twenty-
four months ahead.
CHAPTER II

METHODS, DATA AND PROCEDURES

Recursive Models

Regular fluctuations in a cyclical pattern in prices of hogs have been pointed out almost a century ago. A close association between corn prices in a period and the size of the supply of hogs was recognized too, and the hog-corn price ratio had been used as an indicator of hog production in the next period: a larger hog-corn price ratio would result in a higher level of supply of hogs in the next period, and vice versa. Today corn prices have become more stable, and added to this fact, the relative importance of the cost of corn in the total cost of hog production has been declining because of the increasing costs of other items such as protein supplements, buildings and installations; labor has also become relatively much more important than before. However these two tendencies which were thought to bring much more stabilization to hog prices may only have brought a partial alteration in the pattern, because a substantially regular cycle in the production and price of hogs can still be observed.

Many statistical models have been presented to explain
cycles in agricultural products. A very simple one is of the type:

\[ S_t = a_1 + b_1 P_{t-1} + U_t \]

\[ P_t = a_2 + b_2 D_t + G_t \]

\[ S_t = D_t \]

where:

- \( S_t \) = supply size in a given period of time \( t \).
- \( a \) = estimated parameter.
- \( b \) = other estimated parameter.
- \( P_{t-1} \) = price in the previous period.
- \( P_t \) = price in the current period.
- \( D_t \) = quantity demanded during period \( t \).
- \( U_t \) = error term in the supply equation.
- \( G_t \) = error term in the price equation.

In this model the current supply size is explained by a lagged variable which is the price level in the previous period. But the current price is explained by the demand forces in the same period \( t \); for that is necessary to assume that the whole quantity supplied in the current period be totally consumed in the same period, i.e., \( S_t = D_t \). This is a recursive model, i.e., "it shows how certain initial conditions will affect conditions in a coming period, say, \( t+1 \); then how conditions in period \( t+1 \) will affect conditions in \( t+2 \), and so on" (20).
Data Source and Periods

The recursive model to be presented will use eight exogenous variables and five lagged endogenous explanatory variables. It will explain and predict supply of pork and price of hogs. The forecast program was settled to start at the end of December$_{t-1}$, and generate 24 forecasts of hog prices in the period from January, year $t$, to December, year $t+1$. The computer program for this can be found in Appendix B.

The data period used was from 1958 to 1971, with the exception of the equation for sows farrowing in the "spring" when a slightly longer period was used, 1956-1971.

The use of all the forecast range of the program is necessary to have on hand the lagged data including that for December$_{t-1}$. Some of these data may not have been available at that time; thus some approximate estimates for this month may be necessary. Projected data for exogenous variables to be used are: Consumer Price Index, U. S. population, disposable income, consumption of turkeys and broilers, and consumption of non-pork red meats; some of these projections can be found in current publications while others must be obtained from specialists or experts in the area.

The following list presents a basic source of information used in the present work as well as other sources with collateral relevant outlook information. A relation of
the data used can be found in Appendix A. We can see below relevant information sources for each variable used in the model; the variables are expressed in the same units as used in the equations.

1. (PC)--Price of No. 3 yellow corn at Chicago (average price from October\textsubscript{t-2} to September\textsubscript{t-1} in dollars/bushel.

   (a) *Grain Market News*--U. S. Department of Agriculture, published weekly.

   (b) *Feed Situation*--ERS, U. S. Department of Agriculture, published in February, April, May, August and November.

2. (PSM)--Average price of soybean meal, 44% protein Decatur, Illinois (average price from October\textsubscript{t-2} to September\textsubscript{t-1}) in dollars/ton.

   (a) *Agricultural Prices*--SRS, U. S. Department of Agriculture, published monthly.

3. (PPDF)--Index of Prices Paid by Farmers (base 1967 = 100).

   (a) *Agricultural Prices*--same as above.

4. (PH)--Average price of barrows and gilts, in dollars per hundred pounds of live hogs, 7-8 major markets.


   (b) *Livestock and Meat Situation*--ERS, U. S. Department of Agriculture, published in February, March, May, August, October and November.

5. (DSPK)--Domestic supply of pork (data from total production plus beginning stocks of pork) in millions of pounds.

   (a) *Livestock and Meat Situation*--from source cited previously.

   (b) *Livestock Slaughter*--SRS, U. S. Department of Agriculture report.

   (c) *Cold Storage*--SRS, U. S. Department of Agriculture, published monthly.
(d) Summary of Regional Cold Storage Holdings—SRS, U. S. Department of Agriculture, published annually.

6. (PGS) and (SF)—number of pigs saved and number of sows farrowing respectively, in thousands.
   (a) Hogs and Pigs—ERS, U. S. Department of Agriculture, published trimonthly.

7. (POP), (CPI) and (DI)—respectively, U. S. population, Consumer Price Index (base 1967 = 100) and disposable income.
   (a) Economic Indicators—Council of Economic Advisors, monthly.

8. (CNPK)—Consumption of non-pork red meat (beef, veal, lamb and mutton), in pounds.
   (a) National Food Situation—ERS, U. S. Department of Agriculture.

9. (CTB)—Consumption of turkeys and broilers, in pounds.
   (a) National Food Situation—cited above.
   (b) Poultry and Egg Situation—ERS, U. S. Department of Agriculture, published in February, April, June, September, and November.

10. (PC), (PSM), (PPDF)—for projections of these variables, consult:
      (a) outlook specialists.
      (b) private sources of information.
      (c) future prices on PC and PSM.

Some production and supply variables were used per workday; a table with the number of workdays in each of the months in the period 1958-71 can be found in Appendix A.

An index of seasonality in slaughter hog prices was computed for the period 1958-71 using the following procedure: by dividing each month's observation by a centered 12-month moving average, averaging these over the
years, and multiplying by 100. See Tables 7 and 8 in Appendix A for the slaughter price of hogs data used and for the seasonal computations.

The hog price equations in the forecast model were used in their logarithmic form.

Least Square Estimates

The equations in our recursive model were estimated by the least squares procedure. In our demand equations instead of using prices of competitive commodities as independent variables, their quantities were used in order to reduce the possibility of high serial intercorrelation. "In a strict sense, demand theory requires that prices of substitutes be held constant. But as a practical matter in fitting a demand equation, quantities are often used to reduce the high intercorrelation found among many price series" (8). The quantities enter as predetermined independent variables, i.e., they are not simultaneously determined with price. The price equations were used in their logarithmic form since it shows a better statistical fit and because it makes possible almost direct obtainment of the price elasticity of demand value. Disturbances are assumed to be independently distributed.

Evaluation Criteria

The criteria used for evaluation of the estimates
of the parameters of the equations were the value of the coefficient of correlation ($R^2$) which expresses the proportion of the variation in the dependent variable which was explained by the independent variables used in the equation. The Student t-test was used to test the probability that the regression coefficient is not significantly different from zero; the levels of significance employed were 5% and 10%. The standard error of estimate (SEE) is shown for each equation.

A non-parametric measure of forecast efficiency to be used is the turning point criteria which considers the number of times the direction of changes in prices were correctly predicted by the model.

The magnitude of the error for each forecast value will be shown in the form of a list of the differences among the predicted and the actual value.

An annual measure of forecast error was computed using the formula

$$E = \frac{\sum \frac{(Pred - Rep)}{n}}{\frac{\sum \text{Reported}}{n}} \times .100$$

where:

$Pred$ = values predicted by the model.

$Rep$ = reported values (taken as the actual values).

$n$ = number of observations (it is cancelled out in this equation).

$E$ = average forecast error during the year, in %.
CHAPTER III

SUPPLY AND DEMAND

Production

The size of the pig crop for any given season is equal to the number of sows farrowing times the number of pigs saved per litter from these farrowings.

The production cycle is, on the average, accomplished in a period from 10 to 12 months. It is constituted by the gestation period, i.e., the time since the sow was bred until the farrowing occurs which takes around 4 months, plus 6 to 8 months more for the hog to reach an adequate slaughter weight.

Most specialized hog producers obtain two farrowings per year from the same sow, forming a 6-month farrowing cycle:

<table>
<thead>
<tr>
<th>Breeding</th>
<th>Farrowing</th>
<th>Weaning and new breeding</th>
<th>Farrowing</th>
<th>Weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gestation</td>
<td>Sucking</td>
<td>Gestation</td>
<td>Sucking</td>
<td></td>
</tr>
<tr>
<td>4 months</td>
<td>2 months</td>
<td>4 months</td>
<td>2 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 months</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>12 months</td>
<td></td>
</tr>
</tbody>
</table>

After farrowing sows are not bred immediately but only after
a period of two months when the pigs will be weaned.

The year has therefore been arbitrarily divided into two production seasons: the "spring" farrowing season which takes place during a 6-month period from December to May, and the "fall" farrowing season from June to November. Such a dichotomy does not fit some hog producers. A declining number of farmers are following a "one litter system" with farrowings in the summer in pasture. An increasing number of farmers have sows farrowing throughout the year and not concentrated in the spring and fall. Even so, definite peaks in farrowings remain in these two seasons.

What would determine or influence the number of sows farrowing in a season? What factors do farmers take into consideration in their decision making process in determining the number of sows to be bred?

Certainly farmers consider the factors that influence the amount of profit likely to be obtained when their output will be ready for sale 10 to 12 months later. They have to form their future expectations based on past and present information. Some factors which are believed to enter into their considerations and which will enter formally in our equations are: past and current hog prices and the price of hog feed inputs such as corn and soybean meal, and costs of other inputs. Other factors which could be taken into consideration, although they are not formally included in our equations for simplification reasons, are
the alternative possible returns which could likely be obtained from the production of other commodities such as beef cattle, considerations about prices of other minor hog feed inputs like oats, barley and sorghum grain.

Three variables will be considered as exogenous in our supply model: prices of corn and soybean meal, and the Index of Prices Paid by Farmers which represents the cost of non-feed inputs. These variables enter the supply relationship as components of a "gross margin" variable described on the next page. The expected "gross margin" is considered as a function of current and past "gross margins" in a distributed lag relationship.

The estimate of the number of sows farrowing during the "spring" season was derived from the following regression equation, fitted to data from 1956-1971. The "t" values on the coefficients are given in the parentheses.*

\[ SFS_t = -926.36 + 0.9399 \, SFS_{t-1} + 71.46 \frac{GMH_{t-1}}{PPDF_{t-1}} \]

\( (6.28) \quad (4.67) \)

\[ R^2 = 0.72 \]
\[ SEE = 286.0 \]

*Figures in parentheses below the equation express the calculated "t-values" for testing the hypothesis that coefficients = 0.
where:

\[ SFS_t \] = number of sows farrowing during the "spring" season (from December to May), year \( t \), in thousands.

\[ SFS_{t-1} \] = number of sows farrowing during the "spring" season, year \( t-1 \), in thousands.

\[ GMH_{t-1} \] = average gross margin on a hog weighing 230 pounds, after deducting costs of corn and soybean meal, year \( t-1 \), in dollars.

\[ PPDF_{t-1} \] = Index of Prices Paid by Farmers, year \( t-1 \), (base: 1967 = 100).

\[ \frac{GMH_{t-1}}{PPDF_{t-1}} \] = deflated gross margin on hogs.

Both coefficients show the expected signs; both coefficients for sows farrowing in the past "spring" and for the deflated gross margin on hogs are significantly different from zero at the 0.01 per cent level. The number of sows farrowing during the "spring," year \( t \), is a function of the number of sows farrowing during the past "spring" season, and a function of the deflated gross margin on hogs in a past period; the greater the gross margin on hogs in one year, the larger will be the number of sows farrowing in the next "spring" season. The two independent variables in equation (1) explain 72% of the variability in the dependent variable.

The variable \( GMH_{t-1} \) expresses the aggregate effect of the variables: past prices of hogs, corn and of soybean meal. It is explained by the following identity:

\[ GMH_{t-1} = 2.3 \ PH_{t-1} - \frac{807}{56} \ PC_{t-1} - \frac{159}{100} \ PSM_{t-1} \]
where:

\[ \text{GMH}_{t-1} = \text{average gross margin obtained by a farmer on a hog weighing 230 pounds, after deducting the feeding costs of corn and soybean meal, year } t-1, \text{ in dollars.} \]

\[ \text{PH}_t = \text{average price of barrows and gilts, in dollars, per hundred pounds of live hog, 7-8 major markets, in year } t. \]

\[ \text{PC}_{t-1} = \text{average price of No. 3 yellow corn at Chicago (average price from } \text{October}_{t-2} \text{ to } \text{September}_{t-1} \text{), in dollars per bushel.} \]

\[ \text{PSM}_{t-1} = \text{average price of soybean meal, 44% protein Decatur, Illinois (average price from } \text{October}_{t-2} \text{ to } \text{September}_{t-1} \text{) in dollars per cwt.} \]

The coefficients of the equation above were based on calculations for a typical average feeding cost to raise a hog to a live weight of 230 pounds. It was found that, on the average, for a hog to reach this weight it is necessary to feed around 807 pounds of corn and 159 pounds of soybean meal, including an allowance for the sow and boar. In order to simplify the introduction of data currently published by the USDA, expressed in units other than pounds, simple conversion factors were introduced into the equation to permit direct introduction of the prices of hogs/100 pounds, price of corn/bushel and price of soybean meal/cwt.

Thus:

\[ 2.3 \]  to adjust quantity expressed in pounds to price in dollars/100 pounds

\[ \frac{807}{56} \]  to adjust quantity expressed in pounds to price in dollars/bushel

\[ \frac{159}{100} \]  to adjust quantity in pounds to price in dollars/cwt.
Thus, the gross margin on hogs represents an indication of the relative attractiveness of the hog producing activity. Other formulations of the supply equation were tested, including the addition of a variable for profits from cattle feeding, but they had less favorable statistical properties than equation (1).

The farmer usually makes his decisions in the last portion of a year concerning the production level of hogs for the entire following year, instead of planning just for the next season (9). This being true, what the farmer does during the "spring" season will be a good indication of what he will do in the "fall" season in the same year; changes in production in the "spring" in relation to the same season last year, would mean changes in the same direction during the "fall" season. The data in our period of study have been consistent at first moment with this idea as can be seen in Figure 1; here we can see a tendency of the difference between the number of sows farrowing during the two seasons becoming smaller over time. However, a more accurate examination of data shows that it does not hold true for the second half of the "fall," which is affected by the GMH during the "spring."

The estimate for the "fall" farrowing was derived from the following regression equation, fitted to data from the period 1958-1971.

\[
SFF_t = 398.18 + 0.6997 \text{SFS}_t + 27.61 \text{GMH}3-5_t + 38.20 T
\]

\[
(5.48) \quad (2.04) \quad (1.91)
\]

\[R^2 = 0.73\]
\[\text{SEE} = 225.57\]
Figure 1. "Spring" and "Fall" Farrowings
where:

\[ SFF_t = \text{number of sows farrowing during the "fall" season (June to November), year } t, \text{ in thousands.} \]

\[ SFS_t = \text{number of sows farrowing during the "spring" season, year } t, \text{ in thousands.} \]

\[ T = \text{time variable which assumes the value } T_1 = 1 \text{ when representing the year 1958; } T_2 = 2 \text{ when representing 1959, and the same procedure was used for the following years.} \]
\[ T_1 = 1 \text{ for year 1958} \]
\[ T_2 = 2 \text{ for year 1959} \]
\[ T_3 = 3 \text{ for year 1960} \]
\[ \ldots \text{ for year } \ldots \]
\[ T_{14} = 14 \text{ for year 1971} \]

\[ GMH3-5_t = \text{the same as explained before, now for the period March-May, year } t. \]

In equation (2) all coefficients have the expected signs; the coefficients for sows farrowing during the "spring" year \( t \) is significantly different from zero at least at the 5 per cent level, and the coefficients for \( T \) and \( GMH3-5_t \) variables are significant at the 10% level. This indicates fall farrowings are related to spring farrowings but that, in addition, it is related to the gross margin on hogs during the "spring" and to the time variable. Seventy-three percent of the variability of the \( SFF_t \) variable is explained by the independent variables.

Estimates for different 3-month periods during the year were derived from the "spring" and "fall" farrowings and time in the following four regression equations fitted to data from the period 1958-1971.

\[ SF12_{t-1-2_t} = -615.32 + 0.4469 \ SFS_t + 15.15 \ T \]
\[ (7.23) \quad (1.93) \]
\[ \bar{R}^2 = 0.80 \]
\[ \text{SEE} = 110.2 \]
\[ SF3-5_t = 897.41 + 0.517 \times SFS_t - 21.70 \times T \quad (4) \]
\[ \bar{R}^2 = 0.94 \]
\[ \text{SEE} = 78.1 \]
\[ SF6-8_t = -124.99 + 0.0951 \times SFS_t + 0.4379 \times SFF_t - 6.74 \times T \quad (5) \]
\[ \bar{R}^2 = 0.97 \]
\[ \text{SEE} = 36.29 \]
\[ SF9-11_t = 124.83 - 0.095 \times SFS_t + 0.5622 \times SFF_t + 6.63 \times T \quad (6) \]
\[ \bar{R}^2 = 0.97 \]
\[ \text{SEE} = 38.24 \]

where:

\[ SF12_{t-1-2_t} = \text{number of sows farrowing in the three month period from December year } t-1 \text{ to February year } t, \text{ in thousands.} \]
\[ SF3-5_t = \text{number of sows farrowing during the period from March to May, year } t, \text{ in thousands.} \]
\[ SF6-8_t = \text{number of sows farrowing during the period from June to August, year } t, \text{ in thousands.} \]
\[ SF9-11_t = \text{number of sows farrowing during the period from September to November, year } t, \text{ in thousands.} \]

The coefficients for the independent variables, sows farrowing during the "spring," in the equations (3-4) are significantly different from zero at the 0.01 per cent level; and at the 5% level in equations (5) and (6); the coefficients for the time variables are significantly different from zero at the 0.01 per cent level in equation (4), but is not significant at this level in equation (3) and (5), where it is significant only at the 10 per cent level and in equation (6) in which it is not significant even at the 10%
level. The variability in the dependent variables was better explained in the three last quarters by the independent variables; 80% was explained in equation (3), 94% in equation (4), 97% in equation (5) and 97% in equation (6). The negative sign of the variable $SFS_t$ in equation (6) acts as a device to reduce the value of the dependent variable $SF9-11_t$ when "spring" farrowings are large. The negative sign in the time variable in equation (5) expresses a tendency in reducing the number of sows farrowing in the period from June to August.

It is necessary, now, to have an estimate of the number of pigs saved per farrowing or litter; this was derived from the following two regression equations, fitted to data from 1958-1971.

\[
(PGS/LS_t) = 7.01 + 0.0253 \, T \quad (4.65) \quad R^2 = 0.61 \quad \text{SEE} = 0.082
\]

\[
(PGS/LF_t) = 7.08 + 0.0184 \, T \quad (3.47) \quad R^2 = 0.46 \quad \text{SEE} = 0.08
\]

where:

\[
(PGS/LS_t) = \text{average number of pigs saved per litter during the "spring," year } t.
\]

\[
(PGS/LF_t) = \text{average number of pigs saved per litter during the "fall," year } t.
\]

\[
T = \text{time variable as used previously.}
\]

The temporal coefficients in equations (7) and (8) both are significantly different from zero at least at the 5 per cent level.
The total number of pigs saved by quarters is given by the following identities, in thousands:

\[ PGS_{12t-1-2t} = SF_{12t-1-2t} \cdot (PGS/L_{12t-1-2t}) \]

\[ PGS_{3-5t} = SF_{3-5t} \cdot (PGS/L_{3-5})_t \]

\[ PGS_{6-8t} = SF_{6-8t} \cdot (PGS/L_{6-8})_t \]

\[ PGS_{9-11t} = SF_{9-11t} \cdot (PGS/L_{9-11})_t \]

This simply means that the total number of pigs saved in a given period of time is equal to the number of sows farrowing during the same period multiplied by the average number of pigs saved per litter during the same period.

Where:

- \( PGS_{12t-1-2t} \) = total number of pigs saved during the three month period from December, year \( t-1 \), to February, year \( t \), in thousands.

- \( PGS_{3-5t} \) = total number of pigs saved during the period from March to May, year \( t \), in thousands.

- \( PGS_{6-8t} \) = total number of pigs saved during the period of June-August, year \( t \), in thousands.

- \( PGS_{9-11t} \) = total number of pigs saved during the period from September to November, year \( t \), in thousands.

Since we do not have estimates of the number of pigs saved per litter for the different three month periods, these estimates will be made by use of the following simplifying assumptions:
\[ (PGS/L_{12,t-1} - 2_t) = (PGS/L_{3-5,t}) = (PGS/L_{S,t}) \]

and

\[ (PGS/L_{6-8,t}) = (PGS/L_{9-11,t}) = (PGS/L_{F,t}). \]

This means that we are taking the average number of pigs saved per litter during the whole "spring" season to represent either the first or the second half of the same season. A similar assumption was made for the "fall" season as being a good representative of either of the two half periods.

With these two simplifications, our total pigs saved identities will be:

\[ PGS_{12,t-1} - 2_t = SF_{12,t-1} - 2_t \cdot (PGS/L_{S,t}) \]

\[ PGS_{3-5,t} = SF_{3-5,t} \cdot (PGS/L_{S,t}) \]

\[ PGS_{6-8,t} = SF_{6-8,t} \cdot (PGS/L_{F,t}) \]

\[ PGS_{9-11,t} = SF_{9-11,t} \cdot (PGS/L_{F,t}) \]

Supply

The supply of pork in the market is formed by the total quantity of pork produced, plus cold storage stocks of pork, plus imports, and minus exports. Because imports and exports of pork are relatively minor in relationship to stocks and production, and because international trade in pork is difficult to forecast, these elements of supply were not analyzed in the model.

We are now interested in the domestic supply of
pork expressed by the following identity:

\[ DSPK_{mt} = STPK_{mt} + QPK_{mt} \]

where:

- \( DSPK_{mt} \) = domestic supply of pork in month \( m \), year \( t \).
- \( STPK_{mt} \) = cold storage of pork, month \( m \), year \( t \).
- \( QPK_{mt} \) = total quantity of pork produced in month \( m \), year \( t \).

The quantity of pork produced in month \( m \) affects the price of pork in the same period. This will be reflected in the price of hogs. The effect on the market is better understood when making measurements in terms of average quantity of pork produced during month \( m \) per workday in the month.*

\( (QPK_{mt}/WKD_{mt}) = \text{average quantity of pork produced per workday during month } m, \text{year } t. \)

where:

- \( WKD_{mt} \) = number of workdays during month \( m \), year \( t \).

Quantity per workday in this case is a more adequate indicator of the average level of the flow of hogs being supplied to the meat packers than monthly totals which are affected by year to year variations in work or slaughter days. Also month to month comparisons are more valid on a per workday basis.

Now we are interested in estimating the change in the average pork production per workday occurring in a given

*The number of workdays in a given month, in a given year, was calculated for the period from 1958-1971 according to the rule: Monday to Friday = 1; Saturday = 1/3; Holiday = 1/2, except on Saturday when a holiday = 0 (9). See Table 4 in Appendix A for the number of workdays per month during the period 1958-1971.
month \( m \), year \( t \), relative to the production in the corresponding month \( m \), in the year \( t-1 \).

\[
\Delta (QPKm/WKDM)_t = \frac{(QPKm/WKDM)_t}{(QPKm/WKDM)_{t-1}}
\]

where:

\[
\Delta (QPKm/WKDM)_t = \text{change in pork production per workday.}
\]

The changes in the pork production variable are basically determined by the changes which occurred in the past in the total number of pigs saved. This can be expressed by the following identities:

\[
\Delta (PGS12t-1-2t) = \frac{PGS12t-1-2t}{PGS12t-2-2t-1}
\]

representing the changes in the number of pigs saved during the period from December to February, year \( t \), relative to the same period a year before.

\[
\Delta (PGS3-5)_t = \frac{PGS3-5t}{PGS3-5t-1}
\]

change in the period from March to May, year \( t \).

\[
\Delta (PGS6-8)_t = \frac{PGS6-8t}{PGS6-8t-1}
\]

change in the period from June to August, year \( t \).

\[
\Delta (PGS9-11)_t = \frac{PGS9-11t}{PGS9-11t-1}
\]

change in the period from September to November, year \( t \).

Estimates of the changes in pork production as a function of the changes in the number of pigs saved were derived from the following regression equations, fitted to data for 1959-1971.

For January:

\[
\Delta (QPK1/WKDL)_t = -0.3826 + 0.7297\Delta (PGS3-5)_{t-1} \quad (3.41)
\]

\[
+ 0.6684\Delta (PGS6-8)_{t-1} \quad (3.50)
\]

\[
\bar{R}^2 = 0.85
\]

\[
\text{SEE} = 0.05
\]
For February:

\[ \Delta(QPK2/WKD2)_t = -0.1265 + 1.13\Delta(PGS6-8)_{t-1} \]  
\[ (11.29) \]
\[ \bar{R}^2 = 0.91 \]
\[ \text{SEE} = 0.035 \]

For March:

\[ \Delta(QPK3/WKD3)_t = 0.1657 + 0.4019\Delta(PGS6-8)_{t-1} \]  
\[ (2.17) \]
\[ + 0.4405\Delta(PGS9-11)_{t-1} \]  
\[ (1.99) \]
\[ \bar{R}^2 = 0.86 \]
\[ \text{SEE} = 0.031 \]

For April:

\[ \Delta(QPK4/WKD4)_t = 0.2716 + 0.5517\Delta(PGS6-8)_{t-1} \]  
\[ (2.66) \]
\[ + 0.1942\Delta(PGS9-11)_{t-1} \]  
\[ (0.78) \]
\[ \bar{R}^2 = 0.81 \]
\[ \text{SEE} = 0.034 \]

For May:

\[ \Delta(QPK5/WKD5)_t = 0.3488 + 0.6716\Delta(PGS9-11)_{t-1} \]  
\[ (2.90) \]
\[ \bar{R}^2 = 0.38 \]
\[ \text{SEE} = 0.069 \]

For June:

\[ \Delta(QPK6/WKD6)_t = 0.2387 + 0.7755\Delta(PGS9-11)_{t-1} \]  
\[ (6.12) \]
\[ \bar{R}^2 = 0.75 \]
\[ \text{SEE} = 0.038 \]
For July:

\[
\Delta (\text{QPK7}/\text{WKD7})_t = 0.1882 + 0.3628 \Delta (\text{PGS9-11})_{t-1} \\
(2.79) \\
+ 0.4629 \Delta (\text{PGS12}_{t-1-2})_t \\
(3.66) \\
\]

\[\bar{R}^2 = 0.81 \]

SEE = 0.031

For August:

\[
\Delta (\text{QPK8}/\text{WKD8})_t = 0.4430 + 0.3113 \Delta (\text{PGS9-11})_{t-1} \\
(1.98) \\
+ 0.2669 \Delta (\text{PGS12}_{t-1-2})_t \\
(1.74) \\
\]

\[\bar{R}^2 = 0.56 \]

SEE = 0.037

For September:

\[
\Delta (\text{QPK9}/\text{WKD9})_t = 0.3093 + 0.4604 \Delta (\text{PGS12}_{t-1-2})_t \\
(1.84) \\
+ 0.2557 \Delta (\text{PGS3-5})_t \\
(1.06) \\
\]

\[\bar{R}^2 = 0.54 \]

SEE = 0.052

For October:

\[
\Delta (\text{QPK10}/\text{WKD10})_t = 0.0165 + 0.3956 \Delta (\text{PGS12}_{t-1-2})_t \\
(1.87) \\
+ 0.603 \Delta (\text{PGS3-5})_t \\
(2.95) \\
\]

\[\bar{R}^2 = 0.78 \]

SEE = 0.044
For November:

\[ \Delta(QPK11/WKD11)_t = -0.1894 + 1.213 \Delta(PGS3-5)_t \]  
\[ (8.53) \quad R^2 = 0.86 \]  
\[ \text{SEE} = 0.045 \]

For December:

\[ \Delta(QPK12/WKD12)_t = -0.5587 + 0.8578 \Delta(PGS3-5)_t \]  
\[ (2.83) \]  
\[ + 0.7215 \Delta(PGS6-8)_t \]  
\[ (2.42)^* \]  
\[ R^2 = 0.90 \]  
\[ \text{SEE} = 0.047 \]

From the 20 coefficients in equations (9) through (20), above, 12 are significantly different from zero at least at the five per cent level, 5 coefficients are not significant at this level but are at the 10 per cent level, and 3 coefficients are not significant even at the 10 per cent level. The variation in the dependent variables was better explained by the independent variables for the months of February and December, 91% and 90% respectively; the poorest explanation occurred for May, 38%. The other values were 85% for January, 86% for March, 81% for April, 75% for June, 81% for July, 56% for August, 54% for September, 78% for October and 86% for November.

---

*The critical "t-value" at the 5 per cent level is 2.201, and the "t-value" at the 10 per cent level is 1.796 for 11 degrees of freedom.*
With available information about past data on the variations on the number of pigs saved (PGS) on hand, it is possible to foresee future changes in pork production. Using now these forecasted change estimates, together with other past data, we can forecast monthly quantities of pork produced through the following identities:

\[(QPK1/WKD1)_t = (QPK1/WKD1)_{t-1} \cdot \Delta (QPK1/WKD1)_t \quad \text{for January}\]

\[(QPK2/WKD2)_t = (QPK2/WKD2)_{t-1} \cdot \Delta (QPK2/WKD2)_t \quad \text{for February}\]

\[(QPK3/WKD3)_t = (QPK3/WKD3)_{t-1} \cdot \Delta (QPK3/WKD3)_t \quad \text{for March}\]

\[(QPK4/WKD4)_t = (QPK4/WKD4)_{t-1} \cdot \Delta (QPK4/WKD4)_t \quad \text{for April}\]

\[(QPK5/WKD5)_t = (QPK5/WKD5)_{t-1} \cdot \Delta (QPK5/WKD5)_t \quad \text{for May}\]

\[(QPK6/WKD6)_t = (QPK6/WKD6)_{t-1} \cdot \Delta (QPK6/WKD6)_t \quad \text{for June}\]

\[(QPK7/WKD7)_t = (QPK7/WKD7)_{t-1} \cdot \Delta (QPK7/WKD7)_t \quad \text{for July}\]

\[(QPK8/WKD8)_t = (QPK8/WKD8)_{t-1} \cdot \Delta (QPK8/WKD8)_t \quad \text{for August}\]

\[(QPK9/WKD9)_t = (QPK9/WKD9)_{t-1} \cdot \Delta (QPK9/WKD9)_t \quad \text{for September}\]

\[(QPK10/WKD10)_t = (QPK10/WKD10)_{t-1} \cdot \Delta (QPK10/WKD10)_t \quad \text{for October}\]

\[(QPK11/WKD11)_t = (QPK11/WKD11)_{t-1} \cdot \Delta (QPK11/WKD11)_t \quad \text{for November}\]

\[(QPK12/WKD12)_t = (QPK12/WKD12)_{t-1} \cdot \Delta (QPK12/WKD12)_t \quad \text{for December}\]

Now if we make the following simplifying assumption that: percent of change in the cold storage stocks of pork
during a given quarter, year \( t \), relative to the stocks in
the correspondent period one year before, say \( t-1 \), is equal
to the per cent of change in pork production in the correspond-
ent quarters and years, i.e.,

\[
\Delta \text{STPK}_q^t = \Delta \text{QP}_q^t
\]

then, this would imply that the variation or change in the
quantity of pork produced would be equal to the changes in
the domestic supply of hogs in the same period.*

Applying this reasoning for quarter periods, we have:

\[
\frac{(\text{QP}K1-3/\text{WKD}1-3)_t}{(\text{QP}K1-3/\text{WKD}1-3)_{t-1}} = \frac{\text{DSP}K1-3_t}{\text{DSP}K1-3_{t-1}}
\]

to express that changes in pork production are equal to
changes in the pork supply, from which:

\[
\text{DSP}K1-3_t = \text{DSP}K1-3_{t-1} \cdot \frac{(\text{QP}K1-3/\text{WKD}1-3)_t}{(\text{QP}K1-3/\text{WKD}1-3)_{t-1}}
\]

or, finally:

\[
\text{DSP}K1-3_t = \text{DSP}K1-3_{t-1} \cdot \Delta(\text{QP}K1-3/\text{WKD}1-3)_t
\]

This means that we have the domestic supply of hogs in
the period from January to March, year \( t \), obtained
from past domestic supply data for the correspondent
quarter (January-March) and an estimated year to year
change in total quantity of pork produced

*Based on the identity described previously:
\( \text{DSPK} = (\text{STPK} + \text{QPK}) \).
obtained from equations presented before.

The same principle can be used for the other quarters:

\[
\text{DSPK4-6}_t = \text{DSPK4-6}_{t-1} \cdot \Delta(\text{QPК4-6}/\text{WKD1-3})_t \text{ for the period from April to June,}
\]

\[
\text{DSPK7-9}_t = \text{DSPK7-9}_{t-1} \cdot \Delta(\text{QPК7-9}/\text{WKD7-9})_t \text{ for the period from July to September,}
\]

\[
\text{DSPK10-12}_t = \text{DSPK10-12}_{t-1} \cdot \Delta(\text{QPК10-12}/\text{WKD10-12})_t \text{ for the period from October to December.}
\]

The average quantity of pork produced per workday in a quarter can be obtained by averaging the monthly values for pork production identities previously expressed, or:

For the first quarter (January to March):

\[
(\text{QPК1-3}/\text{WKD1-3})_t = \frac{1}{3}[(\text{QPК1}/\text{WKD1}) + (\text{QPК2}/\text{WKD2}) + (\text{QPК3}/\text{WKD3})]_t
\]

For the second quarter (April to June):

\[
(\text{QPК4-6}/\text{WKD4-6})_t = \frac{1}{3}[(\text{QPК4}/\text{WKD4}) + (\text{QPК5}/\text{WKD5}) + (\text{QPК6}/\text{WKD6})]_t
\]

For the third quarter (July to September):

\[
(\text{QPК7-9}/\text{WKD7-9})_t = \frac{1}{3}[(\text{QPК7}/\text{WKD7}) + (\text{QPК8}/\text{WKD8}) + (\text{QPК9}/\text{WKD9})]_t
\]

For the fourth quarter (October to December):

\[
(\text{QPК10-12}/\text{WKD10-12})_t = \frac{1}{3}[(\text{QPК10}/\text{WKD10}) + (\text{QPК11}/\text{WKD11}) + (\text{QPК12}/\text{WKD12})]_t
\]
Demand

The consumption of pork is a function of such factors as the price of pork; consumption of substitute meats such as beef, broilers, turkeys, and veal; changes in disposable income; changes in population; temperature during the season; holidays and traditionally special dates; changes in tastes and preferences; and other factors.

We will overcome the population changes effect by expressing our data in per capita units. We will consider the following variables:

1. \((\text{CNPK/POP})\) = consumption per capita of non-pork red meats (beef, veal, lamb and mutton) in pounds, in a given quarter.

2. \((\text{CTB/POP})\) = consumption per capita of turkeys and broilers, in pounds, in a given quarter.

3. \((\frac{\text{DI}}{\text{POP}} / \text{CPI})\) = disposable income per capita, in dollars, in a given quarter, deflated by the Consumer Price Index (1967 = 100).

4. \((\text{PH/CPI})\) = deflated price of barrows and gilts, per 100 pounds of live hog.

Instead of using the variable, consumption of pork, we will use in its place the pork production plus stocks variable. This is reasonable because pork production and consumption are closely related but at the same time stocks of pork are relatively more significant than are other meat products. "The close relationship between pork production and consumption means that production can be used as an indicator of consumption in a statistical model" (8). And, instead of using quantity as the dependent variable we
use price since quantity is largely predetermined in the time interval we are considering.

Since the pioneering paper by Working on identification, price has commonly been used as the dependent variable when estimating demand functions for agricultural products by least squares. Justification as shown by Fox (5) is that consumption of agricultural products can be treated as predetermined; whereas price cannot be so treated (8).

Hog price estimates by quarters can be derived from one regression equation, fitted to data from the period 1958-1971. We will use one expression for each quarter, as this fits more clearly in the explanation for the forecasting model in Chapter IV. The regression equation was actually a single equation with dummy variables for quarters.

For the first quarter (January-March):

\[
\frac{PH1-3t}{CPI} = 64.53 - 2.55(DSPK1-3t/POP) \\
(9.13) \\
- 0.7777(CNPK1-3t/POP) - 0.1575(CTB1-3t/POP) \\
(-2.77) (-0.27) \\
+ 0.0089 \left( \frac{DI}{POP} \right) \div CPI \\
(2.56) \\
(21a)
\]

For the second quarter (April-June):

\[
\frac{PH4-6t}{CPI} = 64.53 - 8.33D1 - 2.25(DSPK4-6t/POP) \\
(-1.14) (-7.44) \\
- 0.7777(CNPK4-6t/POP) - 0.1575(CTB4-6t/POP) \\
+ 0.0089 \left( \frac{DI}{POP} \right) \div CPI \\
(21b)
\]
For the third quarter (July-September):

\[
\text{(PH7-9}_t/\text{CPI}) = 64.53 - 8.97 \text{D}_2 - 2.19(\text{DSPK7-9}_t/\text{POP})
\]

\[
\frac{-1.23}{-6.94}
\]

\[-0.7777(\text{CNPK7-9}_t/\text{POP}) - 0.1575 (\text{CTB7-9}_t/\text{POP})
\]

\[+ 0.0089 \left(\frac{\text{DI}}{\text{POP}} \div \text{CPI}\right)
\]

(21c)

For the fourth quarter (October-December):

\[
\text{(PH10-12}_t/\text{CPI}) = 64.53 - 3.37 \text{D}_3 - 2.25(\text{DSPK10-12}_t/\text{POP})
\]

\[
\frac{-0.45}{-8.77}
\]

\[-0.7777(\text{CNPK10-12}_t/\text{POP})
\]

\[-0.1575 (\text{CTB10-12}_t/\text{POP})
\]

\[+ 0.0089 \left(\frac{\text{DI}}{\text{POP}} \div \text{CPI}\right)
\]

\[
\overline{R}^2 = 0.83
\]

\[
\text{SEE} = 1.36
\]

(21d)

where:

\[
\text{(PH1-3}_t/\text{CPI}) = \text{average price of barrows and gilts during the period January-March, in dollars per hundred pounds of live hog, deflated by the Consumer Price Index (1967 = 100), year t.}
\]

\[
\text{(PH4-6}_t/\text{CPI}) \quad \text{for period from April to June.}
\]

\[
\text{(PH7-9}_t/\text{CPI}) \quad \text{for period from July to September.}
\]

\[
\text{(PH10-12}_t/\text{CPI}) \quad \text{for period from October to December.}
\]

\[
D_1 = D_2 = D_3 = 1 \quad \text{= dummy variables used for each of the last three quarters.}
\]

Since the expressions (21a), (21b), (21c), and (21d) are part of the same general equation for the four quarters, all present the same coefficient values for the variable
consumption per capita of non-pork red meats, consumption of turkeys and broilers, and deflated disposable income per capita. Thus the "t-test" values are the same for these coefficients in any of the quarters. The $R^2$ and SEE values are .83 and 1.36 respectively.

All coefficients have the expected signs; the negative signs of the coefficients for domestic supply of pork in the four equations show that increases in the amount of pork supplied would have a depressing effect on prices of hogs; the negative signs of the coefficients of the competing goods represented by the consumption of non-pork red meats and consumption of turkeys and broilers show that an increase in their consumption would bring a reduction in the price of hogs; the positive sign of the coefficient of the deflated disposable income per capita suggests that an increase in the real income per capita would bring higher prices for hogs. The coefficients for the domestic supply of hogs for the four quarters are significant at the 5 per cent level; the coefficients of the dummy variables used for the last three quarters are not significant at the 5 per cent level in any of the three quarters; the coefficient for consumption of non-pork red meat is significant at the 5 per cent level; the coefficient for consumption of turkeys and broilers proved to be not significant at the 5 per cent level; and the coefficient for real income proved to be significant at the 5 per cent level.

Similar estimates for hog prices were obtained in
logarithmic form, since "with price dependent in a logarithmic relationship, the regression coefficient for consumption is the price flexibility which is the reciprocal of the price elasticity, providing other goods do not measurably affect consumption" (8).

The logarithmic estimates follow in their explicit forms, one for each quarter, as was done previously:

For the first quarter (January to March):

\[
\log(\text{PH1-3}_t/\text{CPI}) = 1.85 - 2.17 \log(\text{DSPK1-3}_t/\text{POP}) \\
- 1.06 \log(\text{CNPK1-3}_t/\text{POP}) \\
- 0.0623 \log(\text{CTB1-3}_t/\text{POP}) \\
+ 1.09 \log(\frac{\text{DI}}{\text{POP}} : \text{CPI}) \\
\]

\((22a)\)

For the second quarter (April to June):

\[
\log(\text{PH4-6}_t/\text{CPI}) = 1.85 - 0.39 D_1 - 1.91 \log(\text{DSPK4-6}_t/\text{POP}) \\
- 1.06 \log(\text{CNPK4-6}_t/\text{POP}) \\
- 0.0623 \log(\text{CTB4-6}_t/\text{POP}) \\
+ 1.09 \log(\frac{\text{DI}}{\text{POP}} : \text{CPI}) \\
\]

\((22b)\)
For the third quarter (July to September):

$$\log(\text{PH7-9}_t/\text{CPI}) = 1.85 - 0.58D_3 - 1.75 \log (\text{DSPK7-9}_t/\text{POP})$$

$$(-1.39) \quad (-7.22)$$

$$- 1.06 \log (\text{CNPK7-9}_t/\text{POP})$$

$$- 0.0623 \log (\text{CTB7-9}_t/\text{POP})$$

$$+ 1.09 \log (\frac{\text{DI}}{\text{POP}}/\text{CPI}) \quad (22c)$$

For the fourth quarter (October to December):

$$\log(\text{PH10-12}_t/\text{CPI}) = 1.85 + 0.014D_3 - 2.15 \log (\text{DSPK10-12}_t/\text{POP})$$

$$\quad (0.04) \quad (-9.60)$$

$$- 1.06 \log (\text{CNPK10-12}_t/\text{POP})$$

$$- 0.0623 \log (\text{CTB10-12}_t/\text{POP})$$

$$+ 1.09 \log (\frac{\text{DI}}{\text{POP}}/\text{CPI}) \quad R^2 = .85 \quad (22d)$$

$$\text{SEE} = .028$$

The reciprocal of the pork consumption coefficient, here represented by the coefficient for the domestic supply of pork per capita, is an approximation of the price elasticity of demand. This coefficient points out an approximation of the farm-level demand elasticity (e) as being equal to $\frac{1}{-2.17}$ or -0.46 for the first quarter. This is just an approximation because the pork consumption is represented by the domestic pork supply per capita and because the consumption of pork is affected by the consumption of non-pork red meat and by the consumption of turkeys and broilers. The effect of these two competing goods acts to make our estimated elasticity lower than could be obtained from a more accurate
estimation procedure (8).

Similar estimates of the demand price elasticity (e) with respect to the farm-price level for the other quarters show:

Second quarter: \( e = - \frac{1}{1.91} = -0.52 \)

Third quarter: \( e = - \frac{1}{1.75} = -0.57 \)

Fourth quarter: \( e = - \frac{1}{2.15} = -0.46 \)

These approximations of the elasticity range from -0.46 to -0.57 depending on the quarter period considered. Myers and Havlicek (14), using data from the period 1949-1966, found an average farm level price elasticity of demand for hogs of -0.43, and using monthly average prices and quantities they found this elasticity ranging from -0.35 to -0.52.

**Seasonality of Prices**

Hog prices have exhibited regular seasonal fluctuations as a consequence of timing to fit work patterns on farms and to take advantage of pasture (not as important as formerly). Farrowings during the cold season require costly special installations and equipment; thus hog producers plan to have their sows farrowing during the spring and fall. The concentration of the farrowings in these two favorable periods brings a seasonal peak in the hog supply 6 to 9 months later. The rather large fluctuations in hog slaughter prices are
illustrated in Figure 2, which was derived from data for 1958-1971. We can see two troughs, one in November when the spring pig crop is being marketed, and another in April when the fall pig crop is in the market. The peak occurs during the summer, in July, before the spring crop comes to market.*

The seasonal hog price oscillations are strong not only over the year, but also within the quarterly periods, which makes our quarterly hog price estimates less valuable for shorter time periods. Thus, 12 seasonal adjustment factors (K) were introduced, to permit us to estimate monthly hog prices.

\[
K_1 = 0.9741 + 0.00263 T \quad \text{for January}
\]

\[
K_2 = 0.9816 + 0.0036 T \quad \text{for February}
\]

\[
K_3 = 1.044 - 0.00622 T \quad \text{for March}
\]

\[
K_4 = 0.9843 - 0.00458 T \quad \text{for April}
\]

\[
K_5 = 0.9883 + 0.00084 T \quad \text{for May}
\]

\[
K_6 = 1.0275 + 0.00374 T \quad \text{for June}
\]

*The interrupted lines above and below the full line representing the index of seasonality bound the area of uncertainty about the index. The upper and lower bounds are one standard deviation above and one standard deviation below the mean respectively. This means, in other words, that in two years out of three the price will fall between the boundary lines. See Appendix A for original data and measures of seasonality in Tables 7 and 8.
\[ K_7 = 1.0178 + 0.00122 \text{ T} \quad \text{for July} \]

\[ K_8 = 1.013 - 0.0002 \text{ T} \quad \text{for August} \]

\[ K_9 = 0.9692 - 0.00102 \text{ T} \quad \text{for September} \]

\[ K_{10} = 1.017 - 0.00057 \text{ T} \quad \text{for October} \]

\[ K_{11} = 0.9912 - 0.00107 \text{ T} \quad \text{for November} \]

\[ K_{12} = 0.9919 + 0.00165 \text{ T} \quad \text{for December} \]

where:

\[ K = \text{seasonal monthly adjustment factor.} \]

\[ T = \text{time variable.} \]

\[ T_1 = \text{for year 1958; } T_2 = 2 \text{ for year 1959; } T_3 = 3 \text{ for year 1960, . . . , } T_{14} = 14 \text{ for year 1971.} \]

To obtain the \( K \) monthly adjustment factor for a given month \( m \), we just substitute the value of \( T \) for the year wished.

The adjustment factors \( (K_i) \) came from a formula of the type:

\[ K_i = 1957 \text{ values} + \Delta R \cdot T_i \]

where:

1957 value = the values from Table 11, in Appendix A, entitled "Smoothed Monthly Price Ratio Adjusted to Quarterly Data," for each month of the year 1957.

\[ T = \text{time variable, used in the same way as explained before.} \]

\[ \Delta R = \text{average year to year variation for each column-month on the previously mentioned Table 11 in Appendix A.} \]
With the values of these adjustment factors for the month desired, together with our formulas for estimating quarterly hog prices, we could estimate the monthly hog prices through the following computations.

\[ P_{1t} = K_1 \cdot PH1-3_t \] for January \quad year \ t

\[ PH2_t = K_2 \cdot PH1-3_t \] for February \quad year \ t

\[ PH3_t = K_3 \cdot PH1-3_t \] for March \quad year \ t

\[ PH4_t = K_4 \cdot PH4-6_t \] for April \quad year \ t

\[ PH5_t = K_5 \cdot PH4-6_t \] for May \quad year \ t

\[ PH6_t = K_6 \cdot PH4-6_t \] for June \quad year \ t

\[ PH7_t = K_7 \cdot PH7-9_t \] for July \quad year \ t

\[ PH8_t = K_8 \cdot PH7-9_t \] for August \quad year \ t

\[ PH9_t = K_9 \cdot PH7-9_t \] for September \quad year \ t

\[ PH10_t = K_{10} \cdot PH10-12 \] for October \quad year \ t

\[ PH11_t = K_{11} \cdot PH10-12 \] for November \quad year \ t

\[ PH12_t = K_{12} \cdot PH10-12 \] for December \quad year \ t
CHAPTER IV

THE FORECAST MODEL

Description

The representation of the forecast model presented in Figure 3 shows three different periods of time correspondent to three distinct areas bounded by the two broken lines: the upper area referred to as $|T-1|$ represents a given year $t-1$; the middle $|T|$ and the lower $|T+1|$ represent the forecast period or the future, respectively the first and the second following year $t$ and $t+1$, covering the period 24 months ahead.

The variables in the largest circles represent the exogenous variables, i.e., the ones outside this system or not explained by it. The endogenous variables, i.e., those explained by the model, are represented in the elliptical shaped boxes. The variables $K_i$ inside the medium sized circles are pre-determined by trends in seasonal price patterns. The variable GMH is a mixture of endogenous and exogenous variables; it is presented arbitrarily in the boxes having the same shape as the ones used for the endogenous variables. The smallest circles contain mathematical symbols. The direction of the arrows represents the ordering of the
causal effects or influences from certain variables upon the
others. The reason for the use of the whole figure is to
make the functioning and the operation of the model more
quick, direct and more easily understood.*

Five endogenous variables from the past year t-1,
in area $|T-1|$, were used for the explanation of the variables
in the following year t, area $|T|$:

1. the total number of pigs saved, by quarters, $(PGSq_{t-1})$;
2. the per cent change in the total number of pigs
   saved between year t-2 and year t-1, by quarters
   $(\Delta PGSq_{t-1})$;
3. the domestic supply of pork $(DSPKq_{t-1})$;
4. the price of hogs $(PH_{t-1})$.

Three exogenous variables from period year t-1,
area $T-1$ were also used:

5. the price of corn $(PC_{t-1})$;**
6. the price of soybean meal $(PSM_{t-1})$;**
7. the index of prices paid by farmers $(PPDF_{t-1})$.

These three exogenous variables, together with the price
of hogs, were aggregated into just one variable called
gross margin on hogs, $(GMH_{t-1})$, to represent their associated
effect.***

*To circumvent the bordering problem which occurred
when variables representing a three months average period when
one of the months was in a given year and the two other months
in the following year, the variable was indicated as belonging
to the year in which most of the three month period falls.

**$PC_{t-1}$ and $PSM_{t-1}$ variables, respectively average
price for corn and average price for soybean meal, were
computed for the period from $October_{t-2}$ to $September_{t-1}$.

***A similar $GMH$ is computed for the period March-May,
year $t$. 

We can begin our explanation of the model at the upper left portion of the figure where we see the lagged variables GMH\(_{t-1}\) together with SFS\(_{t-1}\) exerting their influence or determining the number of sows farrowing during the "spring" season in the following year \(t\), SFS\(_t\). This "spring" farrowing, which is of prime importance in the model, together with the trend variable \(T\), establishes the number of farrowings in the first two quarters in the year \(t\). The two quarter components of the "fall" season are determined by the variables SFP\(_t\), SFS\(_t\) and by the time variable \(T\).

The number of sows farrowing in a quarter multiplied by the average number of pigs saved per litter in the quarter, \((\text{PGS/Lq}_t)\), will give us the total number of pigs saved in quarter \(q\), \((\text{PGS}q_t)\).

The number of pigs saved per litter variables, \((\text{PGS/Lq})\), were explained as a function of time.

The total number of pigs saved in a quarter, \((\text{PGS}q)\), divided by its correspondent value a year before will give us the change (increase or decrease) in the total number of pigs saved in quarter \(q\), year \(t\), relative to the correspondent period one year before, \((\Delta\text{PGS}q_t)\). These changes in a given quarter period will determine the future changes in the average quantity of pork produced per workday in a certain month, \([\Delta(\text{QP}Km/\text{WK}Dm)_t]\).

Averaging three month values for the variable \(\Delta(\text{QP}Km/\text{WK}Dm)_t\), we can obtain the values for the quarterly changes, \([\Delta(\text{QP}Kq/\text{WK}Dq)_t]\).
Now, remembering the simplifying assumption made in Chapter III, that the changes in the quantity of pork produced would be equal to the changes in the domestic supply of pork, and, that it implied that

\[ \Delta (QPKq/WKDq)_t \cdot DSPKq_{t-1} = DSPKq_t. \]

To this point we have described the supply side, relating hog prices to the domestic supply of pork. The next step is to generate hog prices from the equation incorporating the domestic pork supply.

The deflated price of hogs per quarter, \((PHq/CPI)\), is the next variable to be explained. For that we introduced five new exogenous variables or demand factors:

8. consumption of turkeys and broilers in the quarter (CTB);
9. consumption of non-pork red meat in the quarter (CNPK);
10. disposable income per capita during the quarter (DI);
11. U. S. population for the quarter (POP);

It can be observed that these values are projected values which must be obtained outside the model from external sources. Some of them may be found in some sources of information mentioned in Chapter II.

Some of these exogenous variables were aggregated and their overall effects together with the domestic supply of pork (DSPK) on the market will determine to a large
extent the deflated price of hogs in the quarter, (PHg/CPI). To get the absolute values for the quarterly prices of hogs it is just enough to cancel the CPI value in the denominator. This is done by multiplying the deflated values by CPI.

Finally, the desired monthly hog prices are obtained by multiplying the quarterly hog prices by the adequate intra-quarter seasonal adjustment factor \( K_i \); there are 12 \( K_i \) values which permit us to determine the forecasted values for the hog prices during the 12 months of the year. The model was settled to forecast monthly prices for the two first quarters; after that, an average PH3-5_t is computed which turns around to the beginning of Figure 3 to enter the variable GMH3-5_t which will influence the two last quarters.

For the forecast of the values of PH for the 12 months of year t+1, area \( |T+1| \), we just repeat the same process used here. In Figure 3 we can see that all variables which came from area \( |T-1| \) entering area \( |T| \), will be generated in year t or will be predetermined for year t and will then generate values for variables in year t+1.

Forecasting

The following results were obtained using the model to forecast its total range, i.e., a 24 month period ahead.
Table 1. Results from forecasting quarterly domestic supply of pork per capita (DSPK/POP), in the first year ahead.

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Reported (DSPK/POP) (lb)</th>
<th>Predicted (DSPK/POP) (lb)</th>
<th>Pred-Rep (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1959</td>
<td>q1</td>
<td>18.66</td>
<td>18.87</td>
<td>+0.21</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.73</td>
<td>16.10</td>
<td>-0.63</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>16.51</td>
<td>15.96</td>
<td>-1.05</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>21.58</td>
<td>20.37</td>
<td>-1.21</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 4.2%</strong></td>
</tr>
<tr>
<td>1960</td>
<td>q1</td>
<td>19.85</td>
<td>19.73</td>
<td>-0.12</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.98</td>
<td>17.19</td>
<td>+0.21</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.61</td>
<td>15.93</td>
<td>+0.32</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>18.22</td>
<td>20.08</td>
<td>+1.86</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 3.6%</strong></td>
</tr>
<tr>
<td>1961</td>
<td>q1</td>
<td>17.58</td>
<td>17.94</td>
<td>+0.36</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>15.81</td>
<td>17.00</td>
<td>+1.19</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>14.65</td>
<td>15.55</td>
<td>+0.90</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>18.59</td>
<td>18.02</td>
<td>-0.57</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 4.5%</strong></td>
</tr>
<tr>
<td>1962</td>
<td>q1</td>
<td>18.03</td>
<td>17.99</td>
<td>-0.04</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.54</td>
<td>16.15</td>
<td>-0.39</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>14.97</td>
<td>14.90</td>
<td>-0.07</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>19.01</td>
<td>18.38</td>
<td>-0.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 1.6%</strong></td>
</tr>
<tr>
<td>1963</td>
<td>q1</td>
<td>18.67</td>
<td>18.38</td>
<td>-0.29</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>17.09</td>
<td>17.20</td>
<td>+0.11</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.98</td>
<td>15.25</td>
<td>-0.73</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>19.95</td>
<td>18.75</td>
<td>-1.93</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 4.3%</strong></td>
</tr>
<tr>
<td>1964</td>
<td>q1</td>
<td>19.25</td>
<td>18.24</td>
<td>-1.01</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>17.32</td>
<td>16.47</td>
<td>-0.85</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.95</td>
<td>15.37</td>
<td>-0.58</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>19.63</td>
<td>18.22</td>
<td>-1.41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 5.3%</strong></td>
</tr>
<tr>
<td>1965</td>
<td>q1</td>
<td>17.68</td>
<td>17.41</td>
<td>-0.27</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>15.20</td>
<td>16.39</td>
<td>+1.19</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>14.07</td>
<td>15.22</td>
<td>+1.15</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>15.53</td>
<td>17.78</td>
<td>+2.25</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>E = 7.8%</strong></td>
</tr>
<tr>
<td>Year</td>
<td>Quarter</td>
<td>Reported (DSPK/POP) (lb)</td>
<td>Predicted (DSPK/POP) (lb)</td>
<td>Pred-Rep (lb)</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
<td>--------------------------</td>
<td>---------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>1966</td>
<td>q1</td>
<td>14.82</td>
<td>15.40</td>
<td>+0.58</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>14.61</td>
<td>14.37</td>
<td>-0.24</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>14.44</td>
<td>14.55</td>
<td>+0.11</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>17.66</td>
<td>17.61</td>
<td>-0.05</td>
</tr>
<tr>
<td>1967</td>
<td>q1</td>
<td>18.03</td>
<td>16.51</td>
<td>-1.52</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.20</td>
<td>15.79</td>
<td>-0.41</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>16.08</td>
<td>15.91</td>
<td>-0.17</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>18.53</td>
<td>19.28</td>
<td>+0.75</td>
</tr>
<tr>
<td>1968</td>
<td>q1</td>
<td>17.89</td>
<td>17.67</td>
<td>-0.22</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>17.12</td>
<td>16.39</td>
<td>-0.73</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.95</td>
<td>16.09</td>
<td>+0.14</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>19.07</td>
<td>17.85</td>
<td>-1.22</td>
</tr>
<tr>
<td>1969</td>
<td>q1</td>
<td>18.30</td>
<td>18.58</td>
<td>+0.28</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.87</td>
<td>17.62</td>
<td>+0.75</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.97</td>
<td>16.75</td>
<td>+0.78</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>17.47</td>
<td>18.83</td>
<td>+1.36</td>
</tr>
<tr>
<td>1970</td>
<td>q1</td>
<td>16.45</td>
<td>16.83</td>
<td>+0.38</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.66</td>
<td>16.22</td>
<td>-0.44</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>16.90</td>
<td>16.34</td>
<td>-0.56</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>20.43</td>
<td>19.87</td>
<td>-0.56</td>
</tr>
<tr>
<td>1971</td>
<td>q1</td>
<td>19.91</td>
<td>19.84</td>
<td>-0.07</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>19.70</td>
<td>19.32</td>
<td>-0.38</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>18.88</td>
<td>18.71</td>
<td>-0.17</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>20.28</td>
<td>20.51</td>
<td>+0.23</td>
</tr>
<tr>
<td>1972</td>
<td>q1</td>
<td>--</td>
<td>18.32</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>--</td>
<td>18.58</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>--</td>
<td>17.76</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>--</td>
<td>19.42</td>
<td>--</td>
</tr>
</tbody>
</table>
Table 2. Results from forecasting quarterly supply of pork (DSPK/POP), in the second year ahead.

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Reported (DSPK/POP) (lb)</th>
<th>Predicted (DSPK/POP) (lb)</th>
<th>Pred-Rep (lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 5.4%</td>
</tr>
<tr>
<td>1960</td>
<td>q₁</td>
<td>19.85</td>
<td>20.51</td>
<td>+0.66</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>16.98</td>
<td>16.10</td>
<td>-0.88</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>15.61</td>
<td>15.46</td>
<td>-0.15</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>18.22</td>
<td>20.37</td>
<td>+2.15</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 7.6%</td>
</tr>
<tr>
<td>1961</td>
<td>q₁</td>
<td>17.58</td>
<td>19.28</td>
<td>+1.70</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>15.81</td>
<td>17.69</td>
<td>+1.88</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>14.65</td>
<td>15.80</td>
<td>+1.15</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>18.59</td>
<td>18.91</td>
<td>+0.32</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 3.3%</td>
</tr>
<tr>
<td>1962</td>
<td>q₁</td>
<td>18.03</td>
<td>17.38</td>
<td>-0.65</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>16.54</td>
<td>16.61</td>
<td>+0.07</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>14.97</td>
<td>15.57</td>
<td>+0.60</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>19.01</td>
<td>18.10</td>
<td>-0.91</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 4.2%</td>
</tr>
<tr>
<td>1963</td>
<td>q₁</td>
<td>18.67</td>
<td>18.19</td>
<td>-0.48</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>17.09</td>
<td>16.45</td>
<td>-0.64</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>15.98</td>
<td>15.26</td>
<td>-0.72</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>19.95</td>
<td>18.78</td>
<td>-1.17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 6.9%</td>
</tr>
<tr>
<td>1964</td>
<td>q₁</td>
<td>19.25</td>
<td>17.62</td>
<td>-1.63</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>17.32</td>
<td>16.65</td>
<td>-0.67</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>15.95</td>
<td>14.86</td>
<td>-1.09</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>19.63</td>
<td>18.01</td>
<td>-1.62</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 8.1%</td>
</tr>
<tr>
<td>1965</td>
<td>q₁</td>
<td>17.68</td>
<td>16.88</td>
<td>-0.80</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>15.20</td>
<td>15.94</td>
<td>+0.74</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>14.07</td>
<td>15.20</td>
<td>+1.13</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>15.53</td>
<td>17.93</td>
<td>+2.40</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>E = 9.0%</td>
</tr>
<tr>
<td>1966</td>
<td>q₁</td>
<td>14.82</td>
<td>16.52</td>
<td>+1.70</td>
</tr>
<tr>
<td></td>
<td>q₂</td>
<td>14.61</td>
<td>16.53</td>
<td>+1.92</td>
</tr>
<tr>
<td></td>
<td>q₃</td>
<td>14.44</td>
<td>15.67</td>
<td>+1.23</td>
</tr>
<tr>
<td></td>
<td>q₄</td>
<td>17.66</td>
<td>18.35</td>
<td>+0.69</td>
</tr>
</tbody>
</table>
Table 2 (Cont'd.).

<table>
<thead>
<tr>
<th>Year</th>
<th>Quarter</th>
<th>Reported (DSPK/POP) (lb)</th>
<th>Predicted (DSPK/POP) (lb)</th>
<th>Pred-Rep (lb)</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>q1</td>
<td>18.03</td>
<td>18.40</td>
<td>+0.37</td>
<td>$E = 3.2%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.20</td>
<td>16.64</td>
<td>+0.44</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>16.08</td>
<td>16.33</td>
<td>+0.25</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>18.53</td>
<td>19.64</td>
<td>+1.11</td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>q1</td>
<td>17.89</td>
<td>17.60</td>
<td>-0.29</td>
<td>$E = 2.3%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>17.12</td>
<td>16.75</td>
<td>-0.37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.95</td>
<td>16.48</td>
<td>+0.53</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>19.07</td>
<td>19.49</td>
<td>+0.42</td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>q1</td>
<td>18.30</td>
<td>17.40</td>
<td>-0.90</td>
<td>$E = 5.8%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.87</td>
<td>16.37</td>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>15.97</td>
<td>16.81</td>
<td>+0.84</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>17.47</td>
<td>19.23</td>
<td>+1.76</td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>q1</td>
<td>16.45</td>
<td>18.04</td>
<td>+1.59</td>
<td>$E = 5.5%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>16.66</td>
<td>17.54</td>
<td>+0.88</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>16.90</td>
<td>17.02</td>
<td>+0.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>20.43</td>
<td>19.17</td>
<td>-1.26</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td>q1</td>
<td>19.91</td>
<td>19.03</td>
<td>-0.88</td>
<td>$E = 6.1%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>19.70</td>
<td>17.84</td>
<td>-1.86</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>18.88</td>
<td>17.46</td>
<td>-1.42</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>20.28</td>
<td>20.93</td>
<td>+0.65</td>
<td></td>
</tr>
<tr>
<td>1972</td>
<td>q1</td>
<td>--</td>
<td>18.79</td>
<td>--</td>
<td>$E = ---%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>--</td>
<td>18.44</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>--</td>
<td>18.00</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>--</td>
<td>19.20</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>1973</td>
<td>q1</td>
<td>--</td>
<td>17.87</td>
<td>--</td>
<td>$E = ---%$</td>
</tr>
<tr>
<td></td>
<td>q2</td>
<td>--</td>
<td>18.59</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q3</td>
<td>--</td>
<td>18.26</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td></td>
<td>q4</td>
<td>--</td>
<td>20.19</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Results when forecasting monthly hog prices (PHm) in the first year ahead.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(dollars/cwt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1959</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>15.04</td>
<td>15.18</td>
<td>15.84</td>
<td>16.83</td>
<td>17.09</td>
<td>17.87</td>
<td>18.20</td>
<td>18.06</td>
<td>17.25</td>
<td>13.37</td>
<td>13.02</td>
<td>13.10</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-1.59</td>
<td>-0.45</td>
<td>-0.05</td>
<td>+0.74</td>
<td>+1.00</td>
<td>+1.96</td>
<td>+3.80</td>
<td>+3.41</td>
<td>+3.44</td>
<td>+0.26</td>
<td>+0.41</td>
<td>+1.24</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.3%</td>
</tr>
<tr>
<td>1960</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>12.65</td>
<td>13.56</td>
<td>16.55</td>
<td>15.96</td>
<td>16.03</td>
<td>16.88</td>
<td>17.74</td>
<td>16.91</td>
<td>16.59</td>
<td>17.30</td>
<td>17.36</td>
<td>17.27</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+0.35</td>
<td>-0.43</td>
<td>-2.98</td>
<td>-0.97</td>
<td>-0.73</td>
<td>-0.84</td>
<td>-0.96</td>
<td>-0.28</td>
<td>-0.72</td>
<td>-3.50</td>
<td>-3.93</td>
<td>-3.72</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>10.0%</td>
</tr>
<tr>
<td>1961</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>17.33</td>
<td>18.13</td>
<td>17.53</td>
<td>17.04</td>
<td>16.37</td>
<td>16.60</td>
<td>17.87</td>
<td>18.33</td>
<td>18.18</td>
<td>16.55</td>
<td>15.97</td>
<td>16.70</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>16.08</td>
<td>16.27</td>
<td>16.64</td>
<td>14.13</td>
<td>14.50</td>
<td>15.25</td>
<td>17.82</td>
<td>17.64</td>
<td>16.82</td>
<td>17.37</td>
<td>16.90</td>
<td>17.10</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-1.25</td>
<td>-1.86</td>
<td>-0.89</td>
<td>-2.91</td>
<td>-1.87</td>
<td>-1.35</td>
<td>-0.05</td>
<td>-0.69</td>
<td>-1.36</td>
<td>+0.82</td>
<td>+0.93</td>
<td>+0.40</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.0%</td>
</tr>
<tr>
<td>1962</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>16.98</td>
<td>16.69</td>
<td>16.31</td>
<td>15.81</td>
<td>15.51</td>
<td>16.87</td>
<td>18.30</td>
<td>18.50</td>
<td>18.82</td>
<td>16.87</td>
<td>16.50</td>
<td>16.16</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-0.05</td>
<td>-0.56</td>
<td>+0.04</td>
<td>+0.74</td>
<td>+1.58</td>
<td>+1.14</td>
<td>+1.37</td>
<td>+0.94</td>
<td>-0.30</td>
<td>-0.09</td>
<td>+0.01</td>
<td>+0.48</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.1%</td>
</tr>
<tr>
<td>1963</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>15.65</td>
<td>15.14</td>
<td>14.07</td>
<td>13.78</td>
<td>15.01</td>
<td>17.10</td>
<td>18.44</td>
<td>17.55</td>
<td>15.89</td>
<td>15.47</td>
<td>14.47</td>
<td>14.21</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>15.49</td>
<td>15.70</td>
<td>15.75</td>
<td>14.35</td>
<td>14.89</td>
<td>15.74</td>
<td>18.49</td>
<td>18.25</td>
<td>17.37</td>
<td>15.66</td>
<td>15.21</td>
<td>15.47</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-0.16</td>
<td>+0.56</td>
<td>+1.68</td>
<td>+0.57</td>
<td>-0.12</td>
<td>-1.36</td>
<td>+0.05</td>
<td>+0.70</td>
<td>+1.48</td>
<td>+0.19</td>
<td>+0.74</td>
<td>+1.26</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.7%</td>
</tr>
<tr>
<td>1964</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>14.70</td>
<td>14.70</td>
<td>14.48</td>
<td>14.16</td>
<td>14.84</td>
<td>15.83</td>
<td>17.11</td>
<td>17.05</td>
<td>16.76</td>
<td>15.39</td>
<td>14.43</td>
<td>15.55</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>15.87</td>
<td>16.10</td>
<td>16.00</td>
<td>15.41</td>
<td>16.09</td>
<td>17.06</td>
<td>19.08</td>
<td>18.81</td>
<td>17.89</td>
<td>17.14</td>
<td>16.64</td>
<td>16.98</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+1.17</td>
<td>+1.40</td>
<td>+1.52</td>
<td>+1.25</td>
<td>+1.25</td>
<td>+1.23</td>
<td>+1.97</td>
<td>+1.76</td>
<td>+1.13</td>
<td>+1.75</td>
<td>+2.21</td>
<td>+1.43</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9.8%</td>
</tr>
<tr>
<td>1965</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>16.06</td>
<td>17.01</td>
<td>16.98</td>
<td>17.63</td>
<td>20.29</td>
<td>23.38</td>
<td>24.27</td>
<td>24.67</td>
<td>22.92</td>
<td>23.36</td>
<td>24.33</td>
<td>28.07</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>18.31</td>
<td>18.59</td>
<td>18.30</td>
<td>17.33</td>
<td>18.20</td>
<td>19.34</td>
<td>20.73</td>
<td>20.41</td>
<td>19.39</td>
<td>18.57</td>
<td>18.02</td>
<td>18.43</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+2.25</td>
<td>+1.58</td>
<td>+1.32</td>
<td>-0.30</td>
<td>-2.09</td>
<td>-4.04</td>
<td>-3.54</td>
<td>-4.26</td>
<td>-3.53</td>
<td>-4.79</td>
<td>-6.31</td>
<td>-9.64</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>16.9%</td>
</tr>
</tbody>
</table>
**Table 3. (Cont'd.)**

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1966</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>27.93</td>
<td>27.80</td>
<td>24.41</td>
<td>22.26</td>
<td>23.16</td>
<td>24.72</td>
<td>25.09</td>
<td>25.75</td>
<td>23.16</td>
<td>21.57</td>
<td>19.07</td>
<td>19.67</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>25.20</td>
<td>25.61</td>
<td>24.95</td>
<td>22.33</td>
<td>23.58</td>
<td>25.13</td>
<td>22.60</td>
<td>22.21</td>
<td>21.08</td>
<td>20.44</td>
<td>19.83</td>
<td>20.34</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-2.73</td>
<td>-2.19</td>
<td>+0.54</td>
<td>+0.07</td>
<td>+0.49</td>
<td>+0.41</td>
<td>-2.49</td>
<td>-3.54</td>
<td>-2.08</td>
<td>-1.13</td>
<td>-0.04</td>
<td>+0.67</td>
</tr>
<tr>
<td><strong>E</strong></td>
<td>5.7%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **1967** |      |      |      |      |      |      |      |      |      |      |      |      |
| Predicted (PH) | 22.23 | 22.61 | 21.82 | 19.12 | 20.31 | 21.70 | 20.82 | 20.44 | 19.39 | 17.85 | 17.30 | 17.79 |
| Pred-Rep (PH-PH) | +2.77 | +3.23 | +3.39 | +1.50 | -1.52 | -0.59 | +1.76 | -0.60 | -0.07 | -0.31 | -0.06 | +0.50 |
| **E** | 6.9% |      |      |      |      |      |      |      |      |      |      |      |

| **1968** |      |      |      |      |      |      |      |      |      |      |      |      |
| Reported (PH) | 18.31 | 19.41 | 19.07 | 19.00 | 18.88 | 20.43 | 21.48 | 20.08 | 19.93 | 18.29 | 17.92 | 18.76 |
| Pred-Rep (PH-PH) | +1.83 | +2.93 | +0.52 | +0.19 | +1.62 | +1.53 | -0.52 | +0.47 | -0.46 | +3.52 | +3.22 | +3.04 |
| **E** | 8.6% |      |      |      |      |      |      |      |      |      |      |      |

| **1969** |      |      |      |      |      |      |      |      |      |      |      |      |
| Predicted (PH) | 19.06 | 19.43 | 18.38 | 17.54 | 18.84 | 20.23 | 20.50 | 20.06 | 19.00 | 19.59 | 18.97 | 19.62 |
| Pred-Rep (PH-PH) | -0.71 | -0.98 | -2.31 | -2.84 | -4.30 | -4.93 | -5.55 | -6.85 | -6.94 | -5.94 | -6.80 | -7.31 |
| **E** | 19.3% |      |      |      |      |      |      |      |      |      |      |      |

| **1970** |      |      |      |      |      |      |      |      |      |      |      |      |
| Reported (PH) | 27.40 | 28.23 | 25.94 | 24.02 | 23.53 | 24.04 | 25.13 | 22.12 | 20.35 | 17.91 | 15.69 | 15.67 |
| Predicted (PH) | 24.64 | 25.13 | 23.54 | 21.34 | 23.06 | 24.83 | 23.10 | 22.58 | 21.36 | 19.21 | 18.60 | 19.28 |
| Pred-Rep (PH-PH) | -2.76 | -3.10 | -2.40 | -2.68 | -0.47 | +0.79 | -2.03 | +0.46 | +1.01 | +1.30 | +2.91 | +3.61 |
| **E** | 8.7% |      |      |      |      |      |      |      |      |      |      |      |

| **1971** |      |      |      |      |      |      |      |      |      |      |      |      |
| Predicted (PH) | 19.04 | 19.43 | 18.02 | 16.26 | 17.67 | 19.08 | 19.14 | 18.68 | 17.66 | 19.35 | 18.72 | 19.46 |
| Pred-Rep (PH-PH) | +2.74 | +0.00 | +0.89 | +0.07 | +0.24 | +0.70 | -0.70 | -0.39 | -1.25 | -0.45 | -0.66 | -0.19 |
| **E** | 3.7% |      |      |      |      |      |      |      |      |      |      |      |

| **1972** |      |      |      |      |      |      |      |      |      |      |      |      |
| Reported (PH) |      |      |      |      |      |      |      |      |      |      |      |      |
| Predicted (PH) | 23.80 | 24.31 | 22.32 | 17.71 | 19.36 | 20.96 | 21.66 | 21.12 | 19.95 | 22.59 | 21.84 | 22.77 |
| Pred-Rep (PH-PH) |      |      |      |      |      |      |      |      |      |      |      |      |
| **E** | ---% |      |      |      |      |      |      |      |      |      |      |      |
Table 4. Results when forecasting monthly hog prices (PH) in the second year ahead.

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1960</td>
<td>12.65</td>
<td>13.56</td>
<td>16.55</td>
<td>15.96</td>
<td>16.03</td>
<td>16.88</td>
<td>17.74</td>
<td>16.91</td>
<td>17.74</td>
<td>17.36</td>
<td>17.27</td>
<td>17.74</td>
</tr>
</tbody>
</table>
Table 4. (Cont'd.).

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>17.17</td>
<td>17.46</td>
<td>16.85</td>
<td>16.80</td>
<td>17.84</td>
<td>19.06</td>
<td>18.50</td>
<td>18.15</td>
<td>17.22</td>
<td>16.15</td>
<td>15.66</td>
<td>16.11</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-2.29</td>
<td>-1.92</td>
<td>-1.58</td>
<td>-0.82</td>
<td>-3.99</td>
<td>-3.23</td>
<td>-4.08</td>
<td>-2.89</td>
<td>-2.24</td>
<td>-2.01</td>
<td>-1.70</td>
<td>-1.18</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.9%</td>
</tr>
<tr>
<td>1968</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>19.42</td>
<td>19.78</td>
<td>18.89</td>
<td>17.01</td>
<td>18.17</td>
<td>19.47</td>
<td>19.60</td>
<td>19.22</td>
<td>18.21</td>
<td>17.42</td>
<td>16.88</td>
<td>17.41</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+1.11</td>
<td>+0.37</td>
<td>-1.80</td>
<td>-3.37</td>
<td>-4.97</td>
<td>-5.69</td>
<td>-6.45</td>
<td>-7.69</td>
<td>-7.73</td>
<td>-8.11</td>
<td>-8.89</td>
<td>-9.52</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>28.4%</td>
</tr>
<tr>
<td>1969</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+1.13</td>
<td>+0.88</td>
<td>-0.55</td>
<td>-1.25</td>
<td>-2.59</td>
<td>-3.08</td>
<td>-6.61</td>
<td>-7.88</td>
<td>-7.92</td>
<td>-6.95</td>
<td>-7.78</td>
<td>-8.33</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19.2%</td>
</tr>
<tr>
<td>1970</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>27.40</td>
<td>28.23</td>
<td>25.94</td>
<td>24.02</td>
<td>23.53</td>
<td>24.04</td>
<td>25.13</td>
<td>22.12</td>
<td>20.35</td>
<td>17.91</td>
<td>15.69</td>
<td>15.67</td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>19.37</td>
<td>20.77</td>
<td>19.45</td>
<td>17.61</td>
<td>19.03</td>
<td>20.49</td>
<td>19.96</td>
<td>19.51</td>
<td>18.46</td>
<td>18.84</td>
<td>18.24</td>
<td>18.91</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>-8.03</td>
<td>-7.46</td>
<td>-6.49</td>
<td>-6.41</td>
<td>-4.50</td>
<td>-3.55</td>
<td>-5.17</td>
<td>-2.61</td>
<td>-1.89</td>
<td>+0.93</td>
<td>+2.55</td>
<td>+3.24</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>19.6%</td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predicted (PH)</td>
<td>18.93</td>
<td>19.33</td>
<td>17.92</td>
<td>17.70</td>
<td>19.23</td>
<td>20.77</td>
<td>20.59</td>
<td>20.10</td>
<td>19.00</td>
<td>17.18</td>
<td>16.62</td>
<td>17.28</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>+2.63</td>
<td>-0.10</td>
<td>+0.79</td>
<td>+1.51</td>
<td>+1.80</td>
<td>+2.39</td>
<td>+0.75</td>
<td>+1.03</td>
<td>+0.09</td>
<td>-2.62</td>
<td>-2.76</td>
<td>-2.37</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>8.5%</td>
</tr>
<tr>
<td>1972</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>---%</td>
</tr>
<tr>
<td>1973</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reported (PH)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Pred-Rep (PH-PH)</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>E</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>---%</td>
</tr>
</tbody>
</table>
In Table 1 are the results when using the model to forecast quarterly domestic supply of pork per capita one year in advance (year t).

A measure of the absolute magnitude of the error, i.e., the difference among predicted and reported (taken as actual) values is presented in the last column. An average measure of the error was computed by the formula

\[
E = \frac{\sum (\text{Pred} - \text{Rep})}{n}
\]

where:

- \text{Pred} = \text{values predicted by the model.}
- \text{Rep} = \text{reported values.}
- n = \text{number of observations, which is cancelled out in the expression above.}
- E = \text{average forecast error during the year, in } \%.

E values for the forecast of (DSPK/POP), one year in advance, ranged from 7.8\% in 1965, to 1.1\% in 1971; see Table 1. The model predicted the right direction of changes in prices 46 times, of a total of 51, which is a good performance.

Table 2 shows correspondent results for (DSPK/POP) but when the model is forecasting two years in advance (year t+1), a larger error is expected.

Table 3 shows the results when the model is forecasting monthly hog prices one year in advance (year t).
E varies from 19.3% in 1969 to 3.7% in 1971. Correspondent forecasts can be found in Table 4, when the model is operating to make forecasts two years in advance.

The model proved to be much more accurate when forecasting the quarterly domestic supply of pork than forecasting monthly prices. It is expected because monthly variations are larger than quarterly variation; variation in a quarter is smoothed out since it is an averaged value. As expected, the model performed better when forecasting one year ahead than when performing the forecast two years in advance.
CHAPTER V

CONCLUSIONS

This research, as was previously mentioned, is a first step in the development of an improved model in the future. It is a basic general model in which the forecaster can introduce his own operating devices, as the ones used by Crom (2), in order to improve estimates involving particular situations. We can make a 24-month in advance forecast as a first development and later make continuous introduction of more recent information published by the USDA, which would be a dynamic way of improving our forecasts.

The December issue of the Hogs and Pigs report published by the USDA brings projections about the number of sows farrowing and other basic variables for the first half of the future year. An interesting check on our model would be to compare the results generated entirely by the model versus the results from introducing directly the variables $\Delta PGS_{1-2}t$ and $\Delta PGS_{3-5}t$ in the model as estimated by the USDA which are based on the farmer's intentions.

The computer program for those who wish to use the model is available in Appendix B.
LITERATURE CITED AND CONSULTED
LITERATURE CITED AND CONSULTED


Agricultural Prices, SRS (monthly).

Cold Storage, SRS (monthly).

Feed Situation, ERS (Feb., April, May, Aug., Nov.).

Grain Market News (weekly).

Hogs and Pigs, ERS (trimonthly).


Livestock Slaughter, SRS.

National Food Situation, ERS.

Poultry and Egg Situation, ERS (Feb., April, June, Sept., Nov.).

Summary of Regional Cold Storage Holdings, SRS (Annually).


APPENDIX A

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>2680</td>
<td>4601</td>
<td>3141</td>
<td>2746</td>
<td>7281</td>
<td>5887</td>
</tr>
<tr>
<td>1959</td>
<td>3053</td>
<td>4943</td>
<td>3346</td>
<td>2782</td>
<td>7996</td>
<td>6128</td>
</tr>
<tr>
<td>1960</td>
<td>2511</td>
<td>4279</td>
<td>3042</td>
<td>2813</td>
<td>6790</td>
<td>5855</td>
</tr>
<tr>
<td>1961</td>
<td>2531</td>
<td>4501</td>
<td>3099</td>
<td>2854</td>
<td>7029</td>
<td>5933</td>
</tr>
<tr>
<td>1962</td>
<td>2580</td>
<td>4416</td>
<td>3141</td>
<td>2957</td>
<td>6996</td>
<td>6098</td>
</tr>
<tr>
<td>1963</td>
<td>2593</td>
<td>4506</td>
<td>3125</td>
<td>2862</td>
<td>7099</td>
<td>5937</td>
</tr>
<tr>
<td>1964</td>
<td>2366</td>
<td>4230</td>
<td>2903</td>
<td>2622</td>
<td>6596</td>
<td>5525</td>
</tr>
<tr>
<td>1965</td>
<td>2178</td>
<td>3712</td>
<td>2548</td>
<td>2458</td>
<td>5890</td>
<td>5006</td>
</tr>
<tr>
<td>1966</td>
<td>2220</td>
<td>3981</td>
<td>3009</td>
<td>2802</td>
<td>6201</td>
<td>5811</td>
</tr>
<tr>
<td>1967</td>
<td>2450</td>
<td>4120</td>
<td>2974</td>
<td>2925</td>
<td>6570</td>
<td>5899</td>
</tr>
<tr>
<td>1968</td>
<td>2557</td>
<td>4112</td>
<td>3152</td>
<td>2977</td>
<td>6669</td>
<td>6129</td>
</tr>
<tr>
<td>1969</td>
<td>2570</td>
<td>3790</td>
<td>2924</td>
<td>2803</td>
<td>6360</td>
<td>5727</td>
</tr>
<tr>
<td>1970</td>
<td>2550</td>
<td>4421</td>
<td>3489</td>
<td>3409</td>
<td>7171</td>
<td>6898</td>
</tr>
<tr>
<td>1971</td>
<td>3009</td>
<td>4270</td>
<td>3201</td>
<td>3097</td>
<td>7279</td>
<td>6298</td>
</tr>
</tbody>
</table>

Table 2. Pigs Saved per Litter, U. S. (Units)--1958-1971.

<table>
<thead>
<tr>
<th>Year</th>
<th>Spring (Dec. 1-May)</th>
<th>Fall (Jun.-Nov.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>7.05</td>
<td>7.17</td>
</tr>
<tr>
<td>1959</td>
<td>7.07</td>
<td>6.98</td>
</tr>
<tr>
<td>1960</td>
<td>6.95</td>
<td>7.05</td>
</tr>
<tr>
<td>1961</td>
<td>7.18</td>
<td>7.16</td>
</tr>
<tr>
<td>1962</td>
<td>7.15</td>
<td>7.23</td>
</tr>
<tr>
<td>1963</td>
<td>7.23</td>
<td>7.23</td>
</tr>
<tr>
<td>1964</td>
<td>7.23</td>
<td>7.21</td>
</tr>
<tr>
<td>1965</td>
<td>7.32</td>
<td>7.27</td>
</tr>
<tr>
<td>1966</td>
<td>7.34</td>
<td>7.25</td>
</tr>
<tr>
<td>1967</td>
<td>7.34</td>
<td>7.38</td>
</tr>
<tr>
<td>1968</td>
<td>7.37</td>
<td>7.35</td>
</tr>
<tr>
<td>1969</td>
<td>7.36</td>
<td>7.34</td>
</tr>
<tr>
<td>1970</td>
<td>7.33</td>
<td>7.21</td>
</tr>
<tr>
<td>1971</td>
<td>7.19</td>
<td>7.25</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>1958</td>
<td>1011</td>
<td>802</td>
</tr>
<tr>
<td>1959</td>
<td>1064</td>
<td>1000</td>
</tr>
<tr>
<td>1960</td>
<td>1166</td>
<td>1036</td>
</tr>
<tr>
<td>1961</td>
<td>1041</td>
<td>905</td>
</tr>
<tr>
<td>1962</td>
<td>1101</td>
<td>935</td>
</tr>
<tr>
<td>1963</td>
<td>1142</td>
<td>991</td>
</tr>
<tr>
<td>1964</td>
<td>1234</td>
<td>1033</td>
</tr>
<tr>
<td>1965</td>
<td>1070</td>
<td>970</td>
</tr>
<tr>
<td>1966</td>
<td>859</td>
<td>838</td>
</tr>
<tr>
<td>1967</td>
<td>1140</td>
<td>1008</td>
</tr>
<tr>
<td>1968</td>
<td>1184</td>
<td>1015</td>
</tr>
<tr>
<td>1969</td>
<td>1200</td>
<td>1077</td>
</tr>
<tr>
<td>1970</td>
<td>1081</td>
<td>956</td>
</tr>
<tr>
<td>1971</td>
<td>1305</td>
<td>1106</td>
</tr>
</tbody>
</table>
Table 4. Number of Workdays per Month—Period from 1958-1971.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>23.8</td>
<td>21.3</td>
<td>22.7</td>
<td>23.3</td>
<td>23.2</td>
<td>22.3</td>
<td>23.8</td>
<td>22.7</td>
<td>22.8</td>
<td>24.3</td>
<td>21.2</td>
<td>23.8</td>
</tr>
<tr>
<td>1959</td>
<td>23.2</td>
<td>21.3</td>
<td>23.3</td>
<td>23.3</td>
<td>22.3</td>
<td>23.3</td>
<td>24.0</td>
<td>22.7</td>
<td>22.8</td>
<td>23.7</td>
<td>21.2</td>
<td>23.8</td>
</tr>
<tr>
<td>1960</td>
<td>22.2</td>
<td>22.3</td>
<td>24.3</td>
<td>22.7</td>
<td>22.8</td>
<td>23.3</td>
<td>22.2</td>
<td>24.3</td>
<td>22.8</td>
<td>22.7</td>
<td>22.8</td>
<td>23.7</td>
</tr>
<tr>
<td>1961</td>
<td>23.3</td>
<td>21.3</td>
<td>24.3</td>
<td>21.7</td>
<td>23.8</td>
<td>23.3</td>
<td>22.2</td>
<td>24.3</td>
<td>22.8</td>
<td>23.3</td>
<td>22.8</td>
<td>22.2</td>
</tr>
<tr>
<td>1962</td>
<td>23.8</td>
<td>21.7</td>
<td>23.7</td>
<td>22.3</td>
<td>23.8</td>
<td>22.7</td>
<td>22.8</td>
<td>24.3</td>
<td>21.2</td>
<td>24.3</td>
<td>22.6</td>
<td>22.2</td>
</tr>
<tr>
<td>1963</td>
<td>23.8</td>
<td>21.3</td>
<td>22.7</td>
<td>23.3</td>
<td>23.8</td>
<td>21.7</td>
<td>23.8</td>
<td>23.7</td>
<td>21.8</td>
<td>24.3</td>
<td>22.2</td>
<td>22.8</td>
</tr>
<tr>
<td>1964</td>
<td>23.8</td>
<td>21.7</td>
<td>23.3</td>
<td>23.3</td>
<td>22.3</td>
<td>23.3</td>
<td>24.0</td>
<td>22.7</td>
<td>22.8</td>
<td>23.7</td>
<td>21.8</td>
<td>23.8</td>
</tr>
<tr>
<td>1965</td>
<td>22.2</td>
<td>21.3</td>
<td>24.3</td>
<td>23.3</td>
<td>22.2</td>
<td>23.3</td>
<td>23.2</td>
<td>23.3</td>
<td>22.8</td>
<td>22.7</td>
<td>22.8</td>
<td>24.0</td>
</tr>
<tr>
<td>1966</td>
<td>22.3</td>
<td>21.3</td>
<td>24.3</td>
<td>22.7</td>
<td>22.8</td>
<td>23.3</td>
<td>22.2</td>
<td>24.3</td>
<td>22.8</td>
<td>22.7</td>
<td>22.8</td>
<td>23.7</td>
</tr>
<tr>
<td>1967</td>
<td>23.3</td>
<td>21.3</td>
<td>24.3</td>
<td>21.7</td>
<td>23.8</td>
<td>23.3</td>
<td>22.2</td>
<td>24.3</td>
<td>22.2</td>
<td>23.3</td>
<td>22.8</td>
<td>22.2</td>
</tr>
<tr>
<td>1968</td>
<td>23.8</td>
<td>22.3</td>
<td>22.7</td>
<td>23.3</td>
<td>23.8</td>
<td>21.7</td>
<td>23.8</td>
<td>23.7</td>
<td>21.8</td>
<td>24.3</td>
<td>22.2</td>
<td>22.8</td>
</tr>
<tr>
<td>1969</td>
<td>23.8</td>
<td>21.3</td>
<td>22.7</td>
<td>23.3</td>
<td>22.7</td>
<td>22.3</td>
<td>23.8</td>
<td>22.7</td>
<td>22.8</td>
<td>24.3</td>
<td>21.2</td>
<td>23.8</td>
</tr>
<tr>
<td>1970</td>
<td>22.2</td>
<td>21.3</td>
<td>23.3</td>
<td>23.3</td>
<td>22.3</td>
<td>23.3</td>
<td>24.0</td>
<td>22.7</td>
<td>22.8</td>
<td>23.7</td>
<td>21.8</td>
<td>23.8</td>
</tr>
<tr>
<td>1971</td>
<td>22.2</td>
<td>21.3</td>
<td>24.3</td>
<td>23.3</td>
<td>22.7</td>
<td>23.3</td>
<td>23.7</td>
<td>23.3</td>
<td>22.8</td>
<td>22.7</td>
<td>22.8</td>
<td>24.0</td>
</tr>
<tr>
<td>YEAR</td>
<td>JAN.</td>
<td>FEB.</td>
<td>MAR.</td>
<td>APR.</td>
<td>MAY</td>
<td>JUNE</td>
<td>JULY</td>
<td>AUG.</td>
<td>SEPT.</td>
<td>OCT.</td>
<td>NOV.</td>
<td>DEC.</td>
</tr>
<tr>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>-------</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>1953.</td>
<td>1.08</td>
<td>1.247</td>
<td>1.164</td>
<td>1.137</td>
<td>1.162</td>
<td>1.157</td>
<td>1.168</td>
<td>1.141</td>
<td>1.125</td>
<td>1.158</td>
<td>1.191</td>
<td>1.178</td>
</tr>
<tr>
<td>1954.</td>
<td>1.045</td>
<td>.990</td>
<td>1.024</td>
<td>1.012</td>
<td>1.057</td>
<td>1.038</td>
<td>.926</td>
<td>.999</td>
<td>.903</td>
<td>.934</td>
<td>.848</td>
<td>.837</td>
</tr>
<tr>
<td>1955.</td>
<td>.851</td>
<td>.915</td>
<td>.966</td>
<td>.945</td>
<td>.981</td>
<td>1.061</td>
<td>.996</td>
<td>.988</td>
<td>1.016</td>
<td>1.077</td>
<td>1.064</td>
<td>1.044</td>
</tr>
<tr>
<td>1956.</td>
<td>1.035</td>
<td>1.033</td>
<td>1.034</td>
<td>1.011</td>
<td>1.043</td>
<td>1.024</td>
<td>1.073</td>
<td>1.029</td>
<td>.982</td>
<td>1.037</td>
<td>1.001</td>
<td>1.029</td>
</tr>
<tr>
<td>1957.</td>
<td>1.037</td>
<td>1.060</td>
<td>1.034</td>
<td>1.064</td>
<td>1.022</td>
<td>1.069</td>
<td>1.020</td>
<td>1.010</td>
<td>1.177</td>
<td>1.007</td>
<td>1.040</td>
<td>1.098</td>
</tr>
<tr>
<td>1958.</td>
<td>1.081</td>
<td>1.023</td>
<td>.959</td>
<td>1.013</td>
<td>.997</td>
<td>.982</td>
<td>.935</td>
<td>.932</td>
<td>.941</td>
<td>1.042</td>
<td>1.038</td>
<td>.938</td>
</tr>
<tr>
<td>1959.</td>
<td>.953</td>
<td>.927</td>
<td>.974</td>
<td>.915</td>
<td>.979</td>
<td>.965</td>
<td>.914</td>
<td>.962</td>
<td>.975</td>
<td>.841</td>
<td>.806</td>
<td>.766</td>
</tr>
<tr>
<td>1960.</td>
<td>.793</td>
<td>.864</td>
<td>.918</td>
<td>.967</td>
<td>1.052</td>
<td>1.037</td>
<td>1.025</td>
<td>1.037</td>
<td>1.070</td>
<td>1.091</td>
<td>1.131</td>
<td>1.254</td>
</tr>
<tr>
<td>1962.</td>
<td>1.017</td>
<td>.982</td>
<td>1.046</td>
<td>1.017</td>
<td>1.196</td>
<td>1.048</td>
<td>1.032</td>
<td>1.173</td>
<td>1.032</td>
<td>1.037</td>
<td>1.032</td>
<td>1.033</td>
</tr>
<tr>
<td>1963.</td>
<td>1.014</td>
<td>1.011</td>
<td>1.003</td>
<td>1.029</td>
<td>.971</td>
<td>1.075</td>
<td>1.029</td>
<td>.989</td>
<td>.969</td>
<td>.951</td>
<td>.918</td>
<td>.919</td>
</tr>
<tr>
<td>1964.</td>
<td>.966</td>
<td>.936</td>
<td>.993</td>
<td>1.015</td>
<td>.949</td>
<td>1.042</td>
<td>1.090</td>
<td>1.077</td>
<td>1.039</td>
<td>1.214</td>
<td>1.246</td>
<td>1.296</td>
</tr>
<tr>
<td>Year/Quarter</td>
<td>Beginning Stocks of Pork (mil. lb)</td>
<td>Production of Pork (mil. lb)</td>
<td>Domestic Supply of Pork (mil. lb)</td>
<td>U.S. Population (mil.)</td>
<td>Domestic Supply Pork/ Capita (lb.)</td>
<td>Per Capita Cons. of Non-Pork (lb.)</td>
<td>Cons. of Crops &amp; Broilers (1967) (lb.)</td>
<td>Per Capita Income (S)</td>
<td>Disp. Income (CPI) (1967 = 100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------------------</td>
<td>------------------------------</td>
<td>----------------------------------</td>
<td>------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>-----------------------------------</td>
<td>------------------------</td>
<td>-------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1958 Q1</td>
<td>194</td>
<td>2690</td>
<td>2884</td>
<td>173.1</td>
<td>16.66</td>
<td>22.30</td>
<td>5.5</td>
<td>2099</td>
<td>86.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>224</td>
<td>2299</td>
<td>2523</td>
<td>173.7</td>
<td>14.53</td>
<td>22.60</td>
<td>6.8</td>
<td>2090</td>
<td>86.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>210</td>
<td>2306</td>
<td>2516</td>
<td>174.5</td>
<td>14.42</td>
<td>23.70</td>
<td>8.1</td>
<td>2124</td>
<td>86.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>127</td>
<td>3159</td>
<td>3286</td>
<td>175.3</td>
<td>18.75</td>
<td>22.30</td>
<td>9.0</td>
<td>2147</td>
<td>86.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1959 Q1</td>
<td>206</td>
<td>3078</td>
<td>3284</td>
<td>176.0</td>
<td>18.66</td>
<td>21.80</td>
<td>6.1</td>
<td>2160</td>
<td>86.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>337</td>
<td>2617</td>
<td>2954</td>
<td>176.6</td>
<td>16.73</td>
<td>23.00</td>
<td>7.5</td>
<td>2188</td>
<td>87.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>313</td>
<td>2616</td>
<td>2929</td>
<td>177.4</td>
<td>16.51</td>
<td>23.80</td>
<td>8.0</td>
<td>2167</td>
<td>87.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>163</td>
<td>3682</td>
<td>3845</td>
<td>178.2</td>
<td>21.58</td>
<td>23.30</td>
<td>8.8</td>
<td>2172</td>
<td>88.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960 Q1</td>
<td>264</td>
<td>3286</td>
<td>3550</td>
<td>178.0</td>
<td>19.85</td>
<td>23.60</td>
<td>5.7</td>
<td>2186</td>
<td>88.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>338</td>
<td>2710</td>
<td>3048</td>
<td>179.5</td>
<td>16.98</td>
<td>23.40</td>
<td>7.0</td>
<td>2210</td>
<td>88.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>351</td>
<td>2462</td>
<td>2813</td>
<td>180.2</td>
<td>15.61</td>
<td>25.30</td>
<td>7.9</td>
<td>2206</td>
<td>88.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>158</td>
<td>3141</td>
<td>3299</td>
<td>181.1</td>
<td>18.22</td>
<td>23.70</td>
<td>8.9</td>
<td>2185</td>
<td>89.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1961 Q1</td>
<td>170</td>
<td>3025</td>
<td>3195</td>
<td>181.7</td>
<td>17.58</td>
<td>23.60</td>
<td>6.0</td>
<td>2172</td>
<td>89.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>244</td>
<td>2640</td>
<td>2884</td>
<td>182.4</td>
<td>15.81</td>
<td>25.10</td>
<td>8.4</td>
<td>2211</td>
<td>89.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>240</td>
<td>2443</td>
<td>2683</td>
<td>183.1</td>
<td>14.65</td>
<td>25.20</td>
<td>9.0</td>
<td>2227</td>
<td>89.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>128</td>
<td>3292</td>
<td>3420</td>
<td>184.0</td>
<td>18.59</td>
<td>24.60</td>
<td>9.8</td>
<td>2260</td>
<td>89.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1962 Q1</td>
<td>200</td>
<td>3130</td>
<td>3330</td>
<td>184.7</td>
<td>18.03</td>
<td>24.90</td>
<td>6.3</td>
<td>2263</td>
<td>90.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>280</td>
<td>2785</td>
<td>3065</td>
<td>185.3</td>
<td>16.54</td>
<td>24.60</td>
<td>7.9</td>
<td>2265</td>
<td>90.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>295</td>
<td>2490</td>
<td>2785</td>
<td>186.1</td>
<td>14.97</td>
<td>25.50</td>
<td>8.3</td>
<td>2265</td>
<td>90.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>139</td>
<td>3413</td>
<td>3552</td>
<td>186.8</td>
<td>19.91</td>
<td>24.60</td>
<td>10.2</td>
<td>2266</td>
<td>91.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1963 Q1</td>
<td>230</td>
<td>3270</td>
<td>3500</td>
<td>187.5</td>
<td>18.67</td>
<td>25.10</td>
<td>6.6</td>
<td>2295</td>
<td>91.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>333</td>
<td>2882</td>
<td>3215</td>
<td>188.1</td>
<td>17.09</td>
<td>25.80</td>
<td>8.0</td>
<td>2318</td>
<td>91.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>323</td>
<td>2694</td>
<td>3017</td>
<td>188.8</td>
<td>15.98</td>
<td>26.90</td>
<td>8.9</td>
<td>2314</td>
<td>92.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>210</td>
<td>3572</td>
<td>3782</td>
<td>189.6</td>
<td>19.95</td>
<td>26.50</td>
<td>10.3</td>
<td>2337</td>
<td>92.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1964 Q1</td>
<td>277</td>
<td>3384</td>
<td>3661</td>
<td>190.2</td>
<td>19.25</td>
<td>26.30</td>
<td>7.1</td>
<td>2390</td>
<td>92.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>411</td>
<td>2894</td>
<td>3305</td>
<td>190.8</td>
<td>17.32</td>
<td>27.70</td>
<td>8.3</td>
<td>2439</td>
<td>92.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>413</td>
<td>2639</td>
<td>3052</td>
<td>191.3</td>
<td>15.95</td>
<td>27.70</td>
<td>9.2</td>
<td>2458</td>
<td>93.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>184</td>
<td>3588</td>
<td>3772</td>
<td>192.2</td>
<td>19.63</td>
<td>27.60</td>
<td>10.4</td>
<td>2472</td>
<td>93.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Year/Quarter</td>
<td>Beginning Stocks of Pork (mil. lb)</td>
<td>Production of Pork (mil. lb)</td>
<td>Domestic Supply of Pork (mil. lb)</td>
<td>U.S. Population (mil.)</td>
<td>Domestic Supply Pork/Capita (lb.)</td>
<td>Per Capita Cons. of Non-Pork (lb.)</td>
<td>Per Capita Cons. of Turkeys &amp; Broilers (lb.)</td>
<td>Disp. Income Per Capita (1967) ($)</td>
<td>CPI (1967=100)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------------</td>
<td>-----------------------------</td>
<td>----------------------------------</td>
<td>------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>---------------------------------</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1965 Q1</td>
<td>152</td>
<td>2741</td>
<td>2893</td>
<td>195.2</td>
<td>17.62</td>
<td>26.80</td>
<td>7.3</td>
<td>2499</td>
<td>93.6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>217</td>
<td>2643</td>
<td>2860</td>
<td>197.8</td>
<td>16.20</td>
<td>28.60</td>
<td>10.9</td>
<td>2670</td>
<td>95.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>214</td>
<td>2620</td>
<td>2834</td>
<td>198.4</td>
<td>17.53</td>
<td>28.30</td>
<td>12.2</td>
<td>2682</td>
<td>98.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>151</td>
<td>3324</td>
<td>3475</td>
<td>196.8</td>
<td>17.66</td>
<td>28.30</td>
<td>12.2</td>
<td>2682</td>
<td>98.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1966 Q1</td>
<td>239</td>
<td>3319</td>
<td>3558</td>
<td>197.3</td>
<td>18.03</td>
<td>28.50</td>
<td>8.4</td>
<td>2729</td>
<td>98.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>331</td>
<td>2873</td>
<td>3204</td>
<td>197.8</td>
<td>16.20</td>
<td>28.60</td>
<td>9.8</td>
<td>2740</td>
<td>99.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>293</td>
<td>2897</td>
<td>3190</td>
<td>198.4</td>
<td>16.08</td>
<td>28.80</td>
<td>10.9</td>
<td>2746</td>
<td>100.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>203</td>
<td>3483</td>
<td>3686</td>
<td>198.9</td>
<td>18.53</td>
<td>28.30</td>
<td>12.3</td>
<td>2763</td>
<td>101.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1967 Q1</td>
<td>286</td>
<td>3289</td>
<td>3575</td>
<td>199.8</td>
<td>17.89</td>
<td>29.00</td>
<td>8.6</td>
<td>2801</td>
<td>102.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>306</td>
<td>3124</td>
<td>3430</td>
<td>200.3</td>
<td>17.12</td>
<td>28.60</td>
<td>9.5</td>
<td>2829</td>
<td>103.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>326</td>
<td>3004</td>
<td>3330</td>
<td>200.8</td>
<td>15.95</td>
<td>30.10</td>
<td>10.8</td>
<td>2821</td>
<td>104.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>197</td>
<td>3646</td>
<td>3843</td>
<td>201.5</td>
<td>19.07</td>
<td>29.30</td>
<td>12.1</td>
<td>2827</td>
<td>106.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968 Q1</td>
<td>256</td>
<td>3437</td>
<td>3693</td>
<td>201.8</td>
<td>18.30</td>
<td>29.00</td>
<td>9.0</td>
<td>2823</td>
<td>107.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>270</td>
<td>3142</td>
<td>3412</td>
<td>202.3</td>
<td>16.87</td>
<td>28.30</td>
<td>10.3</td>
<td>2817</td>
<td>109.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>246</td>
<td>2992</td>
<td>3238</td>
<td>202.8</td>
<td>15.97</td>
<td>30.30</td>
<td>11.3</td>
<td>2844</td>
<td>110.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>174</td>
<td>3382</td>
<td>3556</td>
<td>203.6</td>
<td>17.47</td>
<td>30.70</td>
<td>12.9</td>
<td>2841</td>
<td>112.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969 Q1</td>
<td>211</td>
<td>3144</td>
<td>3355</td>
<td>203.9</td>
<td>16.45</td>
<td>30.00</td>
<td>9.7</td>
<td>2873</td>
<td>113.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>268</td>
<td>3138</td>
<td>3406</td>
<td>204.4</td>
<td>16.66</td>
<td>29.50</td>
<td>10.9</td>
<td>2898</td>
<td>115.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>304</td>
<td>3161</td>
<td>3465</td>
<td>205.0</td>
<td>16.90</td>
<td>30.50</td>
<td>11.9</td>
<td>2907</td>
<td>116.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>210</td>
<td>3991</td>
<td>4201</td>
<td>205.6</td>
<td>20.43</td>
<td>29.90</td>
<td>12.9</td>
<td>2878</td>
<td>118.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970 Q1</td>
<td>336</td>
<td>3770</td>
<td>4106</td>
<td>206.2</td>
<td>19.91</td>
<td>29.20</td>
<td>9.9</td>
<td>2931</td>
<td>119.4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>389</td>
<td>3683</td>
<td>4072</td>
<td>206.7</td>
<td>19.70</td>
<td>29.50</td>
<td>10.8</td>
<td>2961</td>
<td>120.8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>476</td>
<td>3436</td>
<td>3912</td>
<td>207.2</td>
<td>18.88</td>
<td>30.90</td>
<td>12.1</td>
<td>2960</td>
<td>122.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q4</td>
<td>309</td>
<td>3907</td>
<td>4216</td>
<td>207.8</td>
<td>20.28</td>
<td>29.60</td>
<td>13.2</td>
<td>2961</td>
<td>122.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>17.88</td>
<td>17.16</td>
<td>17.25</td>
<td>17.95</td>
<td>18.24</td>
<td>19.65</td>
<td>20.79</td>
<td>21.27</td>
<td>19.34</td>
<td>17.20</td>
<td>17.01</td>
<td>18.45</td>
</tr>
<tr>
<td>1960</td>
<td>12.65</td>
<td>13.56</td>
<td>16.55</td>
<td>15.96</td>
<td>16.03</td>
<td>16.88</td>
<td>17.74</td>
<td>16.92</td>
<td>16.59</td>
<td>17.30</td>
<td>17.36</td>
<td>17.27</td>
</tr>
<tr>
<td>1961</td>
<td>17.33</td>
<td>18.13</td>
<td>17.53</td>
<td>17.04</td>
<td>16.37</td>
<td>16.60</td>
<td>17.87</td>
<td>18.33</td>
<td>18.18</td>
<td>16.55</td>
<td>15.97</td>
<td>16.70</td>
</tr>
<tr>
<td>1963</td>
<td>15.65</td>
<td>15.14</td>
<td>14.07</td>
<td>13.78</td>
<td>15.01</td>
<td>17.10</td>
<td>18.44</td>
<td>17.55</td>
<td>15.89</td>
<td>15.47</td>
<td>14.47</td>
<td>14.21</td>
</tr>
<tr>
<td>1964</td>
<td>14.70</td>
<td>14.70</td>
<td>14.48</td>
<td>14.16</td>
<td>14.84</td>
<td>15.83</td>
<td>17.11</td>
<td>17.05</td>
<td>16.76</td>
<td>15.39</td>
<td>14.43</td>
<td>15.55</td>
</tr>
<tr>
<td>1965</td>
<td>16.06</td>
<td>17.01</td>
<td>16.98</td>
<td>17.63</td>
<td>20.29</td>
<td>23.38</td>
<td>24.27</td>
<td>24.67</td>
<td>22.92</td>
<td>23.36</td>
<td>24.33</td>
<td>28.07</td>
</tr>
<tr>
<td>1966</td>
<td>27.93</td>
<td>27.80</td>
<td>24.41</td>
<td>22.26</td>
<td>23.16</td>
<td>24.72</td>
<td>25.09</td>
<td>25.75</td>
<td>23.16</td>
<td>21.57</td>
<td>19.87</td>
<td>19.67</td>
</tr>
<tr>
<td>1968</td>
<td>18.31</td>
<td>19.41</td>
<td>19.07</td>
<td>19.00</td>
<td>18.88</td>
<td>20.43</td>
<td>21.48</td>
<td>20.08</td>
<td>19.93</td>
<td>18.29</td>
<td>17.92</td>
<td>18.76</td>
</tr>
<tr>
<td>1970</td>
<td>27.40</td>
<td>28.23</td>
<td>25.94</td>
<td>24.02</td>
<td>23.53</td>
<td>24.04</td>
<td>25.13</td>
<td>22.12</td>
<td>20.35</td>
<td>17.91</td>
<td>15.69</td>
<td>15.67</td>
</tr>
</tbody>
</table>

Table 8. Index of the Seasonal Pattern.

<table>
<thead>
<tr>
<th></th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Index</td>
<td>97.3</td>
<td>98.8</td>
<td>97.1</td>
<td>95.0</td>
<td>99.7</td>
<td>105.9</td>
<td>109.8</td>
<td>108.1</td>
<td>102.7</td>
<td>96.7</td>
<td>93.9</td>
<td>96.1</td>
</tr>
<tr>
<td>Std Dev</td>
<td>6.4</td>
<td>6.7</td>
<td>5.7</td>
<td>6.0</td>
<td>5.7</td>
<td>5.4</td>
<td>5.3</td>
<td>4.0</td>
<td>4.2</td>
<td>3.8</td>
<td>5.0</td>
<td>7.5</td>
</tr>
<tr>
<td>Trend</td>
<td>0.5</td>
<td>0.6</td>
<td>-0.3</td>
<td>-0.7</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.1</td>
<td>0.2</td>
<td>0.1</td>
<td>0.4</td>
<td>0.4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>0.9358</td>
<td>0.9437</td>
<td>0.9941</td>
<td>0.9993</td>
<td>1.0089</td>
<td>1.0518</td>
<td>1.0788</td>
<td>1.0722</td>
<td>1.0250</td>
<td>0.9563</td>
<td>0.9316</td>
<td>0.9348</td>
</tr>
<tr>
<td>1959</td>
<td>0.9411</td>
<td>0.9500</td>
<td>0.9908</td>
<td>0.9922</td>
<td>1.0072</td>
<td>1.0528</td>
<td>1.0815</td>
<td>1.0734</td>
<td>1.0253</td>
<td>0.9579</td>
<td>0.9327</td>
<td>0.9385</td>
</tr>
<tr>
<td>1960</td>
<td>0.9465</td>
<td>0.9564</td>
<td>0.9876</td>
<td>0.9851</td>
<td>1.0054</td>
<td>1.0538</td>
<td>1.0843</td>
<td>1.0746</td>
<td>1.0256</td>
<td>0.9595</td>
<td>0.9338</td>
<td>0.9422</td>
</tr>
<tr>
<td>1961</td>
<td>0.9518</td>
<td>0.9628</td>
<td>0.9843</td>
<td>0.9781</td>
<td>1.0037</td>
<td>1.0548</td>
<td>1.0871</td>
<td>1.0759</td>
<td>1.0258</td>
<td>0.9611</td>
<td>0.9348</td>
<td>0.9459</td>
</tr>
<tr>
<td>1962</td>
<td>0.9572</td>
<td>0.9691</td>
<td>0.9810</td>
<td>0.9710</td>
<td>1.0019</td>
<td>1.0558</td>
<td>1.0899</td>
<td>1.0771</td>
<td>1.0261</td>
<td>0.9627</td>
<td>0.9359</td>
<td>0.9496</td>
</tr>
<tr>
<td>1963</td>
<td>0.9626</td>
<td>0.9754</td>
<td>0.9778</td>
<td>0.9640</td>
<td>1.0002</td>
<td>1.0568</td>
<td>1.0927</td>
<td>1.0784</td>
<td>1.0264</td>
<td>0.9643</td>
<td>0.9369</td>
<td>0.9533</td>
</tr>
<tr>
<td>1964</td>
<td>0.9679</td>
<td>0.9818</td>
<td>0.9745</td>
<td>0.9569</td>
<td>0.9984</td>
<td>1.0578</td>
<td>1.0954</td>
<td>1.0796</td>
<td>1.0267</td>
<td>0.9659</td>
<td>0.9380</td>
<td>0.9570</td>
</tr>
<tr>
<td>1965</td>
<td>0.9733</td>
<td>0.9881</td>
<td>0.9712</td>
<td>0.9498</td>
<td>0.9967</td>
<td>1.0588</td>
<td>1.0982</td>
<td>1.0808</td>
<td>1.0270</td>
<td>0.9675</td>
<td>0.9391</td>
<td>0.9607</td>
</tr>
<tr>
<td>1966</td>
<td>0.9786</td>
<td>0.9945</td>
<td>0.9679</td>
<td>0.9427</td>
<td>0.9499</td>
<td>1.0599</td>
<td>1.1010</td>
<td>1.0821</td>
<td>1.0273</td>
<td>0.9691</td>
<td>0.9401</td>
<td>0.9643</td>
</tr>
<tr>
<td>1967</td>
<td>0.9840</td>
<td>1.0008</td>
<td>0.9647</td>
<td>0.9356</td>
<td>0.9932</td>
<td>1.0609</td>
<td>1.1038</td>
<td>1.0833</td>
<td>1.0276</td>
<td>0.9707</td>
<td>0.9412</td>
<td>0.9680</td>
</tr>
<tr>
<td>1968</td>
<td>0.9894</td>
<td>1.0072</td>
<td>0.9614</td>
<td>0.9286</td>
<td>0.9914</td>
<td>1.0619</td>
<td>1.1066</td>
<td>1.0846</td>
<td>1.0279</td>
<td>0.9723</td>
<td>0.9422</td>
<td>0.9717</td>
</tr>
<tr>
<td>1969</td>
<td>0.9947</td>
<td>1.0135</td>
<td>0.9581</td>
<td>0.9215</td>
<td>0.9897</td>
<td>1.0629</td>
<td>1.1093</td>
<td>1.0858</td>
<td>1.0282</td>
<td>0.9739</td>
<td>0.9433</td>
<td>0.9754</td>
</tr>
<tr>
<td>1970</td>
<td>1.0001</td>
<td>1.0199</td>
<td>0.9549</td>
<td>0.9144</td>
<td>0.9879</td>
<td>1.0639</td>
<td>1.1121</td>
<td>1.0870</td>
<td>1.0285</td>
<td>0.9755</td>
<td>0.9444</td>
<td>0.9791</td>
</tr>
<tr>
<td>1971</td>
<td>1.0054</td>
<td>1.0262</td>
<td>0.9516</td>
<td>0.9074</td>
<td>0.9862</td>
<td>1.0649</td>
<td>1.1149</td>
<td>1.0883</td>
<td>1.0287</td>
<td>0.9771</td>
<td>0.9454</td>
<td>0.9828</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1958</td>
<td>0.9579</td>
<td>1.0200</td>
<td>1.0587</td>
<td>0.9409</td>
</tr>
<tr>
<td>1959</td>
<td>0.9606</td>
<td>1.0174</td>
<td>1.0601</td>
<td>0.9430</td>
</tr>
<tr>
<td>1960</td>
<td>0.9635</td>
<td>1.0148</td>
<td>1.0615</td>
<td>0.9452</td>
</tr>
<tr>
<td>1961</td>
<td>0.9663</td>
<td>1.0122</td>
<td>1.0629</td>
<td>0.9473</td>
</tr>
<tr>
<td>1962</td>
<td>0.9691</td>
<td>1.0096</td>
<td>1.0644</td>
<td>0.9494</td>
</tr>
<tr>
<td>1963</td>
<td>0.9719</td>
<td>1.0070</td>
<td>1.0658</td>
<td>0.9515</td>
</tr>
<tr>
<td>1964</td>
<td>0.9747</td>
<td>1.0044</td>
<td>1.0672</td>
<td>0.9536</td>
</tr>
<tr>
<td>1965</td>
<td>0.9775</td>
<td>1.0018</td>
<td>1.0687</td>
<td>0.9558</td>
</tr>
<tr>
<td>1966</td>
<td>0.9803</td>
<td>0.9992</td>
<td>1.0701</td>
<td>0.9578</td>
</tr>
<tr>
<td>1967</td>
<td>0.9832</td>
<td>0.9966</td>
<td>1.0716</td>
<td>0.9600</td>
</tr>
<tr>
<td>1968</td>
<td>0.9860</td>
<td>0.9940</td>
<td>1.0730</td>
<td>0.9621</td>
</tr>
<tr>
<td>1969</td>
<td>0.9888</td>
<td>0.9914</td>
<td>1.0744</td>
<td>0.9642</td>
</tr>
<tr>
<td>1970</td>
<td>0.9916</td>
<td>0.9887</td>
<td>1.0759</td>
<td>0.9663</td>
</tr>
<tr>
<td>1971</td>
<td>0.9944</td>
<td>0.9862</td>
<td>1.0773</td>
<td>0.9684</td>
</tr>
</tbody>
</table>
Table 11. Smoothed Monthly Price Ratio Adjusted to Quarterly Averages.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1957</td>
<td>0.9741</td>
<td>0.9816</td>
<td>1.0440</td>
<td>0.9843</td>
<td>0.9883</td>
<td>1.0275</td>
<td>1.0178</td>
<td>1.0130</td>
<td>0.9692</td>
<td>1.0170</td>
<td>0.9912</td>
<td>0.9919</td>
</tr>
<tr>
<td>1958</td>
<td>0.9769</td>
<td>0.9852</td>
<td>1.0378</td>
<td>0.9797</td>
<td>0.9891</td>
<td>1.0312</td>
<td>1.0190</td>
<td>1.0128</td>
<td>0.9682</td>
<td>1.0164</td>
<td>0.9901</td>
<td>0.9935</td>
</tr>
<tr>
<td>1959</td>
<td>0.9797</td>
<td>0.9890</td>
<td>1.0314</td>
<td>0.9752</td>
<td>0.9900</td>
<td>1.0348</td>
<td>1.0202</td>
<td>1.0125</td>
<td>0.9672</td>
<td>1.0158</td>
<td>0.9891</td>
<td>0.9952</td>
</tr>
<tr>
<td>1960</td>
<td>0.9824</td>
<td>0.9926</td>
<td>1.0250</td>
<td>0.9707</td>
<td>0.9907</td>
<td>1.0384</td>
<td>1.0215</td>
<td>1.0123</td>
<td>0.9662</td>
<td>1.0151</td>
<td>0.9879</td>
<td>0.9968</td>
</tr>
<tr>
<td>1961</td>
<td>0.9850</td>
<td>0.9964</td>
<td>1.0186</td>
<td>0.9663</td>
<td>0.9916</td>
<td>1.0421</td>
<td>1.0228</td>
<td>1.0122</td>
<td>0.9651</td>
<td>1.0146</td>
<td>0.9868</td>
<td>0.9985</td>
</tr>
<tr>
<td>1962</td>
<td>0.9877</td>
<td>1.0000</td>
<td>1.0123</td>
<td>0.9618</td>
<td>0.9924</td>
<td>1.0458</td>
<td>1.0240</td>
<td>1.0119</td>
<td>0.9640</td>
<td>1.0140</td>
<td>0.9858</td>
<td>1.0002</td>
</tr>
<tr>
<td>1963</td>
<td>0.9904</td>
<td>1.0036</td>
<td>1.0061</td>
<td>0.9573</td>
<td>0.9932</td>
<td>1.0495</td>
<td>1.0252</td>
<td>1.0118</td>
<td>0.9630</td>
<td>1.0135</td>
<td>0.9847</td>
<td>1.0019</td>
</tr>
<tr>
<td>1964</td>
<td>0.9930</td>
<td>1.0073</td>
<td>0.9998</td>
<td>0.9527</td>
<td>0.9940</td>
<td>1.0532</td>
<td>1.0264</td>
<td>1.0116</td>
<td>0.9621</td>
<td>1.0129</td>
<td>0.9836</td>
<td>1.0036</td>
</tr>
<tr>
<td>1965</td>
<td>0.9957</td>
<td>1.0108</td>
<td>0.9936</td>
<td>0.9481</td>
<td>0.9949</td>
<td>1.0569</td>
<td>1.0276</td>
<td>1.0113</td>
<td>0.9610</td>
<td>1.0122</td>
<td>0.9825</td>
<td>1.0051</td>
</tr>
<tr>
<td>1966</td>
<td>0.9983</td>
<td>1.0145</td>
<td>0.9874</td>
<td>0.9435</td>
<td>0.9957</td>
<td>1.0607</td>
<td>1.0289</td>
<td>1.0112</td>
<td>0.9600</td>
<td>1.0118</td>
<td>0.9815</td>
<td>1.0068</td>
</tr>
<tr>
<td>1967</td>
<td>1.0008</td>
<td>1.0179</td>
<td>0.9812</td>
<td>0.9388</td>
<td>0.9966</td>
<td>1.0645</td>
<td>1.0300</td>
<td>1.0109</td>
<td>0.9589</td>
<td>1.0111</td>
<td>0.9804</td>
<td>1.0083</td>
</tr>
<tr>
<td>1968</td>
<td>1.0034</td>
<td>1.0215</td>
<td>0.9751</td>
<td>0.9342</td>
<td>0.9974</td>
<td>1.0683</td>
<td>1.0313</td>
<td>1.0108</td>
<td>0.9580</td>
<td>1.0106</td>
<td>0.9793</td>
<td>1.0100</td>
</tr>
<tr>
<td>1969</td>
<td>1.0060</td>
<td>1.0250</td>
<td>0.9690</td>
<td>0.9295</td>
<td>0.9983</td>
<td>1.0721</td>
<td>1.0325</td>
<td>1.0106</td>
<td>0.9570</td>
<td>1.0101</td>
<td>0.9783</td>
<td>1.0116</td>
</tr>
<tr>
<td>1970</td>
<td>1.0086</td>
<td>1.0285</td>
<td>0.9630</td>
<td>0.9249</td>
<td>0.9992</td>
<td>1.0761</td>
<td>1.0336</td>
<td>1.0103</td>
<td>0.9559</td>
<td>1.0095</td>
<td>0.9773</td>
<td>1.0132</td>
</tr>
<tr>
<td>1971</td>
<td>1.0111</td>
<td>1.0320</td>
<td>0.9570</td>
<td>0.9201</td>
<td>1.0000</td>
<td>1.0798</td>
<td>1.0349</td>
<td>1.0102</td>
<td>0.9549</td>
<td>1.0090</td>
<td>0.9762</td>
<td>1.0149</td>
</tr>
</tbody>
</table>

Note: The data above was obtained by dividing the smoothed monthly price ratio into the quarterly average smoothed price ratio.
APPENDIX B

COMPUTER PROGRAM
SUBROUTINE JANUARY TRACE

DATA (DSPK2(K), K=1,11) / 2523, 2594, 3048, 2854, 2610, 2866, 3204, 3433, 3872, 4272, 4872, 5600, 6382, 7088, 7800, 8536, 9302, 10100, 10920, 11760, 12624, 13512, 14424, 15360, 16320, 17304, 18312, 19344, 20400, 21480, 22584, 23728, 24900, 26112, 27352, 28624, 30000, 31408, 32848, 34336, 35872, 37456, 39096, 40784, 42528, 44336, 46216, 48176, 50224, 52368, 54624, 57000, 59496, 62144, 64908, 67816, 70904, 74184, 77712, 81504, 85552, 89904, 94576, 99656, 105184, 111032, 117336, 123992, 131152, 138824, 146992, 155680, 164960, 174944, 185584, 197088, 209696, 223328, 238080, 253904, 271008, 289296, 308936, 330152, 353088, 377936, 404864, 433936, 465216, 500000, 537968, 580928, 627936, 680128, 738688, 805696, 883296, 1000000, 968592, 1061360, 1154528, 1250112, 1359904, 1485944, 1642224, 1819200, 2015312, 2242256, 2513824, 2828144, 3192928, 3639424, 4163056, 4801280, 5608416, 6585600, 7749120, 9214288, 10944608, 12983520, 15500240, 18624320, 22449136, 27138976, 33089888, 40675440, 50874288, 63947648, 80942976, 103093136, 137917488, 184263312, 245017792, 327583472, 422379264, 543362424, 692027984, 872339232, 1114019704, 1408033648, 1814444864, 2400252480, 3200336800, 4400451200, 6000601600, 8000802400, 10001003200, 13001304000, 17001704000, 22002205600, 29002907200, 38003809600, 50005012800, 65006517920, 83008331200, 105001051040, 135001351344, 175001751744, 230002302320, 300003003000, 400004004000, 530005305300}

DO 10 I=1,11
   5 SFSL(I) = SF5(I)
   6 PLH(I) = PH(I)
   7 DPGSL3(I) = PG3(I)
   8 DPGSL4(I) = PG4(I)
   9 PIGL(I) = PIG(I)
  10 PLSL(I) = PSL(I)
 11 CONTINUE

5 FORMAT(9I3), *GMHT-1*, I3, 7(2X,I4,.2X),/1X, 7(2X,F14.2)

10 DO 20 J=1,11
   15 IF (J .EQ. I) THEN
      20 SFSC3(J) = C(1) + C(2) * SFSL(J) + C(3) * SF5(J) / PPDF(J)
      25 SF3(J) = C(7) + C(8) * SFSC3(J) + C(9) * IT
      30 SFZ(J) = C(18) + C(30) * SFSC3(J) + C(12) * IT
      35 PFGS(J) = C(22) + C(23) * IT
      40 PLSL(J) = C(24) + C(29) * IT
      45 APLS(J) = PLSL(J)
      50 APF3(J) = SF3(J)
      55 APF5(J) = SF5(J)
      60 APF6(J) = SF6(J)
      65 APF7(J) = SF7(J)
      70 APF8(J) = SF8(J)
      75 APF9(J) = SF9(J)
      80 APF10(J) = SF10(J)
      85 APF11(J) = SF11(J)
      90 APF12(J) = SF12(J)
     95 APF13(J) = SF13(J)
    100 APF14(J) = SF14(J)
    105 APF15(J) = SF15(J)
    110 APF16(J) = SF16(J)
    115 APF17(J) = SF17(J)
    120 APF18(J) = SF18(J)
    125 APF19(J) = SF19(J)
    130 APF20(J) = SF20(J)
    135 APF21(J) = SF21(J)
    140 APF22(J) = SF22(J)
    145 APF23(J) = SF23(J)
    150 APF24(J) = SF24(J)
    155 APF25(J) = SF25(J)
    160 APF26(J) = SF26(J)
    165 APF27(J) = SF27(J)
    170 DO 70 K=1,12
       75 VV = 1
      80 CONTINUE

56 DO 70 K=1,12
   85 KK = K**2
   90 CONTINUE

PAGE
2      ALOG10(0.04/1.1)  IJ
J1:  Y=10**(I-1)  + I1
PRINT 11, J1:  I1, A11
FORMAT(A3,F8.5)  I1  IJ
PRINT 6, IJ:  J2, IJ:  J3, IJ:  J4, IJ:  J5, IJ:  J6, IJ:
FORMAT(A3,F8.5)  IJ  I3  IJ:  J3, IJ:  J3, IJ:  J3, IJ:  J3, IJ:
FORMAT(A3,F8.5)  IJ  I4  IJ:  J4, IJ:  J4, IJ:  J4, IJ:  J4, IJ:
FORMAT(A3,F8.5)  IJ  I5  IJ:  J5, IJ:  J5, IJ:  J5, IJ:  J5, IJ:
FORMAT(A3,F8.5)  IJ  I6  IJ:  J6, IJ:  J6, IJ:  J6, IJ:  J6, IJ:
FORMAT(A3,F8.5)  IJ  I7  IJ:  J7, IJ:  J7, IJ:  J7, IJ:  J7, IJ:
FORMAT(A3,F8.5)  IJ  I8  IJ:  J8, IJ:  J8, IJ:  J8, IJ:  J8, IJ:
FORMAT(A3,F8.5)  IJ  I9  IJ:  J9, IJ:  J9, IJ:  J9, IJ:  J9, IJ:
FORMAT(A3,F8.5)  IJ  I10  IJ:  J10, IJ:  J10, IJ:  J10, IJ:  J10, IJ:
FORMA
SUBROUTINE JANUARY TRACE

PRINT 23, IYEAR
24 FORMAT(10H0,QPKW,D10.4,L3,/,I3,/)  
DO 24 KQ=1,14
   NYEAR=1957+KQ+IYEAR
26 PRINT 25,NYEAR, (DFKMD(KP,KQ), KP=1,12)
28 FORMAT(14,14,12(F10.3))
24 CONTINUE
PRINT 27, IYEAR
29 FORMAT(14,4,14*QPK, 12*NUN цена горячего погольства*),  
113,/)  
DO 29 M=1,14
   MYEAR=1957+MP+IYEAR
29 PRINT 28, MYEAR, (DFPKD(MP,MQ), MQ=1,14)
28 FORMAT(14,15,14*FF16.3))
31 PRINT 41, IYEAR
41 FORMAT(14,M, 5X,12*НУН цена горячего польского*),  
114,/)  
DO 42 NP=1,14
   PRINT 43, (DFPKD(NQ,NP), NQ=1,12)
39 FORMAT(14,12(F10.3))
31 CONTINUE
PRINT 44, IYEAR, (PKG(1M),IM=1,14)
44 FORMAT(14,12*PKG01(1M), IM=1,14)
44 PRINT 45, IYEAR, (PKG01(1M), IM=1,14)
44 PRINT 46, IYEAR, (PKG02(1M), IM=1,14)
44 PRINT 47, IYEAR, (PKG03(1M), IM=1,14)
44 PRINT 48, IYEAR, (PKG04(1M), IM=1,14)
44 PRINT 49, IYEAR, (PKG(1M), 5X,15, 4X, (4X,F15.2))
48 CONTINUE
DO 49 IM=1,14
   PRINT 30, IM, (PKPOP1(IM), IM=1,14)
31 CONTINUE
DO 50 I=1,14
   PKPOP1(IYEAR,I)= PKPOP1(I)
50 CONTINUE
DO 51 I=1,14
   PKPOP2(IYEAR,I)= PKPOP2(I)
51 CONTINUE
DO 52 I=1,14
   PKPOP3(IYEAR,I)= PKPOP3(I)
52 CONTINUE
DO 53 I=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
53 CONTINUE
DO 54 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
54 CONTINUE
DO 55 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
55 CONTINUE
DO 56 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
56 CONTINUE
DO 57 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
57 CONTINUE
DO 58 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
58 CONTINUE
DO 59 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
59 CONTINUE
DO 60 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
60 CONTINUE
DO 61 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
61 CONTINUE
DO 62 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
62 CONTINUE
DO 63 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
63 CONTINUE
DO 64 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
64 CONTINUE
DO 65 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
65 CONTINUE
DO 66 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
66 CONTINUE
DO 67 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
67 CONTINUE
DO 68 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
68 CONTINUE
DO 69 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
69 CONTINUE
DO 70 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
70 CONTINUE
DO 71 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
71 CONTINUE
DO 72 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
72 CONTINUE
DO 73 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
73 CONTINUE
DO 74 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
74 CONTINUE
DO 75 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
75 CONTINUE
DO 76 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
76 CONTINUE
DO 77 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
77 CONTINUE
DO 78 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
78 CONTINUE
DO 79 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
79 CONTINUE
DO 80 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
80 CONTINUE
DO 81 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
81 CONTINUE
DO 82 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
82 CONTINUE
DO 83 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
83 CONTINUE
DO 84 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
84 CONTINUE
DO 85 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
85 CONTINUE
DO 86 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
86 CONTINUE
DO 87 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
87 CONTINUE
DO 88 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
88 CONTINUE
DO 89 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
89 CONTINUE
DO 90 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
90 CONTINUE
DO 91 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
91 CONTINUE
DO 92 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
92 CONTINUE
DO 93 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
93 CONTINUE
DO 94 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
94 CONTINUE
DO 95 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
95 CONTINUE
DO 96 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
96 CONTINUE
DO 97 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
97 CONTINUE
DO 98 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
98 CONTINUE
DO 99 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
99 CONTINUE
DO 100 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
100 CONTINUE
DO 101 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
101 CONTINUE
DO 102 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
102 CONTINUE
DO 103 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
103 CONTINUE
DO 104 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
104 CONTINUE
DO 105 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
105 CONTINUE
DO 106 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
106 CONTINUE
DO 107 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
107 CONTINUE
DO 108 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
108 CONTINUE
DO 109 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
109 CONTINUE
DO 110 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
110 CONTINUE
DO 111 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
111 CONTINUE
DO 112 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
112 CONTINUE
DO 113 IM=1,14
   PKPOP4(IYEAR,I)= PKPOP4(I)
113 CONTINUE
DO 114 IM=1,14
SUBROUTINE JANUARY TRACE

PSFSI(IYEAR,K)= SFSC(K)
FHKMC(IYEAR,K)= GMHC(K)
PRINTPH(IYEAR,K)= PHC(K)

114 CONTINUE
GO TO 115, 314
PSFS1(IYEAR,L)= SFSL(L)
PSFS2(IYEAR,L)= SFSL2(L)
PSFS3(IYEAR,L)= SFSL3(L)
PSFS4(IYEAR,L)= SFSL4(L)
PPGSI(IYEAR,L)= PPGC(L)
PPGSL2(IYEAR,L)= PPGC2(L)
PPGSL3(IYEAR,L)= PPGC3(L)
PPGSL4(IYEAR,L)= PPGC4(L)
SFFP(IYEAR,L)= SFL(L)

115 CONTINUE
PRINT 308, IYEAR, (PSFS1(IYEAR,NX), NX=1,14)
PRINT 301, IYEAR, (PSFS2(IYEAR,NX), NX=1,14)
PRINT 312, IYEAR, (PSFS3(IYEAR,NX), NX=1,14)
PRINT 315, IYEAR, (PSFS4(IYEAR,NX), NX=1,14)

301 FORM(1,1,4), *SFSL*, 14, 7(2,LF14.2)/ 8X, 7(2,LF14.2)
302 FORM(1,1,4), *SFSL2*, 14, 7(2,LF14.2)/ 8X, 7(2,LF14.2)
303 FORM(1,1,4), *SFSL3*, 14, 7(2,LF14.2)/ 8X, 7(2,LF14.2)
304 FORM(1,1,4), *SFSL4*, 14, 7(2,LF14.2)/ 8X, 7(2,LF14.2)
PRINT 13, IYEAR, (PPGSL(IYEAR,NY), NY=1,14)
PRINT 14, IYEAR, (PPGSL2(IYEAR,NY), NY=1,14)
PRINT 15, IYEAR, (PPGSL3(IYEAR,NY), NY=1,14)
PRINT 16, IYEAR, (PPGSL4(IYEAR,NY), NY=1,14)
PRINT 17, IYEAR, (SFFP(IYEAR,NZ), NZ=1,14)
PRINT 18, IYEAR
DO 117 K=1,14
DO 116 L=1,12
QPKMD(L,IYEAR,K)= QPKMD(L,K)

116 CONTINUE
NYEAR = 1957 + K + IYEAR
PRINT 26, NYEAR, (QPKMD(LP,IYEAR,K), LP=1,12)

117 CONTINUE
RETURN
ENTRY JANLEG
DO 200 M=1,14
SFSL(M)= SFSC(M)
GMHC(M)= GMHC(M)

200 CONTINUE
DO 201 M=1,14
PFGSL(M)= PFGC(M)
PFGSL2(M)= PFGC2(M)
PFGSL3(M)= PFGC3(M)
PFGSL4(M)= PFGC4(M)
DO 202 M=1,14
DPGSL1(M)= DPGSC1(M)
DPGSL2(M)= DPGSC2(M)
DPGSL3(M)= DPGSC3(M)
DPGSL4(M)= DPGSC4(M)

202 CONTINUE
DO 203 M=1,14
DO 203 M=1,14
SUBROUTINE JANUARY TRACE
DSFKL(N,M) = DSFKC(N,M)
203 CONTINUE
RETURN
END
SUBROUTINE PRINTJ
COMMON/IMH1, IDATE, IYEAR, CONT
COMMON/PSF1(1,10,14), PSF2(1,14,14), PSF3(10,14,14)
5 COMMON/PRINT, PDPODF1(10,14), PDPODF2(10,14), PDPODF3(10,14),
1 PDPODF4(10,14), PH1(1,10,14), PH2(1,10,14), PH3(1,10,14),
2 PH4(1,10,14), PH5(1,10,14), PH6(1,10,14), PH7(1,10,14),
3 PH8(1,10,14), PH9(1,10,14), PH10(1,10,14), PH11(1,10,14),
4 PH12(1,10,14), PH13(1,10,14), PH14(1,10,14), PH15(1,10,14),
9 PPSG1(10,14), PPSG2(10,14), PPSG3(10,14), PPSG4(10,14)
10 PRINT 10
16 FORMAT(11,3X, *MODEL FOR GENERATING MONTHLY HOG PRICE FORECASTS F
120W*, /37X, *DECEMBER PIG CQOF REPORT AND SUPPLY-DEMAND EQUATIO
316X, *YEAR, 12X, 1HMSPK1-3/PFO, 9X, 1HMSPK4-6/PFO, 9X,
41HMSPK7-9/PFO, 9X, 13HMSPK11-12/PFO, 9X,
K= 10 15 J= I= 1,14
16 16 J= I= 1,14
20 K= 1500 J= K
25 PRINT 20, KK, PDPODF1(J,J), PDPODF2(J,J), PDPODF3(J,J),
1 PDPODF4(J,J)
20 FORMAT(14, 15X, 14, 5X, 4(F17.2, 3X))
16 CONTINUE
K= K+1
25 PRINT 17
17 FORMAT(140)
15 CONTINUE
16 FORMAT(40)
25 PRINT 25
25 FORMAT(11, 16X, *YEAR, 15X, SPMH1-3, 15X, SPMH4-6, 15X, SPMH7-9,
1 15X, 7PH13-12, 1X)
30 30 J= I= 1,14
35 J= I= 1,14
40 J= I= 1,14
J1= 0
45 J1= J1+1
J1= 1958 J= J1
35 PRINT 35, J1, PDPODF1(J1,J1), PDPODF2(J1,J1), PDPODF3(J1,J1),
30 PDPODF4(J1,J1)
45 CONTINUE
J1= J1+1
40 CONTINUE
45 PRINT 45
50 11= 0
55 11= 11
SUBROUTINE PRINTJ  TRACE

1   6HPGS6=13X, 7HPGS8=11,,//
00  58  I=1,14
00  51  J=1,JYEAR
LL=1956+J*11

60  PRINT 35, LL, PPGS1(J,I), PPGS2(J,I), PPGS3(J,I), PPGS4(J,I)
51  CONTINUE
   LI=LI+1
   PRINT 17
56  CONTINUE
   INDEX=0
   PRINT 65
   00  55  J=I,14
   00  57  J=J1,JYEAR
   JM=1956+J*INDEX
   PRINT 65, JM, (PPHMONT(K,J,I), K=1,6)
60  FORMAT(1H ,5X,14, 7X, 6(F15.2, 3X))
57  CONTINUE
   INDEX=INDEX+1
   PRINT 17
56  CONTINUE
   PRINT 65
   INDEX=INDEX+1
   DO 70  I=1,14
   70  DO 71  J=1,JYEAR
   JM=1956+J*INDEX
   PRINT 65, JM, (PPHMONT(K,J,I), K=7,12)
71  CONTINUE
   INDEX=INDEX+1
   PRINT 17
70  CONTINUE
   PRINT 75
   75  FORMAT(INKEY,4X, *YEAR*, 15X, 12H(QPK1/MKD1), 6X, 12H(QPK2/MKD2),
2   6X, 12H(QPK6/MKD6),//)
   M=M+1
95  DO 80  I=1,14
   80  DO 81  J=1,JYEAR
   MJ=1956+J*M
   PRINT 65, M, (QPK(K,J,I), K=1,6)
85  FORMAT(INKEY,4X, *YEAR*, 15X, 6(F15.2, 3X))
91  CONTINUE
   MK=M+1
   PRINT 17
80  CONTINUE
   PRINT 90
   90  FORMAT(INKEY,4X, *YEAR*, 13X, 12H(QPK7/MKD7), 6X, 12H(QPK8/MKD8),
1   6X, 12H(QPK9/MKD9), 6X, 14H(QPK10/MKD10), 5X,
2   14H(QPK11/MKD11), 5X, 14H(QPK12/MKD12),//)
   J=8
   DO 91  I=1,14
   91  DO 92  J=1,JYEAR
   MK=M+1
   PRINT 17
90  CONTINUE
   PRINT 90
   90  FORMAT(INKEY,4X, *YEAR*, 13X, 12H(QPK7/MKD7), 6X, 12H(QPK8/MKD8),
1   6X, 12H(QPK9/MKD9), 6X, 14H(QPK10/MKD10), 5X,
2   14H(QPK11/MKD11), 5X, 14H(QPK12/MKD12),//)
   J=8
   DO 91  I=1,14
   91  DO 92  J=1,JYEAR
   MK=M+1
   PRINT 17
90  CONTINUE
   PRINT 90
   90  FORMAT(INKEY,4X, *YEAR*, 13X, 12H(QPK7/MKD7), 6X, 12H(QPK8/MKD8),
1   6X, 12H(QPK9/MKD9), 6X, 14H(QPK10/MKD10), 5X,
2   14H(QPK11/MKD11), 5X, 14H(QPK12/MKD12),//)
   J=8
   DO 91  I=1,14
   91  DO 92  J=1,JYEAR
   MK=M+1
   PRINT 17
SUBROUTINE PRINTJ

JYR= 1958*J+J2
PRINT 35, JYR, I PJFKWD(L,J,1), L=7,12
92 CONTINUE
JE=J2+1
PRINT 17
91 CONTINUE
PRINT 95
120 LL=0
DO 96 I=1,14
DO 37 J=1,J1,1
LYR= 1954+J+LL
PRINT 98, LYR, SFST(J,1), GHT(J,J), PRINTFH(J,1), SFF(J,J),
37 CONTINUE
96 CONTINUE
PRINT 17
130 CONTINUE
RETURN
END