CHANGES IN THE SEASONAL PATTERNS OF MARKETINGS, PRICES, AND WEIGHTS OF FEEDER PIGS IN KENTUCKY

By

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INTRODUCTION

Production of feeder pigs has long been an important enterprise in Central and Northern Kentucky, the area included in this study. Several factors support this enterprise in the area: (1) feeder-pig production generally requires pasture in excess of other needs, and in Central Kentucky more than one half of the land is in pasture; (2) small grain crops are seeded in the fall and provide late fall and early spring pasture; (3) Central Kentucky is a grain-deficit area, and feeder pigs can be produced on a limited supply of concentrate feed; and (4) the feeder-pig enterprise is a flexible enterprise in that farmers can decide at any time after weaning age to sell feeders or to hold hogs to heavier weights depending on price and cost expectations.

Purposes of the Study

The present study is a continuation in part of earlier research by Rudd [4] on prices of feeder pigs. The objectives of the present study were: (1) to determine the seasonal patterns of feeder-pig prices and receipts at five Central Kentucky markets over the years 1949-62 and to determine if these patterns have changed from those found in the earlier study (1926-48), (2) to determine if shifts have occurred in the seasonal patterns of marketing and prices, to determine the underlying reasons for such changes, and (3) to determine the most profitable timing of feeder-pig purchases and slaughter-hog sales from the standpoint of seasonal price variation. Having knowledge of this type should enable producers of feeder pigs to time production, to the extent possible, to take advantage of normal seasonal patterns in prices.

Data and Time Period Used for Analyses

The data for this study were taken from the sales records of five Central Kentucky auction markets located at Danville, Lexington,

Winchester, and Paris[1] and serving most of Central Kentucky (Fig. 1). These markets are among the largest of the 21 auctions located in 18 towns in the Bluegrass area. Data were collected for the years 1949-62 on market receipts, weights, and prices.

Selection of markets was made on the basis of size and sales-day continuity. Size assures sufficient market receipts for continuous price quotations. This group of markets gives a complete set of sale days Monday through Friday each week which makes possible a continuous price reflection.

The price and market-receipt information was taken from the pen sheets of the auction companies along with the total pen weights of pigs. Information on 108,653 pen sales were obtained for use in the study. In the collection of these data all single lots (one head) and all pigs sold with sows were eliminated.

The chief limitation to these feeder-pig data is the lack of any measure of quality. In the editing of the data, all lots of pigs that seemed to be of low quality were eliminated. The measure of low quality was prices of $3.00 or more per hundredweight lower than other lots of pigs sold the same day at the same market and of approximately the same weight.

In addition, a top average weight per lot of feeder pigs was set at 159 pounds; consequently, all lots whose average weight was greater than 159 pounds were excluded since most of these hogs would go for slaughter.

The data series were combined for the five markets and summarized into monthly and annual series of prices and market receipts by 20-pound weight groups from 20 to 160 pounds for the combined markets. A price and market-receipts series for slaughter hogs was obtained on the same basis for three weight groups: 181-220; 181-199; and 200-220 pounds, to compare feeder-pig and slaughter-hog prices and receipts at the local level.

Evidence of the Emergence of a Feeder-Pig Industry in Kentucky

Buying and selling of feeder pigs have, until recently, been the result of short-term adjustments to changes in feed costs or changes in the financial position of the participant. A transformation toward a commercial feeder-pig industry based on the demands of a deliberate over-all business policy is now evident.

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[1]Livestock auction markets supplying sales data were: Boyle County Stockyards, Danville; Bluegrass Stockyards, Lexington; Clay-Gentry Stockyards (later operating as Clay-Wachs), Lexington; Farmers Sales Company, Winchester; and Bourbon County Stockyards, Paris.

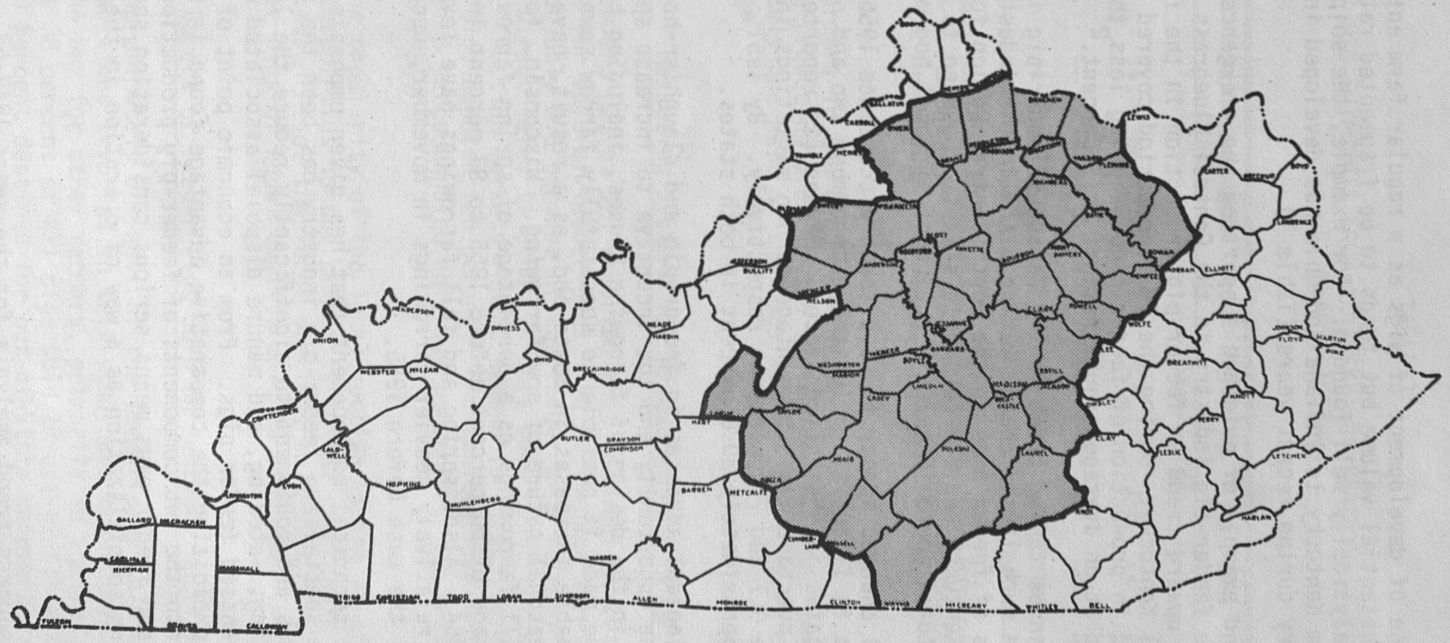

Fig. 1.—Approximate Market Supply Area of Five Central Kentucky Livestock Auction Markets

Evidence of development of pigs as a regular farm enterprise is available in substantial volume but tends to be fragmented rather than cohesive and analytically well founded. For example, the shipment of feeder pigs from Kentucky to Indiana and Ohio has developed into a substantial industry during recent years (Table 1).

A second example of evidence supporting the emergence of a distinct and viable feeder-pig industry in the Central Bluegrass area of Kentucky is the upward trend in feeder-pig production in the five market areas of Central Kentucky. During the 14-year period covered by this study, the trend in production of feeder pigs weighing less than 80 pounds increased at an average annual rate of 6.77 percent.[2]

The changes taking place in the Kentucky feeder-pig industry are only a part of a much larger change taking place in the industry in general. Purchases of feeder pigs in the North Central Region for 1956, which includes Kentucky and the corn-belt states, amounted to 7.4 million head and constituted approximately 10.2 percent of total hog marketings.

Radical changes appear to have taken place since 1956 as indicated by changes in Illinois and Indiana, the number two and number three hog-producing states in the United States. Gaydon [2] reported in 1956 that feeder-pig purchases as a percentage of hog marketings in Illinois and Indiana were 9.7 and 7.4 percent, respectively. By 1961, these proportions were approximately 20.0 percent in both states.

Technological advances in feeder-pig and slaughter-hog production have provided the opportunity and the incentive to increase specialization. Advances in the design of farrowing houses, including heating and ventilation, have made it possible to successfully farrow sows in winter without unreasonable increases in costs and, as a result, have cut down on the highly seasonal nature of sow farrowing. Wisconsin, for example, has increased fall farrowings as a percentage of spring farrowings from a long-term average of 50 percent before 1955 to 83 percent in 1960 and 85 percent in 1964. Also, spring and fall farrowings have leveled out by months, with relatively heavier farrowings in November, December and January than was the case before 1955.

Another technical advancement that has given emphasis to the development of a specialized feeder-pig industry has been the development of techniques and equipment to significantly reduce the labor involved in feeding, watering, and manure disposal associated with the finishing of purchased feeder pigs. From an economic point of view, the desirability of exploiting the comparative advantage found in separating hog production into the two components of feeder-pig production and finishing purchased feeder pigs means serious consideration should be given to accepting specialization as a way of operation in the hog business.

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[2]Based on least squares trend analysis for the years 1947-62.

TABLE 1

FEEDER PIG SHIPMENTS FROM KENTUCKY, BY STATE OF DESTINATION, BY YEARS, 1957-64

State	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967
	thousands of head										
Indiana	14	48	73	81	99	161	146	147	130	162	240
Ohio	--	--	--	56	47	44	44	39	58	56	74
Total	14	48	73	137	146	205	190	186	188	218	314

Sources: Indiana: Indiana State-Federal Crop and Livestock Reporting Service.
Ohio: "Shipment of Feeder Pigs into Ohio," Ohio Crop Reporting Service, Ohio Department of Agriculture, Division of Animal Industry.

Farmers in the Central Kentucky area, which is the principal feeder-pig producing area in the state, sold 413,000 head of hogs in 1964. Approximately one half of the hogs sold in the Central Kentucky area are feeder pigs.

Marketing Systems for Kentucky Feeder Pigs

Newberg [3, p. 52] reported that terminal markets are of little importance for sale of feeder pigs. Sales through terminal markets accounted for only 0.8 percent of the feeder pigs sold by Kentucky farmers in 1956. Direct sales to other farmers made up 55 percent of the feeder-pig sales. Auction markets ranked second to direct farm sales in percentage of feeder pigs handled (26 percent) and dealers ranked third (15 percent). Concentration yards handled only 1.3 percent of the feeder pigs sold by farmers in 1956.

The popularity of the local auction market as an outlet for Kentucky feeder pigs is due primarily to the geographic convenience of these markets. Also, the local auctions sell pigs on a pen-lot basis with feeder pigs of equal quality sold in each lot.

Buyers of Feeder Pigs Sold on Kentucky Auctions

Approximately one-half of the feeder pigs sold on the five Central Kentucky auctions involved in this study are transported out of the state. Dealers who buy for other farmers, primarily in Indiana, Ohio, and Illinois, take about 30 percent of all pigs sold to out-of-state feeders. The remaining 20 percent destined for out-of-state shipment are taken by corn-belt farmers for their own farm enterprise. A significant market for Kentucky feeder pigs to be used by serum companies producing hog-cholera serum

existed up until the early 1950's. However, changes in serum technology and the development of cholera-free states have reduced the total number of feeder pigs required for this purpose. Also, some serum companies prefer to raise their own pigs rather than compete in the market for feeder pigs. Intrastate sales of feeder pigs from the Central Bluegrass market go mainly to garbage feeders in the Louisville area. Local farmers buy only a negligible number of feeders from these markets each year.

The Market Class of Feeder Pigs

Feeder pigs can be segregated as a market class of livestock primarily in that they lack the weight and quality of finish associated with slaughter hogs. Therefore, feeder pigs are pigs that can economically take on additional weight and finish.

Slaughter hogs are separated from feeder pigs on the basis of weight in U.S.D.A. Market News Service publications. Generally, barrows and gilts weighing less than 120 pounds are considered feeder pigs. However, this weight division is often overlooked and at various times swine up to 180 pounds are referred to as feeder pigs. Historically, there appears to be no distinct line between feeder pigs and slaughter hogs because sometimes barrows and gilts in the 140-160 pound class find use for immediate slaughter and occasionally hogs above 160 pounds are held for more feeding.

For the purposes of this study the division between feeder pigs and slaughter hogs has been set at 160 pounds. The break between the two categories of swine is arbitrary but follows the precedent set earlier in research by Rudd [4] in the field of feeder-pig price determination.

SEASONAL PRICE VARIATIONS IN FEEDER PIGS

The problem of when to market livestock is an important decision confronting the producer. An error in judgment in the timing of marketings by the farmer can mean the difference between profit and loss. The measurement of seasonal variation in prices offers useful assistance to the producer in this problem.

The average seasonal index of prices received for feeder pigs on the five Central Kentucky auctions during 1949-1962 reached a high of 115 percent during April and declined about 18 percent, on the average, to a seasonal low of 94 percent for the months of July, November, and December[3]

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[3]Seasonal variation in prices has been separated out by use of a ratio of prices to 12-month moving average, centered and adjusted. The years 1949-62 were used, yielding indices for 1950-61. However, due to the shift in the seasonal index during the period 1949-53, these years were left out of the final index for this study. An index covering the

(Fig. 2). However, July is the more consistent low month in price of feeder pigs. A seasonal index for a month measures the percentage that prices for that month are of the average price for the entire year. A seasonal index for April of 115 percent, for example, would indicate that during April prices averaged 15 percent above the average price received for the entire year. A monthly index of 100 means that the price for that month was the same as the average for the year.

Stability in seasonal price patterns can also be measured by the relative variability of the index for individual months. The coefficient of variation of the individual annual seasonal indices indicates the amount of variation of the monthly indices from year to year. A relative variability of 2 percent for April means that in two years out of three the relative price will be the same as indicated by the index, plus or minus 2 percent (Appendix, Table 1).

The seasonal index calculated for an earlier period of years (1926-48) using the same five Kentucky auctions as a source of data shows a seasonal high price reached in July and a seasonal low price in December. A substantial change has taken place in the seasonal price patterns for feeder pigs since 1948.

Seasonal Price Variation of Feeder Pigs with Rising and Falling Farm-Product Price Levels

A comparison was made of the seasonal price movements of feeder pigs for the years in which the price of all farm products[4] rose or declined by at least 10 percent for the years 1949-62. The average seasonal price index during the three years of increasing farm-product prices (1950, 1951, 1958) reached a high of 110 percent during July and declined about 19 percent, on the average, to a seasonal low of 89 percent for the month of December (Fig. 3).

The seasonal variability of prices for the years of rising farm-product prices was only one percent greater than the average price variability of all feeder pigs under 160 pounds for the entire period 1954-62.

During the four years of falling farm-product prices (1952, 1953, 1955, 1959), the average seasonal price index was highest in May at 116 percent of the yearly average price (Fig. 3). The seasonal low occurred in December when the price index equaled 88 percent of the yearly average price. The seasonal change of 24 percent, on the average, was about 6 percent greater than the average price variability of all feeder pigs over the entire period.

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years 1954-61 was found to be representative of the actual seasonal movement of feeder-pig prices. Seasonal variation in market receipts of feeder pigs was isolated by the same method using 1949-62 inclusive.

[4]Changes in the price of all farm products were measured by the *Index of Wholesale Prices of Farm Products (1910-14 = 100)* [6].

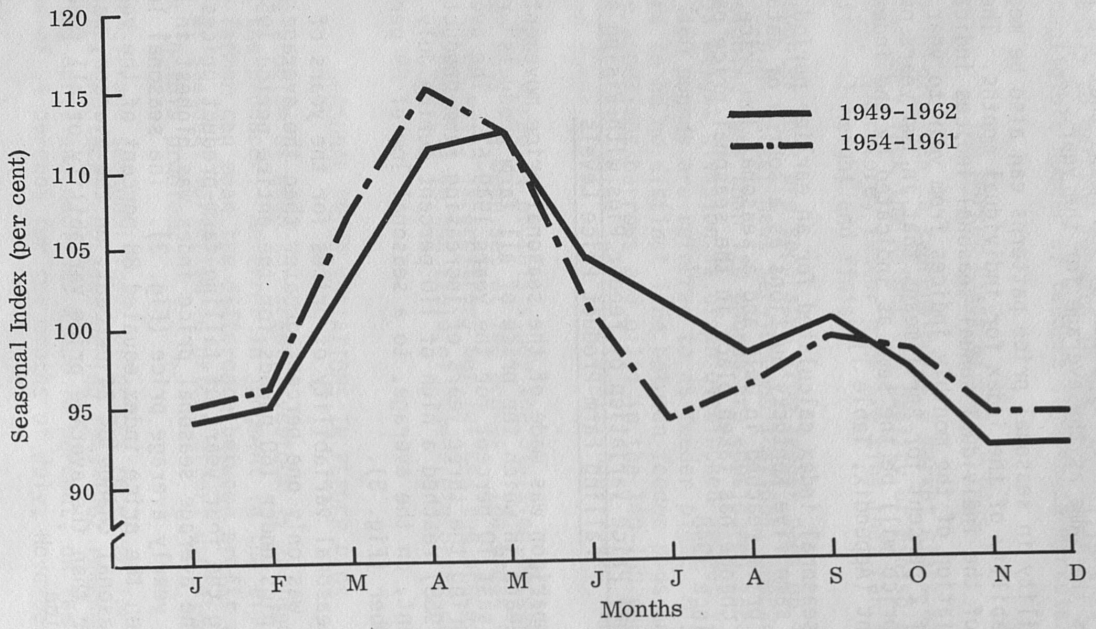

Fig. 2.--Comparison of Average Seasonal Index of Prices of Feeder Pigs under 160 pounds at Five Kentucky Auction Markets, 1949-62, with 1954-61.

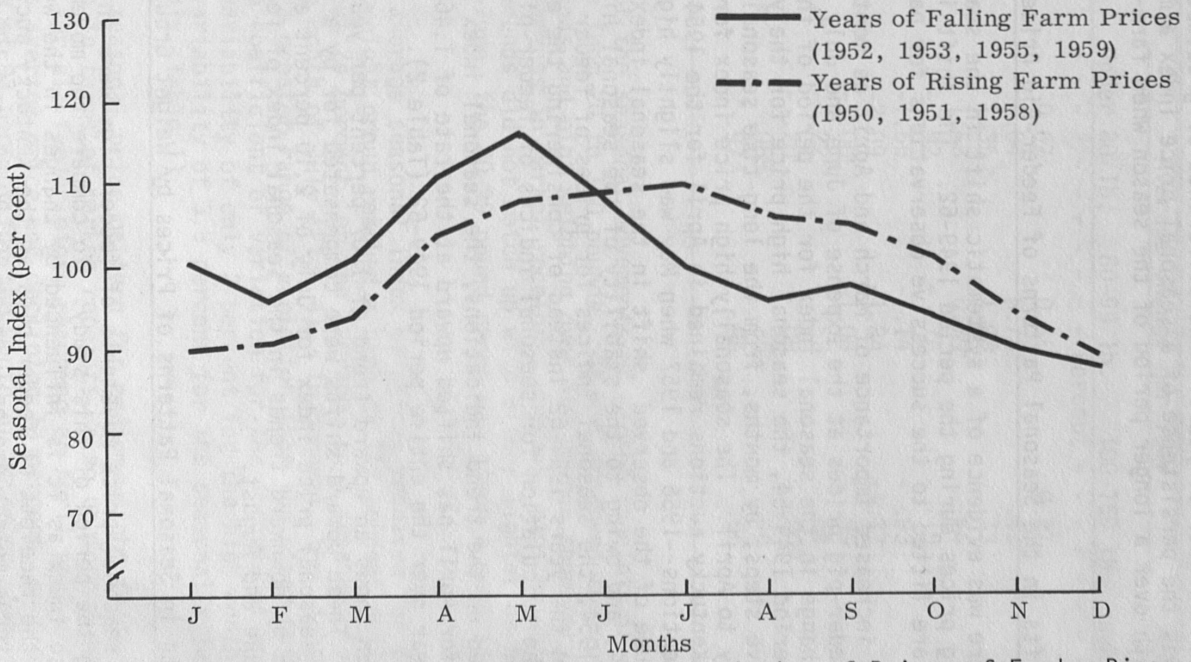

Fig. 3.--Comparison of Index of Seasonal Variation of Prices of Feeder Pigs under 160 pounds under Conditions of Rising and Falling Farm-Product Prices, Five Kentucky Auctions.

The differences in seasonal price patterns between years of rising and falling farm-product prices are located in differences in the size of the peak price index. An explanation of this difference is that (deflated) prices of feeder pigs average lower during years of falling farm-product prices, but the range in seasonal variation in deflated dollars was about equal for the two sets of years. The difference of greatest significance, therefore, was the persistence of a seasonal price index almost equal to the peak month over a longer period of the season when farm-product prices were rising.

Shifts in the Seasonal Patterns of Feeder-Pig Prices

There was evidence of a systematic shift in the seasonal movement of feeder-pig prices during the period 1949-62. The shift is descernible when trends are fitted to the successive observations for particular months.

The increased importance of March and April as months of seasonally high feeder-pig prices at the expense of June and July is the most pronounced change in the seasonal index for the period of this study. During the period 1949-54, the seasonal high price for the year changed in progressive steps, by months, from the long-time seasonally high month of July to April. The seasonally high price index for feeder pigs at the five Kentucky auctions remained in April for the 1954-62 period with only two exceptions--1956 and 1957 when May was slightly higher than April. Because of the observed shift in the seasonal index between 1949 and 1954, and owing to the stability of the seasonal high price index since 1954, the seasonal indices for prices of feeder pigs have been based on the years 1954-62 instead of considering the entire period 1949-62 in the calculation for seasonal indices of feeder-pig prices.

Based on the trend indications, the seasonal index of prices of feeder pigs for April has shifted upward at the rate of 1.46 percentage points per year over the entire period 1949-62 (Table 2).

March shows an upward trend of 1.07 percent per year for the same period. These upward shifts were compensated for by a downward trend in the seasonal price index for July of 2.10 percent and to a lesser extent by downward trends in the seasonal index of feeder-pig prices for June and August.

Shifts in Seasonal Patterns of Prices by Weight Groups

The seasonal price movements of feeder pigs were influenced by weight during the period of this study. To compare the movements of the seasonal price index as it is influenced by changes in the weight of feeder pigs, the receipts of feeder pigs at the Kentucky auctions were divided into three weight groups: under 80; 80-99; and 100-159 pounds. These groups will be referred to respectively as lightweight, medium-weight, and heavy feeder pigs. The basis for these divisions was a

TABLE 2

AVERAGE ANNUAL CHANGE OF SEASONAL PATTERN OF AVERAGE PRICE OF FEEDER PIGS, BY WEIGHT GROUPS, KENTUCKY AUCTION MARKETS, 1949-62

Month	Average Change per Year			Average of All Pigs under 160 lb.
	Under 80 lb.	80-99 lb.	100-159 lb.	
	- - - - - - - - - - - - Percent - - - - - - - - - - - -			
January	0.67	0.65	0.27	0.36
February	1.04	0.75	.43	.61
March	1.35	1.08	.73	1.07
April	1.53	0.79	.64	1.46
May	- .92	- .78	- .19	- .16
June	-1.55	-1.14	- .83	-1.21
July	-2.09	-1.84	-1.77	-2.10
August	-1.00	-1.08	- .99	-1.14
September	- .22	- .52	- .44	- .45
October	- .20	.09	- .009	- .10
November	.068	.26	.46	.19
December	.97	.96	.65	.74

comparison of the seasonal movements of market receipts in each 20-pound weight group from 20 to 160 pounds. It was observed that pigs weighing under 80 pounds and pigs weighing over 100 pounds show very uniform seasonal movements in market receipts; whereas, pigs weighing between 80 and 100 pounds did not match up with either lighter or heavier feeder pigs. Therefore, the 80-99 pound group was given a separate classification.

The average seasonal index of prices received for feeder pigs in the lightweight group reached a high of 119 percent during April and declined about 24 percent, on the average, to a seasonal low of 90 percent for the month of July (Fig. 4). In general, the lightweight feeder pigs showed a greater range of variation than the other weight groups. However, the coefficient of variation for the individual months reveals a relative variability of only 2 percent for the high month of April and a relative variability of 3.5 percent for the seasonally low month of July (Appendix, Table 1).

The seasonal price pattern for medium-weight feeders, the smallest weight group in terms of market receipts, also conformed quite closely to the average for all feeder pigs, reaching an April peak of 116 percent of the season's average price and declining 18 percent, on the average, to a seasonal low of 93 percent for the month of November (Fig. 4). Variability of the medium-weight group equaled the variability found for all feeder pigs. The coefficient of variability for the high month was 2.5 percent and for November, the seasonally low month, the coefficient equaled 4.0 percent (Appendix, Table 1).

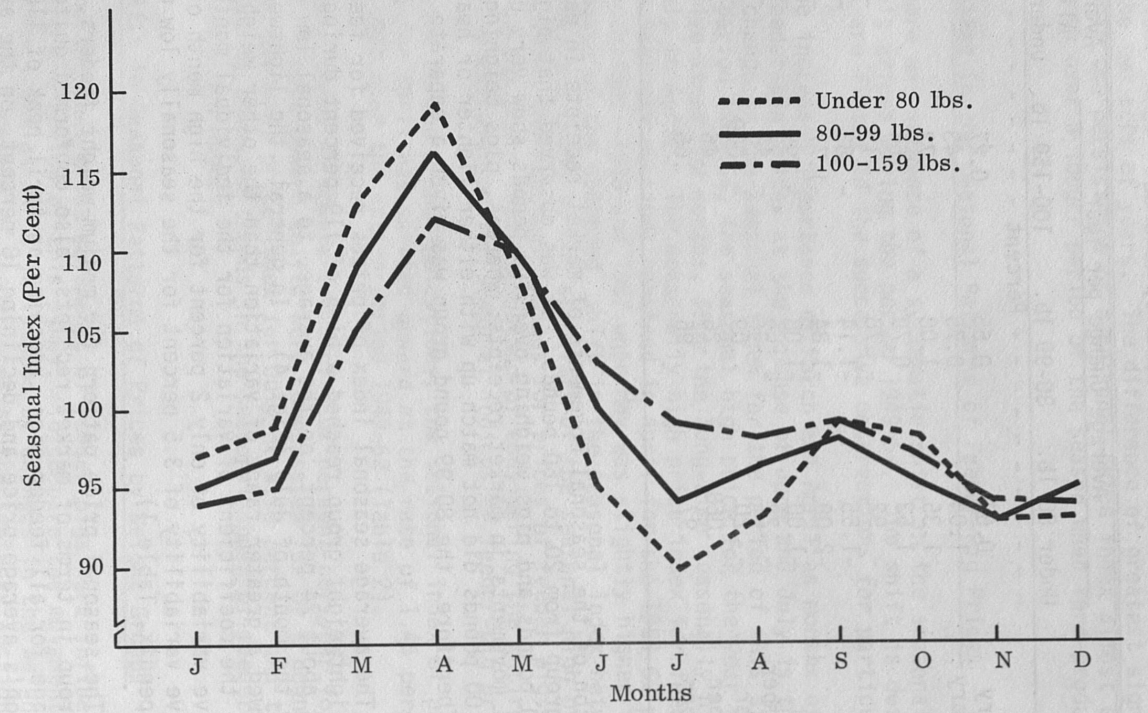

Fig. 4.--Average Seasonal Index of Prices of Feeder Pigs, by Weight Groups, at Five Kentucky Auction Markets, 1954-62.

For heavyweight feeder pigs the price pattern resembled the movement found in the other two groups. The range of seasonal price variation for heavy feeders showed a range of only 16 percent, on the average, which was 2 percent less than the average range of variation found for all feeder pigs under 160 pounds. The characteristic seasonal peak price came in April, but the low for the year extended from November to January (Fig. 4).

Reasons Underlying Changes in Seasonal Prices for Feeder Pigs

The principal cause of the change in the seasonal index of prices for feeder pigs can be found in observing that the lightweight feeders, under 80 pounds, make up an increasing percentage of all feeder pigs used in this study. In 1962, lightweight feeder pigs made up 72 percent of the total number of feeder pigs marketed at the five Central Kentucky auctions which supplied data for this analysis. This is in contrast with the 27 percent represented by pigs under 80 pounds in weight in 1949. Lightweight feeder pigs characteristically reach a seasonal peak price in the spring months. A study covering the years 1926-48 reveals that lightweight feeder pigs reached a seasonal high price in May compared with the seasonal high for April in the current study. Also, the seasonal low in market receipts for lightweight pigs is in March--only a month before the seasonally high price.

On the demand side, farmers are anxious to buy the lightweight feeder pigs in early spring so that there will be time enough to fatten these pigs for sale as slaughter hogs in July. The month of July is the seasonally high month for slaughter-hog prices, as measured by the seasonal price index for the Kentucky auctions and for seven Midwest terminal markets.[5]

The medium-weight and heavyweight pigs also show a seasonal low in market receipts for the spring months. For the medium-weight feeder pigs, the seasonal low occurs in April with May almost as low. The heavyweight feeders show a seasonal low in market receipts in May and June.

Demand again influences the prices of the two heavier-weight groups of feeder pigs, causing the seasonal price peak in April. Farmers are willing to buy the medium or heavy feeders in the spring either to supplement or in place of the lightweight feeders. When heavy feeders are bought, they are not pushed to gain weight as fast as the lighter feeder pigs and, therefore, are placed on the market in June or july at nearly the same weight as the lighter feeder pigs which have been pushed to faster weight gains.

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[5]A seasonal price index was calculated for barrows and gilts weighing 200-220 pounds at the following market locations: South St. Paul, Minnesota; Chicago, Illinois; Omaha, Nebraska; Sioux City, Iowa; East St. Louis N.S.Y., Illinois; Indianapolis, Indiana; and Cincinnati, Ohio.

Seasonal Price Movements at Kentucky Auctions and at South St. Paul

There are very little data available for a geographic comparison of feeder-pig prices. However, South St. Paul, Minn., an important central market for feeder pigs,[6] does make price quotations available and these have been used with Kentucky prices as a comparison.

The seasonal price movements in the two markets were not very similar (Fig. 5). The primary reason for this dissimilarity is that the feeder pigs making up the Kentucky seasonal price index are heavily weighted with lightweight feeder pigs weighing less than 80 pounds; whereas the feeder pigs which form the basis for the South St. Paul seasonal price index fall into two groups: (1) a group made up exclusively of good and choice feeder pigs weighing 70-120 pounds for the years 1949-May 1956, and (2) a group made up of good and choice pigs of all weights up to 180 pounds for the period from June 1956 to December 1962.

The seasonal index of feeder-pig prices for South St. Paul, Minnesota, shows much more similarity to slaughter-hog seasonal price movements than to the general movements of the seasonal index of price for Kentucky feeder pigs.

Seasonal Prices for Feeder Pigs and Central Market Prices for Slaughter Hogs

The seasonal pattern of prices of slaughter hogs at the Kentucky auctions coincides almost exactly with the seasonal price index for slaughter hogs at Chicago. Both indices show a seasonal high in July and a seasonal low in November (Fig. 6). However, the seasonal index of price of feeder pigs would not be expected to show such a close relationship in a comparison with the seasonal movement of slaughter-hog prices at a central market. The logical basis for this comparison is that the majority of feeder pigs are bought to be fed out and sold as slaughter hogs. The Chicago market was chosen to represent a large terminal market for slaughter hogs, thereby assuring adequate market receipts for price quotations.[7] The average variability of the two seasonal price indices is similar, with the feeder-pig price showing only

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[6]The feeder-pig price series for the South St. Paul market consisted of the prices of feeder pigs as reported by the Market News Service, U.S. Department of Agriculture [5]. These are estimated prices based on the reporter's judgment and observations on the market on each sale day and averaged to form a monthly series.

[7]The price series used was from barrows and gilts, 200-220-pound purchases, on the Chicago market. Seasonal indices were calculated for 1949-62.

Fig. 5.--Comparison of Seasonal Index of Prices of Feeder Pigs at Five Kentucky Auctions and South St. Paul, Minn., 1954-62.

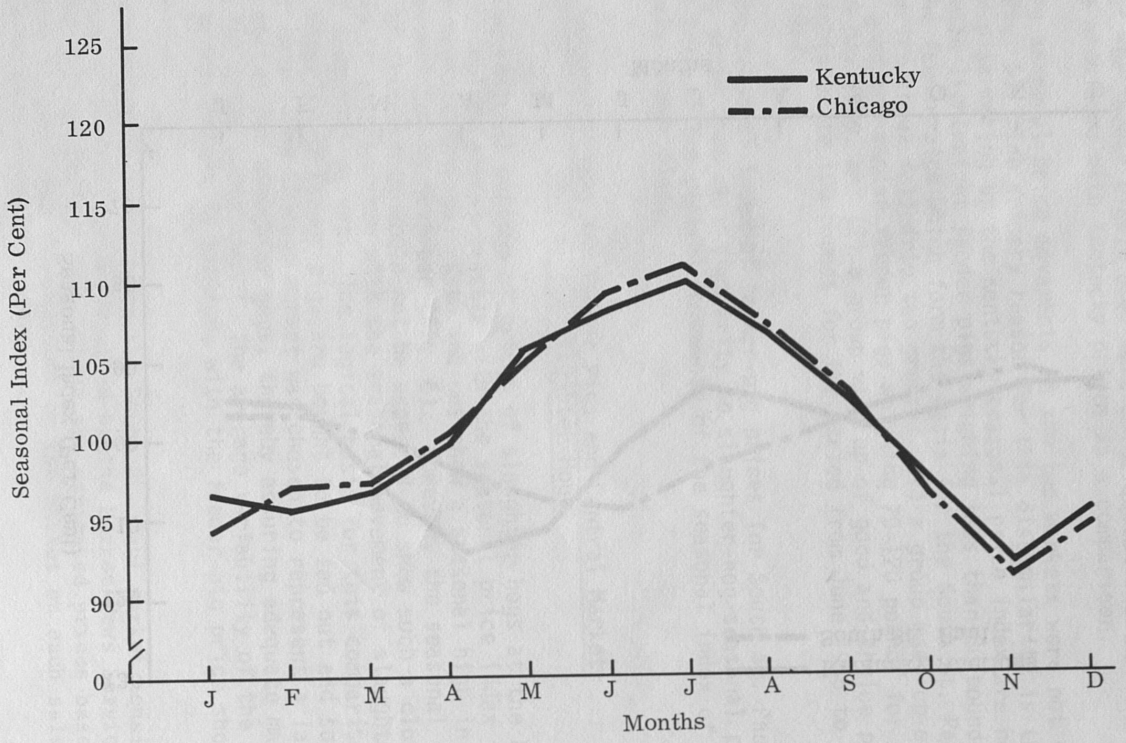

Fig. 6.--Average Seasonal Index of Slaughter-Hog Prices (200-220 lb) at Five Central Kentucky Auctions Compared with Chicago, 1949-62.

slightly more seasonal variability than the slaughter-hog price index (Fig. 7). However, a comparison of the seasonal high and low reveals very little similarity between the two seasonal price indices.

The differences between the seasonal movement of feeder-pig and slaughter-hog prices are explained primarily by a difference in the seasonal indices of market receipts and the difference in the use of the two classes of swine--one for further feeding and the other for immediate slaughter. In general, the seasonal peak in slaughter-hog price in July is associated with a relatively small volume of market receipts, while the seasonal low price occurs during the period of high volume of hog marketings. Market receipts of feeder pigs reach a low seasonally in February and March and the peak in the seasonal price index comes in the next month, April. The demand for feeder pigs increases in April because buyers are planning to sell their slaughter hogs on the July market when the price of slaughter hogs is seasonally highest. Also, since corn is no longer as important from the standpoint of total cost[8] of feeding out pigs as it used to be, farmers no longer wait to get some idea of the size of the new corn crop before buying spring feeder pigs. The seasonal low in feeder-pig prices in July corresponds with the seasonal high in market receipts. The secondary seasonal increase in the price of feeder pigs in September and October corresponds to the period when farmers wish to purchase feeder pigs to consume the soft corn left in the fields following the picking operation. The seasonal price increase in September and October is dampened somewhat by seasonal increases in market receipts of feeder pigs in October and November.

Seasonal Feeder-Pig Market Receipts Movements

Much of the seasonal variation in the price of feeder pigs is associated with seasonal change in the number of feeders coming to market. Seasonal variation in market receipts of feeder pigs at the Kentucky auctions was determined by the same method used to isolate seasonal variation in price for the years 1949-62.

The market receipts of feeder pigs at the Kentucky auctions showed a little more variation than the seasonal price index. The seasonal price index varied from a high of 115 percent of the season's average price to a low of 94 percent. The range of variation in market receipts was from a high of 118 percent of the season's average market receipts for July to a low of 80 percent for February and March. The range of variation in market receipts was equal to 32 percent, on the average, compared with 18 percent for feeder-pig prices.

Measured by the coefficient of variation for the individual months, the month of highest seasonal market receipts was much more variable than

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[8]Blosser [1] reported that corn accounted for approximately 61 percent of the total cost of producing hogs in 1925-30 in West Central Ohio, compared with 47 percent in 1965.

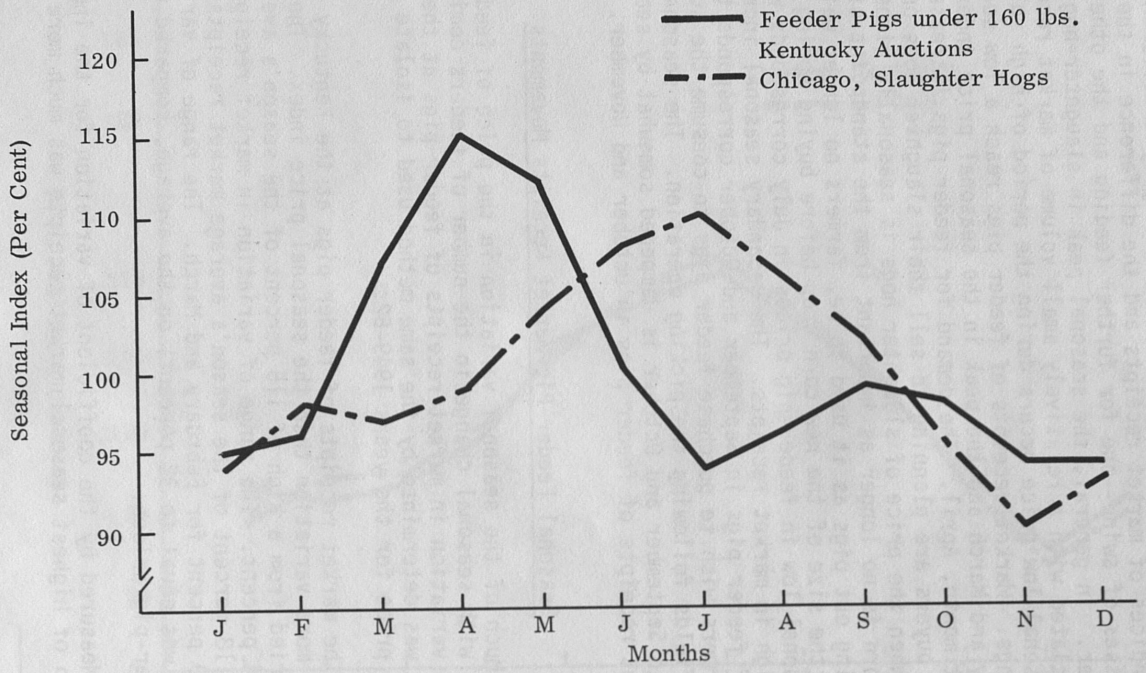

Fig. 7.--Average Seasonal Index of Feeder-Pig Prices (1954-62) at Five Kentucky Auctions Compared with Slaughter-Hog Prices, Chicago, 1949-62.

the seasonally high month for feeder-pig prices. The relative variability of 11 percent for July--the month of highest seasonal market receipts--is not so large as for some other months in the same series but is considerably greater than the 2-percent relative variability associated with April--the month of highest seasonal price of feeder pigs (Appendix, Table 1).

The principal characteristics of the seasonal index of market receipts of feeder pigs were: (1) the seasonal low came in February and March--a two-month period just prior to the seasonal high in feeder-pig prices in April; and (2) the seasonal high in feeder-pig receipts occurred in July which corresponds with the seasonal low in feeder-pig prices which also occurred in July (Fig. 8). However, a second peak in seasonal feeder-pig receipts occurred in October. The bulk of the feeder pigs sold in October were in the lightweight and heavyweight classifications. The majority of the medium-weight pigs were sold in July. An explanation for the predominance of lightweight pigs in the October sales is that corn-belt producers are in a position to know the volume of their corn harvest and are buying feeder pigs in line with their needs in utilizing the corn crop. The corn-belt farmer is especially interested in pigs weighing between 40 to 65 pounds to turn into the corn fields after harvest.

The explanation for occurrence of the seasonal high in market receipts for heavyweight feeders in October is that feed supplies on farms are known by October, and farmers who have been running feeder pigs on pasture determine how many pigs they will be able to fatten on their available feed supplies and market the remainder. Also, by October, pasture has begun to fail and the problem of housing pigs for winter becomes important.

Seasonal Market Receipts of Feeder Pigs and Slaughter Hogs

A comparison of the seasonal movement of market receipts of feeder pigs at Kentucky auction markets with market receipts of slaughter hogs at Chicago reveals that the range in seasonal variation is 9 percent greater, on the average, for the Chicago slaughter-hog market than for the Kentucky feeder-pig markets (Figs. 8 and 9). The seasonal index of receipts of slaughter hogs at Chicago had a range of 41 percent, on the average, for the period 1949-62 compared with a range of seasonal variation of 32 percent, on the average, for market receipts of feeder pigs during this same period. However, a comparison of monthly variation shows that there is very little difference between the two groups. The expected relationship would be that the central market should show considerably less variation in seasonal movement than the local auction markets.

The difference in months of highest and lowest market receipts for the year between the Kentucky feeder-pig market and the Chicago slaughter-hog market is easily seen by comparing Fig. 8 with Fig. 9. Contrasted with the July and October peaks in receipt of feeder pigs, slaughter hogs reached a peak volume in December and fell very rapidly to a spring low in February. The smallest number of receipts of slaughter hogs at Chicago occurred in August. Feeder-pig receipts were

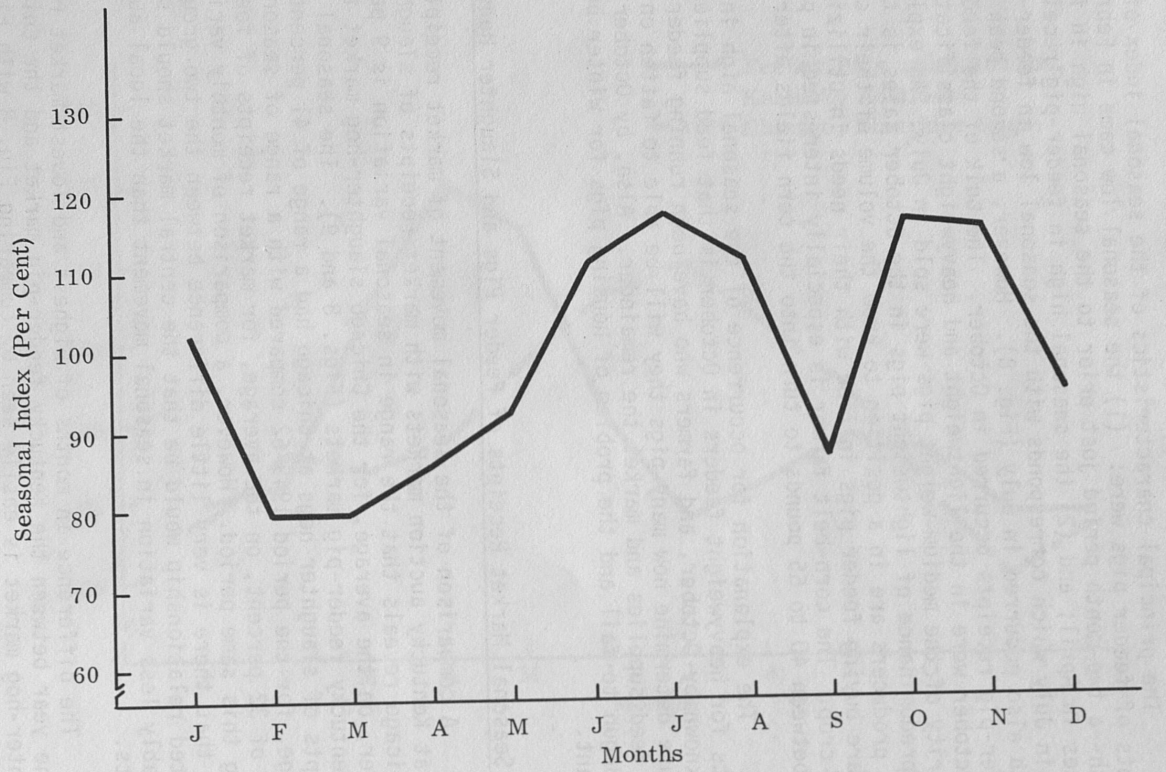

Fig. 8.--Seasonal Index: Receipts of Feeder Pigs (under 160 lb.) at Five Kentucky Auctions, 1949-62.

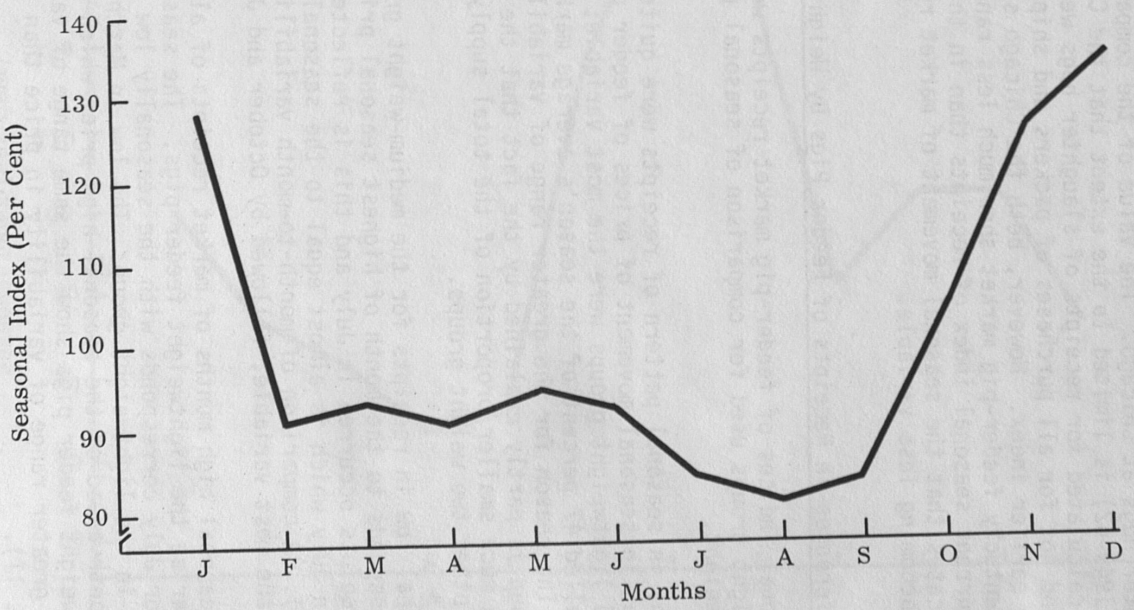

Fig. 9.--Seasonal Index: Receipt of Slaughter Hogs at Chicago (1949-62).

lowest in February and March. The significance of this comparison is that some indication of the stability of the Kentucky feeder-pig market can be gained by comparing the local feeder-pig market with the large central slaughter-hog market. A historical comparison of these same two markets by Rudd [4] showed that the range of seasonal variation for feeder-pig receipts was about 30 percent greater than the range of seasonal variation for slaughter hogs at Chicago. The value of the comparison for the current period (1949-62) is limited to the extent that the Chicago seasonal index was calculated for receipts of slaughter hogs weighing between 200-220 pounds and not for all purchases of packers and shippers as was the case for the earlier index. However, both the Chicago slaughter-hog market and the Kentucky feeder-pig market show much less range of variability in the current seasonal index of receipts than in the earlier study which indicates that the seasonal movement of market receipts in both markets is becoming less variable.

Seasonal Differences in Receipts of Feeder Pigs by Weight Groups

The seasonal indices of feeder-pig market receipts were divided into the same weight groups used for comparison of seasonal price changes associated with weight.

Variations in seasonal pattern of receipts were quite different from the variation in seasonal movement of prices of feeder pigs. The medium-weight and lightweight groups were the most variable; the range of variation equalled 47 percent of the season's average market receipts for each group. The reason for the greater range of variability in the medium-weight group is partly explained by the fact that the medium weights make up a much smaller proportion of the total supply of feeder pigs than do the other two weight groups.

The seasonal low in receipts for the medium-weight group came in April, which corresponds to the month of highest seasonal price. The peak volume of receipts occurred in July and this is reflected in a seasonal low price in July which is almost equal to the seasonal low in November (Fig. 10). A comparison of month-to-month variability shows that December is the most variable, followed by October and July.

The two seasonal high months of market receipts of almost equal magnitude characterize the lightweight feeder pigs. The seasonal high in market receipts for July corresponds with the seasonally low month for feeder-pig prices in the lightweight group. The low in March for market receipts is one month ahead of the seasonal high price which occurs in April. The lightweight feeder pigs show the same range of variability in receipts but a greater range of variability in price than the medium-weight group (Fig. 11).

The seasonal movements of market receipts of heavyweight feeders reveal a low of 85 percent during May and June and a high of 117 percent in October. The range of seasonal movement was 27 percent, on the average,

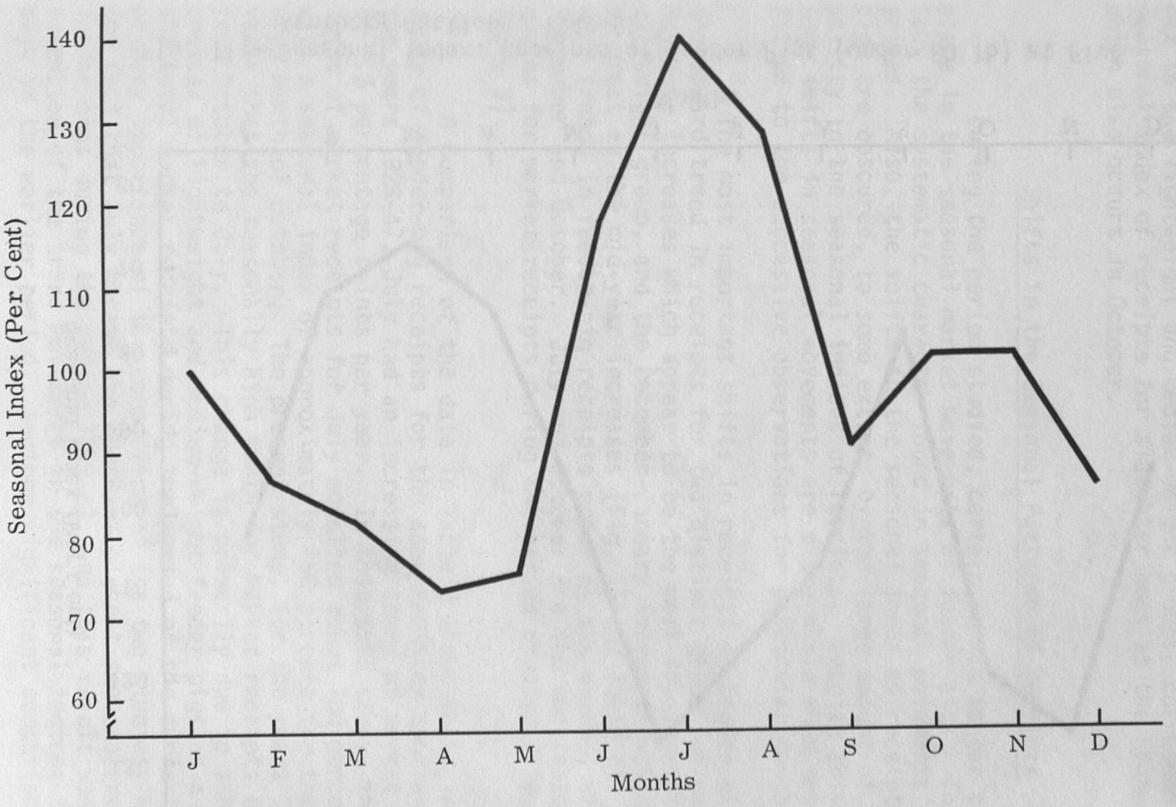

Fig. 10.--Seasonal Index: Receipts of Feeder Pigs (80-99 lb.) at Five Kentucky Auctions, 1949-62.

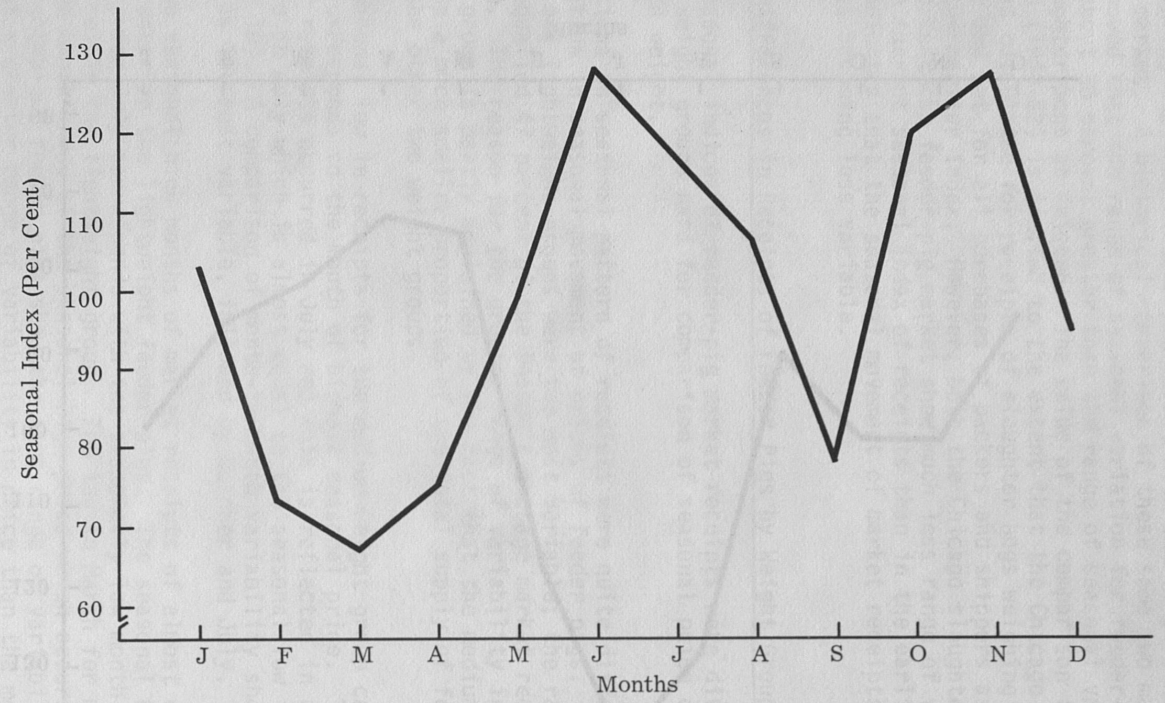

Fig. 11.--Seasonal Index: Receipts of Feeder Pigs (under 80 lb) at Five Kentucky Auctions, 1949-62.

which was less than the other two weight groups and also less than the average seasonal variability for all feeder pig receipts under 160 pounds. Heavyweight feeder pigs show a seasonal rise in receipts in March and April, which is characteristic of the April and May seasonal high in slaughter-hog receipts (Fig. 12 and 13). Also, the seasonally high index of receipts in October, in contrast with the July high index in the lightweight and medium-weight groups, corresponds to the high seasonal index of receipts for slaughter hogs at the Kentucky auctions which also occurs in October.

Shifts in the Seasonal Patterns of Receipts

During the period studied, certain shifts appear to have taken place in the seasonal market movements of feeder pigs. These shifts lack the systematic character found in seasonal movements of feeder-pig prices. Also, the shifts in the seasonal index of receipts of feeder pigs are obscured, to some extent, by the large amount of variability in the seasonal indices of receipts. Despite this difficulty, some shifts in seasonal movements are discernible when trends are fitted to the successive observations for particular months.[9]

The most important shifts in receipts of feeder pigs have been the upward trend in receipts for two distinct groups of months--the May-June increases which appear to be the most important in the overall weight group, and the December-January increases which are nearly as great as the mid-year increases (Fig. 14 and Table 3). These upward trends in feeder-pig receipts occur at the expense of July, August, September and October. July and October are the two seasonally high months for market receipts during the period studied (Fig. 15 and Table 3).

A comparison of the data in Table 3 shows that, in an earlier study of feeder-pig receipts for the same Kentucky auctions covering the years 1928-47, July had an increasing trend of market receipts equal to 2.3 percentage points per year. In this same study, the seasonal index of market receipts for July equalled about 100 percent compared with a seasonal index of approximately 150 percent for the seasonally high month of October. The present study, for the years 1949-62, reveals that the seasonally high month for market receipts has changed from October to July. This change is primarily due to substantial increases of lightweight and medium-weight feeder pigs as a proportion of the total market receipts during the period of the current study. The primary importance of the comparison of the two studies, however, is the fact that July became the month of highest seasonal receipts of feeder pigs during the period 1949-62, and this result was a natural extension of the trend movements in the seasonal indices for feeder pigs in the earlier period. Another significant comparison is the low

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[9]Trends in the seasonal indices of feeder-pig receipts were fitted by least-squares technique.

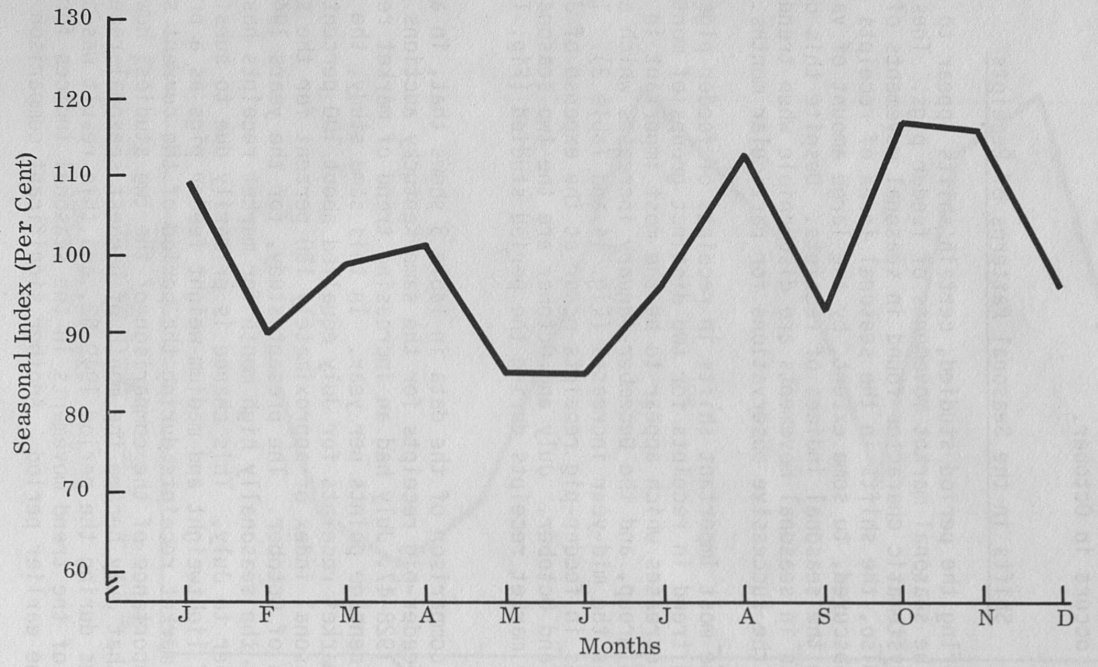

Fig. 12.--Seasonal Index: Receipts of Feeder Pigs (100-159 lb.) at Five Kentucky Auctions (1949-62).

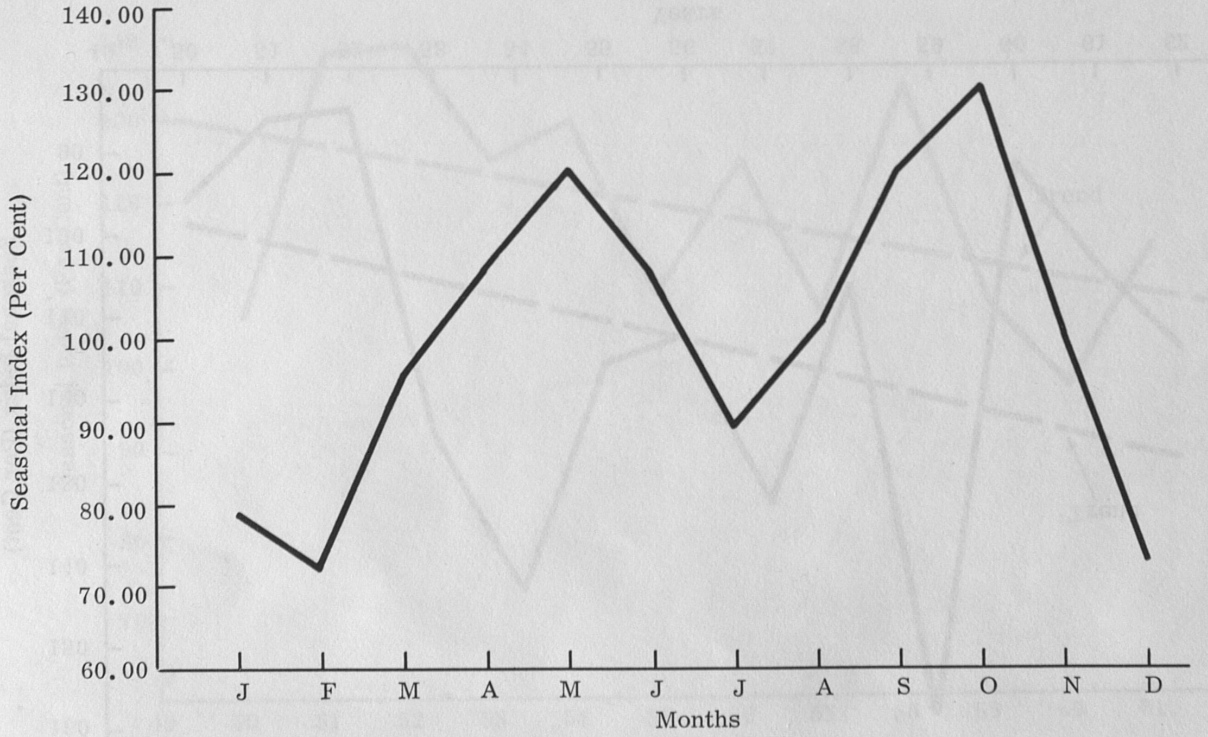

Fig. 13.--Seasonal Index: Number of Head of Slaughter Hogs Weighing 181-220 lb. at Five Kentucky Auction Markets (1949-62).

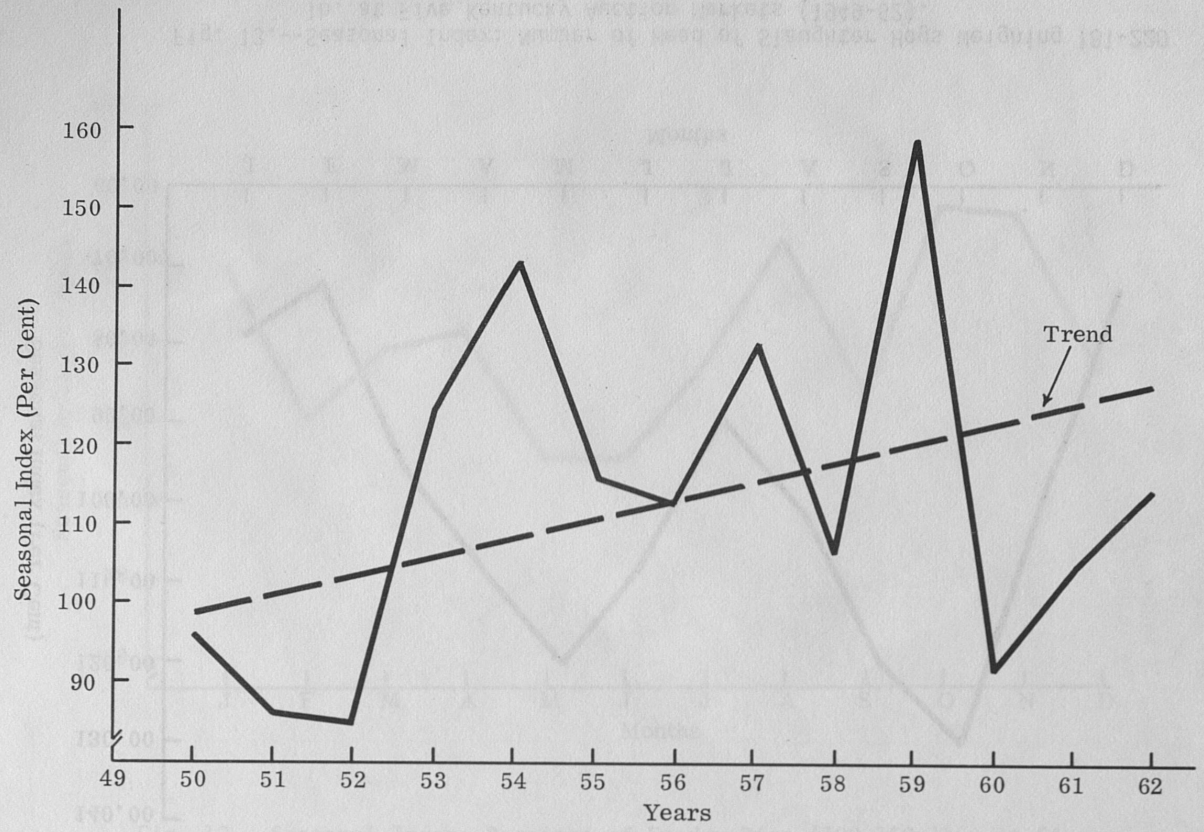

Fig. 14.--Seasonal Index: Market Receipts of Feeder Pigs under 160 lb. for June at Five Kentucky Auctions, 1950-62.

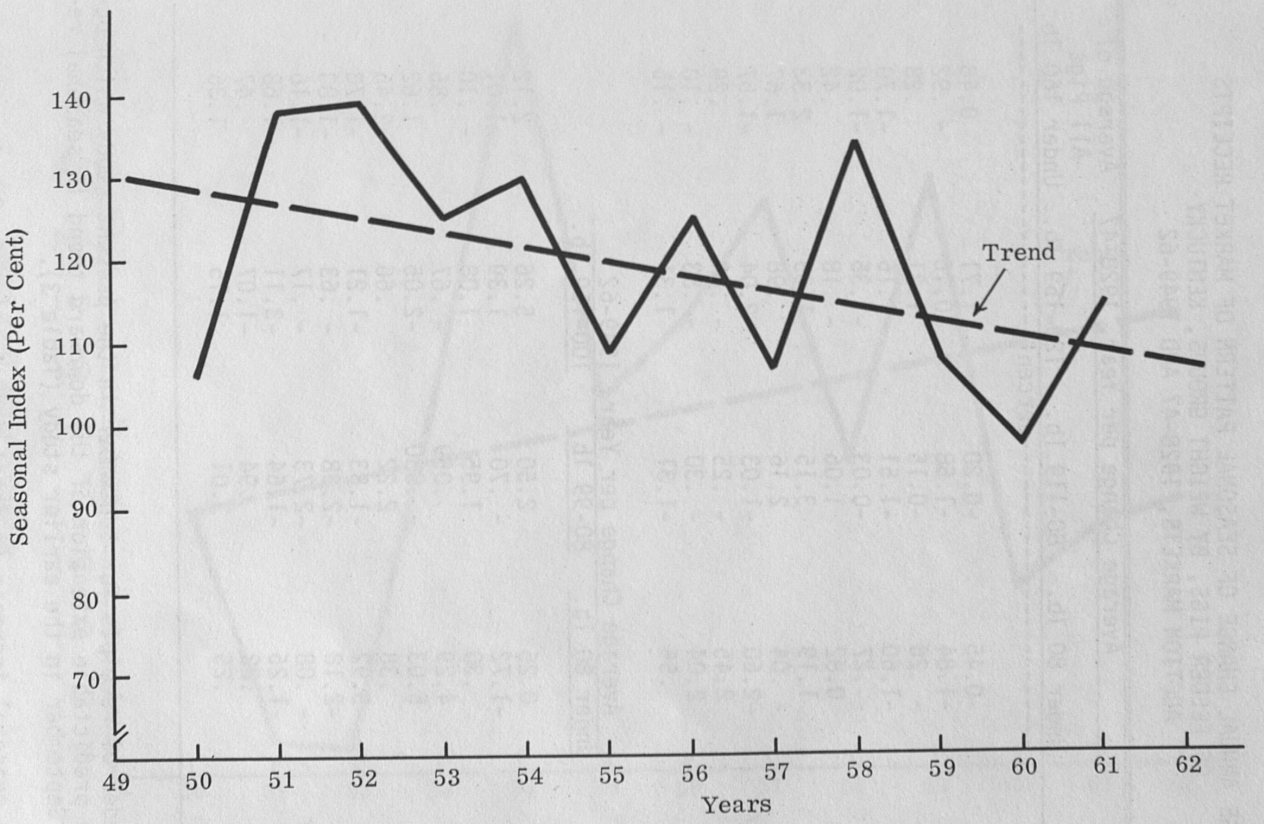

Fig. 15.--Seasonal Index: Market Receipts of Feeder Pigs (under 160 lb.) for July at Five Kentucky Auctions, 1950-61.

TABLE 3

AVERAGE ANNUAL CHANGE OF SEASONAL PATTERN OF MARKET RECEIPTS OF FEEDER PIGS, BY WEIGHT GROUPS, KENTUCKY AUCTION MARKETS, 1928-47 AND 1949-62

Month	Average Change per Year, 1928-47			Average of All Pigs
	Under 80 lb.	80-119 lb.	120-159 lb.	Under 160 lb.
	percent			
January	-0.45	-0.20	1.71	0.48
February	-1.84	-1.58	-0.16	- .92
March	- .26	-0.15	1.21	.28
April	-1.60	-1.51	-1.16	-1.70
May	- .27	-0.03	-1.35	-1.02
June	0.82	1.06	- .18	.42
July	1.19	3.15	1.35	2.33
August	- .04	2.16	.98	1.67
September	-2.60	-1.03	-2.04	-1.57
October	2.45	- .25	- .84	.29
November	2.04	- .30	- .83	- .10
December	.55	-1.31	1.31	- .15
	Average Change per Year, 1949-62			
	Under 80 lb.	80-99 lb.	100-159 lb.	
January	0.25	2.50	5.26	2.12
February	-1.72	- .70	1.39	-1.01
March	.30	1.95	1.08	- .10
April	4.29	.059	- .67	.85
May	5.03	- .080	-2.05	1.62
June	.38	2.22	.66	2.46
July	-3.92	-1.83	-1.21	-1.73
August	-2.18	-2.38	- .63	-1.83
September	- .08	-2.73	- .17	-1.16
October	-1.25	-1.64	-3.11	-1.68
November	.82	.94	-1.07	.47
December	.25	3.01	1.15	1.36

seasonal index of receipts for September in the present study which occurred as a predictable extension of the downward trend in seasonal receipts for September in the earlier study (Table 3).

The seasonal increase in total market receipts for June was primarily the result of a substantial upward trend in receipts of medium-weight pigs (80-99 pounds) in June for the period of this study (Fig. 16). The increase in lightweight feeder-pig receipts in May caused the increase

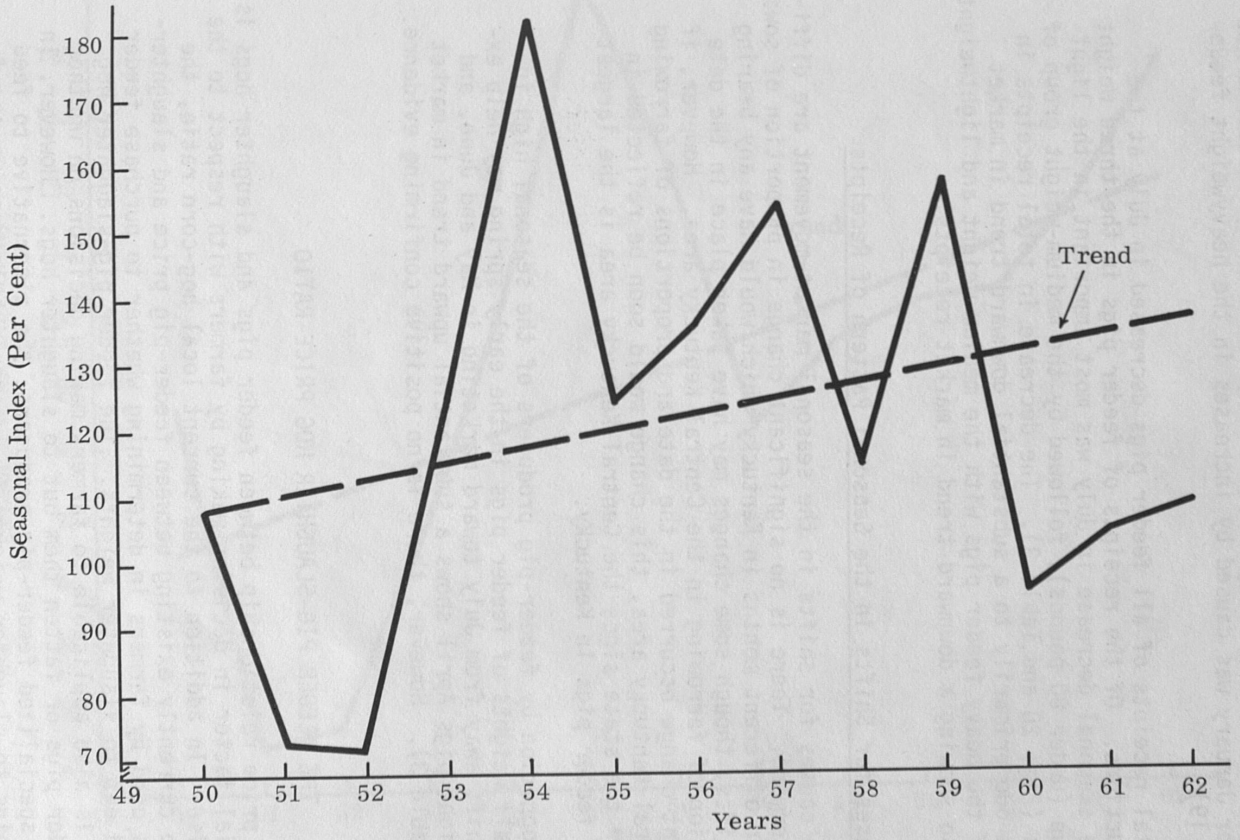

Fig. 16.--Seasonal Index: Market Receipts of Feeder Pigs (80-99 lb.) for June at Five Kentucky Auctions, 1950-61.

in total receipts for the same month (Fig. 17). Total market receipts of feeder pigs increased in December as a result of an increase in the medium-weight feeder pigs (Fig. 18). The upward trend in total market receipts for January was caused by increases in the heavyweight feeder pigs (Fig. 19).

Total receipts of all feeder pigs decreased in July at the Kentucky auctions. Of the receipts of feeder pigs in the three weight groups, the seasonal decrease in July was most important in the lightweight group (under 80 pounds), followed by the medium-weight group of feeder pigs (Fig. 20 and Table 3). The decrease in total receipts in October was due primarily to a substantial downward trend in market receipts of the heavy feeder pigs with the medium-weight and lightweight feeders also showing a downward trend in market receipts.

Causes for Shifts in the Seasonal Pattern of Receipts

The causes for shifts in the seasonal market movement are difficult to determine. There is no significant change in proportion of sows farrowing in different months in Kentucky which would have any bearing on these shifts, though some changes may have taken place in the date and proportion of farrowing in the Central Kentucky area. However, if a significant change occurred in the date and proportions of farrowing in the Central Kentucky area, this change would soon be reflected in the data for the state since the Central Kentucky area is the largest producer of feeder pigs in Kentucky.

Recognition by feeder-pig producers of the seasonal high in prices for all weights of feeder pigs in the early spring may help explain the shift away from July toward marketing in May and June, and for lightweight pigs April shows a substantial upward trend in market receipts (Table 3). However, there is no positive confirming evidence.

THE FEEDER PIG-SLAUGHTER HOG PRICE RATIO

The price relationship between feeder pigs and slaughter hogs is an influential factor in decision-making by farmers with respect to the hog enterprise. In addition to the current local hog-corn ratio, the relationship currently existing between feeder-pig price and slaughter-hog price is used by farmers in determining whether to purchase feeder pigs to feed out to slaughter weights. The feeder pig-slaughter hog price ratio is also applicable to farmers making decisions on whether to sell feeder pigs or fatten them out to slaughter hogs. However, in the case of specialized feeder-pig producers, the alternative to feed out feeder pigs to slaughter weights is not applicable because the facilities for the feeding operation are not always available.

The relationship between feeder-pig price and slaughter-hog price can be measured either in terms of the absolute difference or by express-

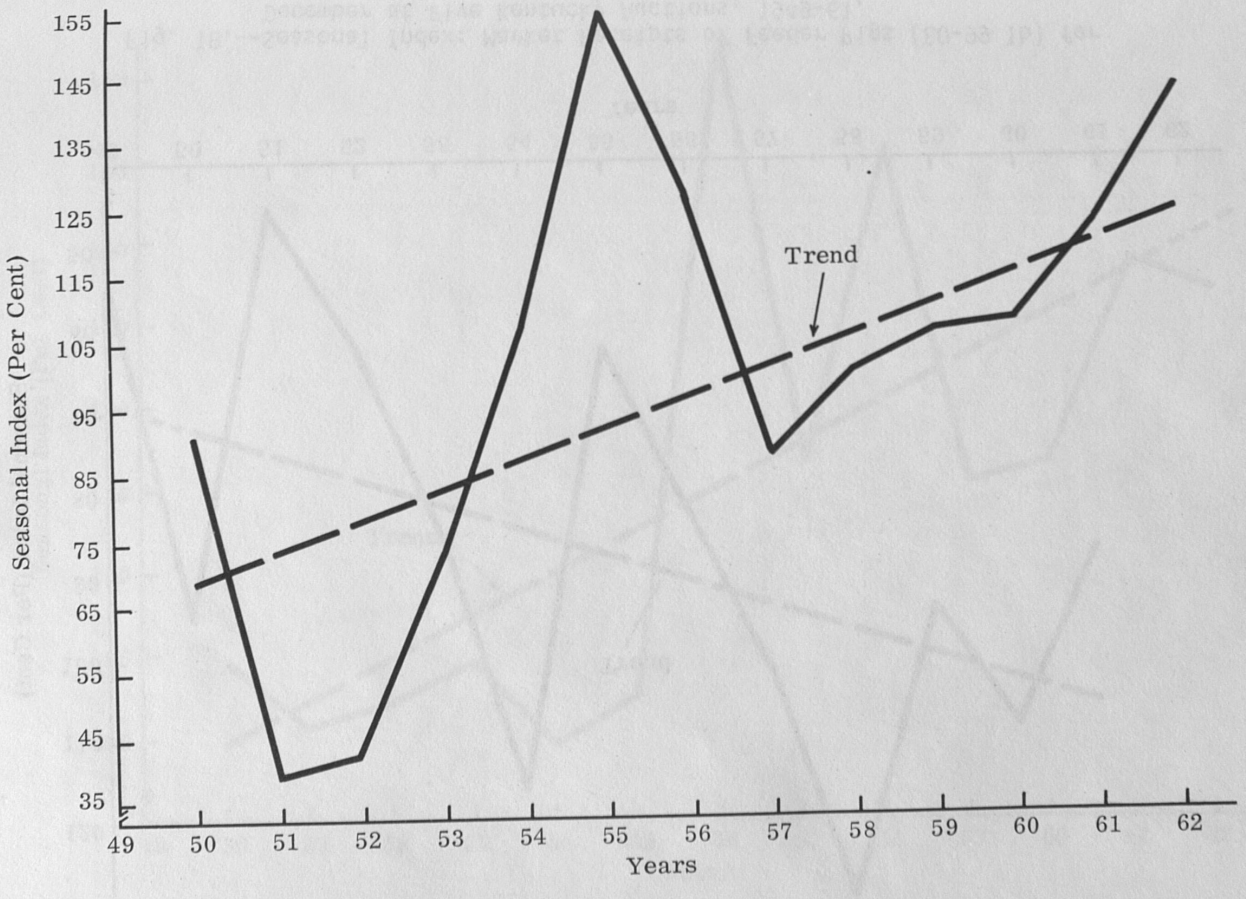

Fig. 17.--Seasonal Index: Market Receipts of Feeder Pigs (under 80 lb.) for May at Five Kentucky Auctions, 1950-62.

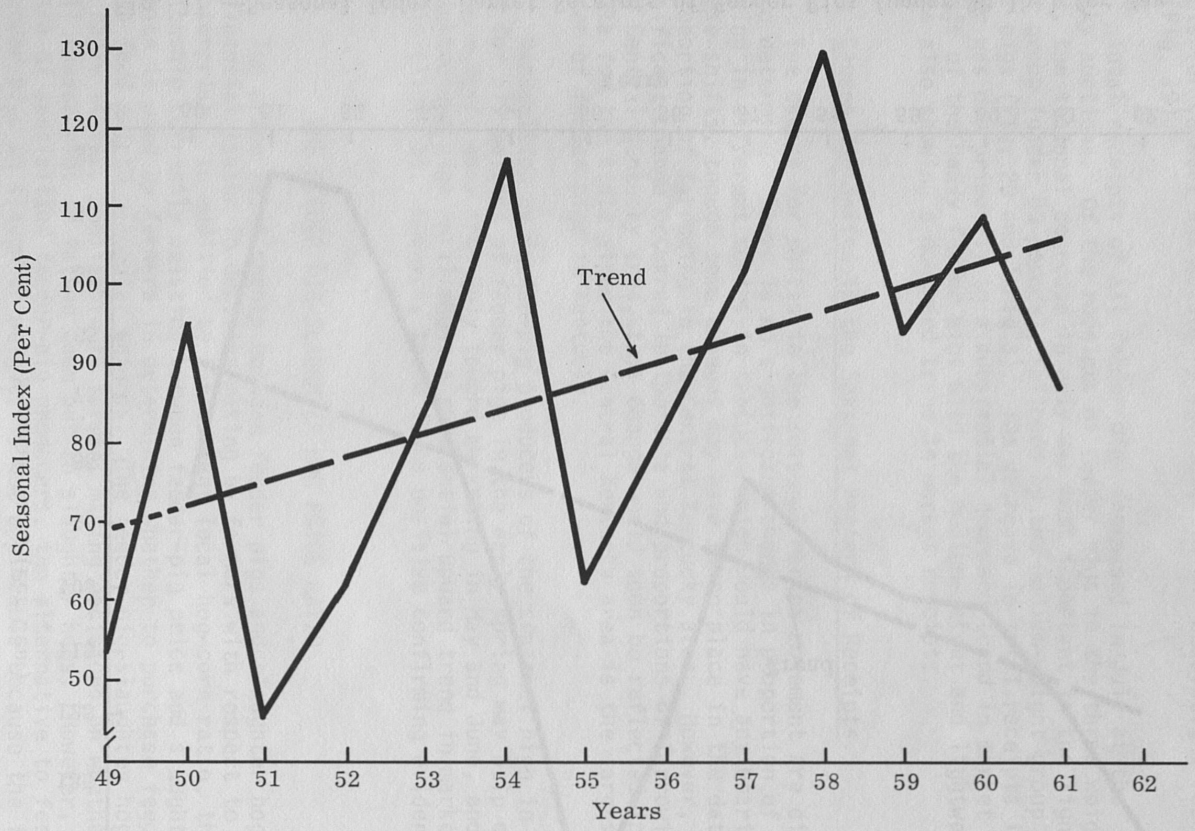

Fig. 18.--Seasonal Index: Market Receipts of Feeder Pigs (80-99 lb) for December at Five Kentucky Auctions, 1949-61.

December at Five Kentucky Auctions, 1949-61.

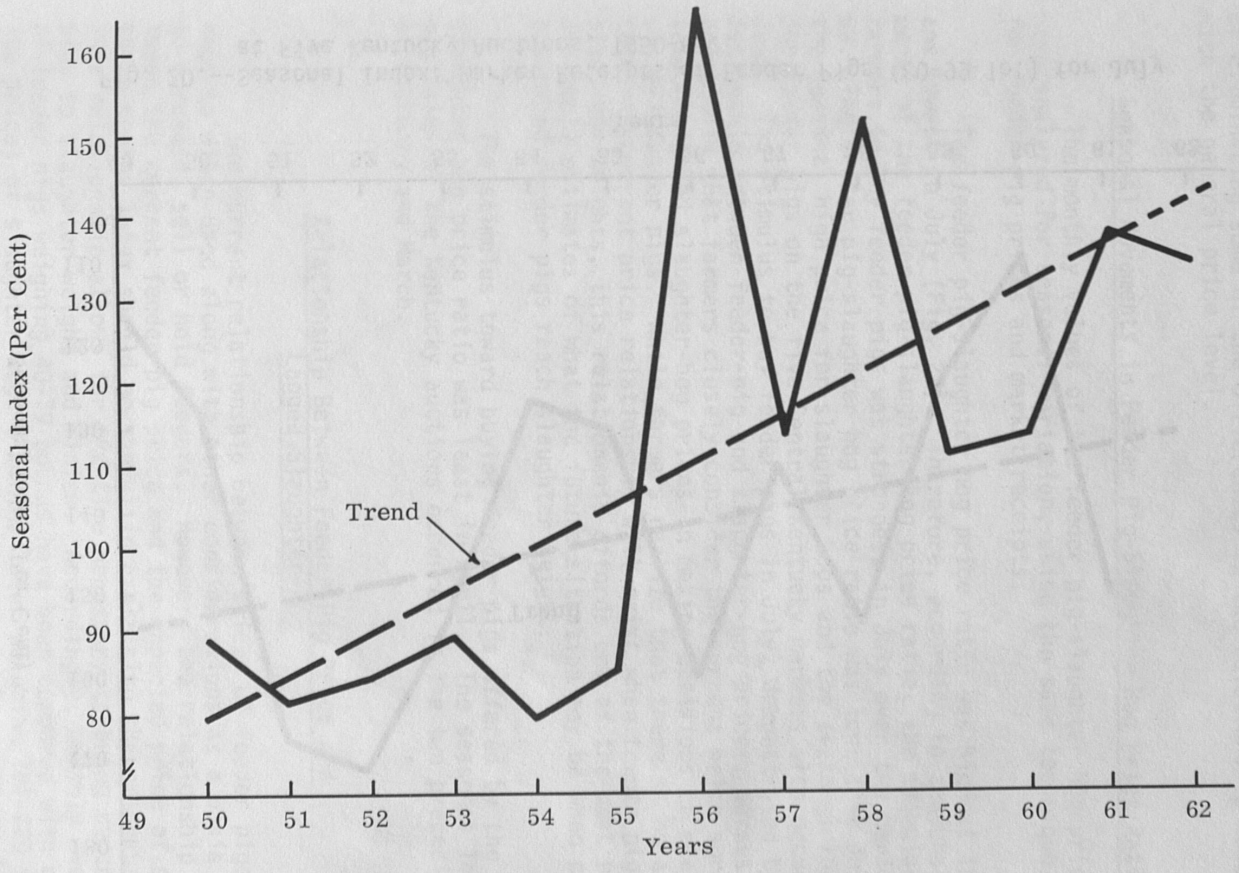

Fig. 19.--Seasonal Index: Market Receipts of Feeder Pigs (100-159 lb.) for January at Five Kentucky Auctions, 1950-62.

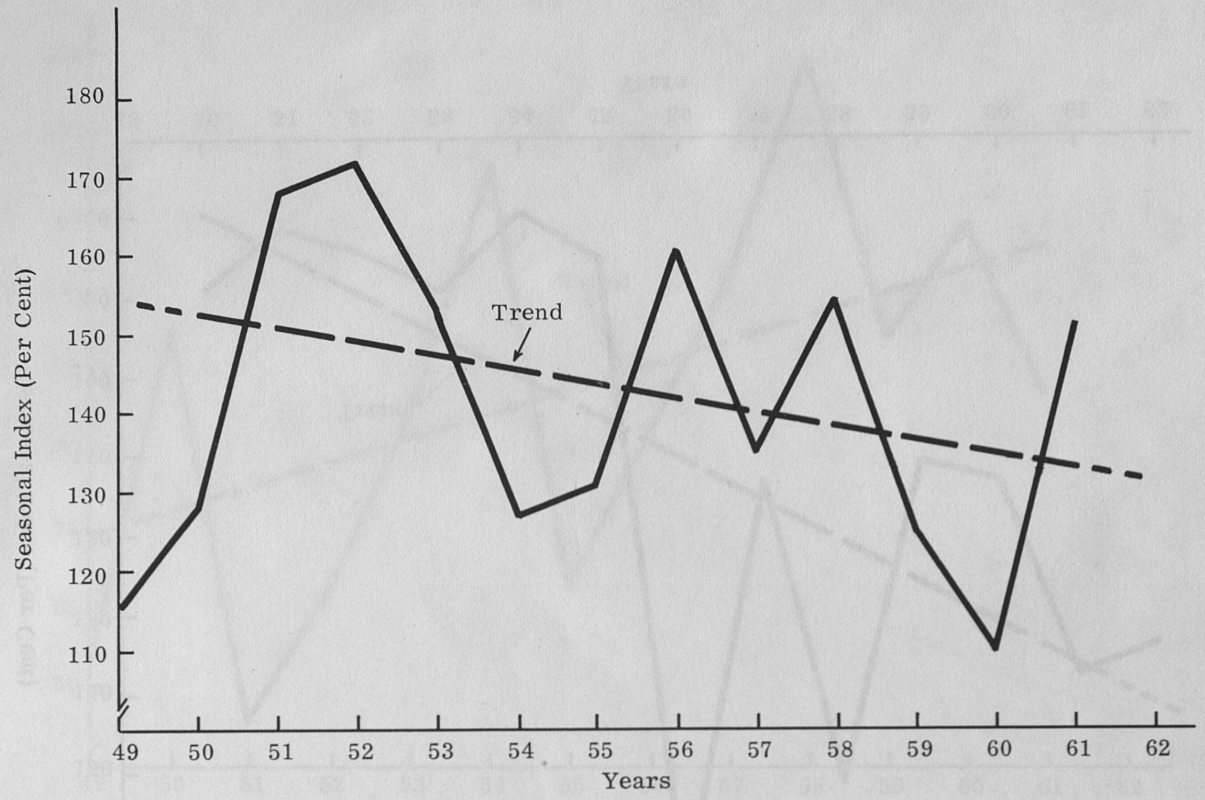

Fig. 20.--Seasonal Index: Market Receipts of Feeder Pigs (80-99 lb.) for July at Five Kentucky Auctions, 1950-61.

ing feeder-pig price as a percentage of slaughter-hog price (Fig. 21). The latter method was used in this study because it has the advantage of eliminating some of the differences in the relationship associated with the general price level.

Seasonal Movements in Feeder Pig-Slaughter Hog Price Ratio

The monthly values of the feeder pig-slaughter hog price ratio were analyzed for seasonal variation, using the same technique applied for feeder-pig prices and market receipts.

The feeder pig-slaughter hog price ratio was highest in April and lowest in July (Fig. 22). Therefore, according to seasonal movements of the feeder pig-slaughter hog price ratio, the stimulus for farmers to buy feeder pigs was strongest in July over the period 1949-62. The feeder pig-slaughter hog price ratio was lowest in July because the seasonal high price for slaughter hogs and the seasonal low price for feeder pigs on the five Central Kentucky markets also occurred in July. The stimulus to buy feeder pigs in July, demonstrated by the relationship between feeder-pig and slaughter-hog prices, agrees with the hypothesis that farmers closely consider the current price spread between feeder-pig and slaughter-hog prices in making decisions on whether to buy or sell feeder pigs. While farmers realize that there is no assurance that the current price relationship will exist when feeder pigs reach slaughter weights, this relationship affords one of the best readily available estimates of what the future situation may be when currently purchased feeder pigs reach slaughter weight.

The stimulus toward buying feeder pigs offered by the feeder pig-slaughter hog price ratio was least in April. The seasonal low in feeder-pig sales at the Kentucky auctions occurred in the two preceding months of February and March.

Relationship Between Feeder-Pig Price and Lagged Slaughter-Hog

The current relationship between prices of feeder pigs and slaughter hogs is often used along with other considerations as a basis for decisions to purchase, sell or hold feeders. However, the relationship existing between the current feeder-pig price and the expected price of slaughter hogs three months later should be useful in explaining the price-profit picture. This relationship allows for the time necessary to bring purchased feeder pigs to slaughter weight and finish. Accordingly, monthly average prices of feeder pigs weighing 40-79 pounds have been compared with monthly average prices of slaughter hogs 3 months later weighing 181-220 pounds, on a historical basis, using the data from the Kentucky auctions for the years 1949-62. On the basis of this ratio, feeder pigs bought in February and

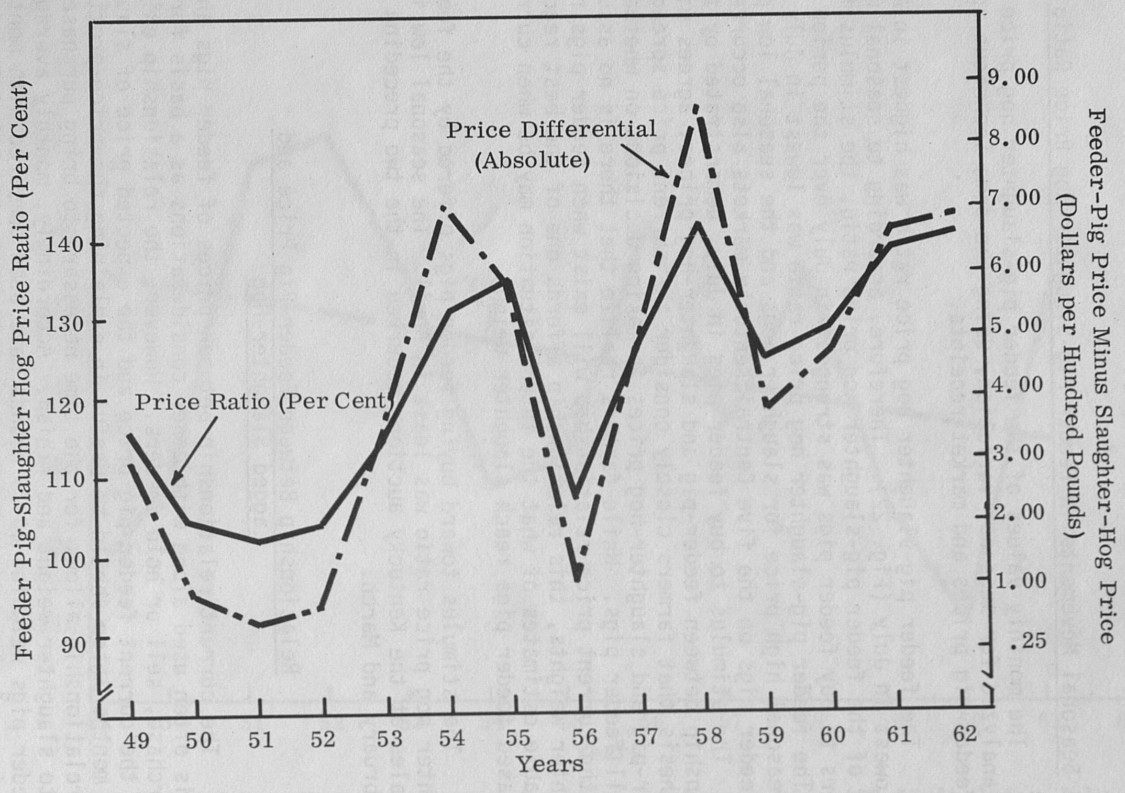

Fig. 21.--Annual Average Feeder Pig-Slaughter Hog Price Ratio and Price Difference at Five Kentucky Auction Markets, 1949-62.

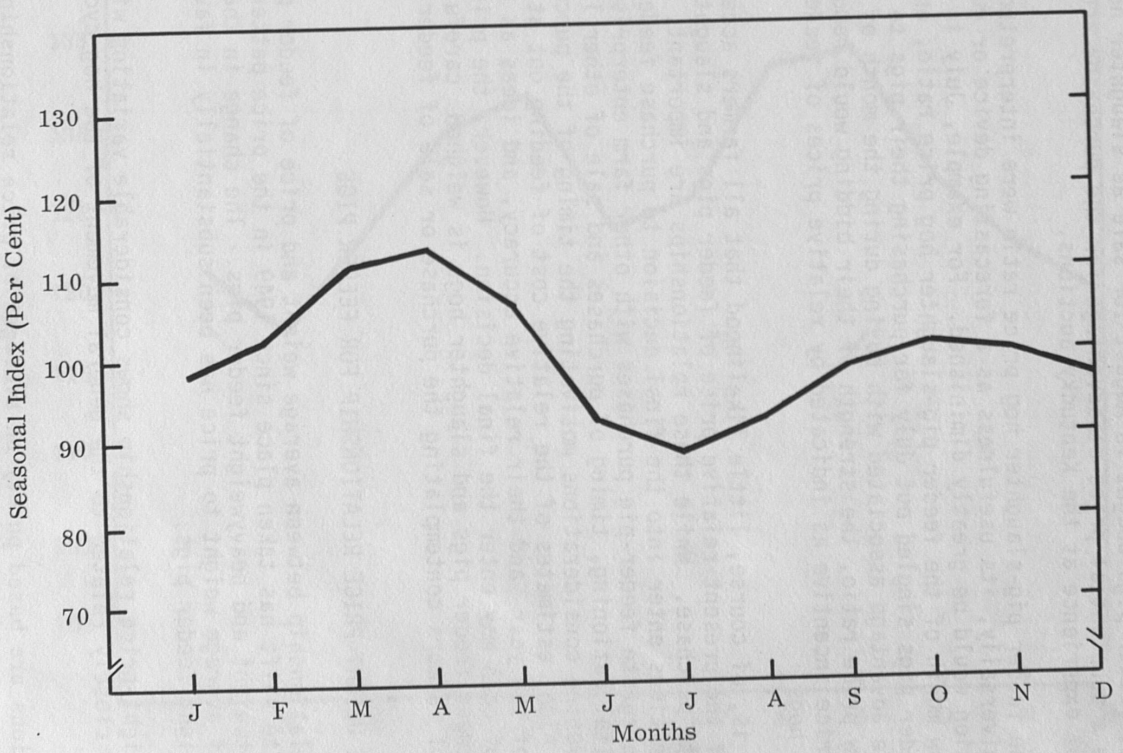

Fig. 22.--Average Seasonal Index: Ratio of Feeder-Pig Price to Slaughter-Hog Price at Five Kentucky Auction Markets, 1949-62.

sold as slaughter hogs in May afforded the greatest per-pound increase in price[10] (Fig. 23).

Second in importance was the June purchase of feeder pigs for sale as slaughter hogs in September. The greatest price disadvantage came to purchasers of feeder pigs in September for sale as slaughter hogs in December. Also, feeder pigs bought in August for sale as slaughter hogs in November show a substantial price disadvantage for the purchaser according to the 1949-62 experience at the Kentucky auctions.

If the feeder pig-slaughter hog price ratio were interpreted and acted upon universally, its usefulness as a forecasting device or guide to future action would be greatly diminished. For example, July is the seasonally low month of the feeder pig-slaughter hog price ratio, and if buyers of feeder pigs singled out July for purchasing their pigs to gain from the price advantage associated with buying during the month of the seasonally low price ratio, the strength of their bidding would remove most of the price incentive as indicated by relative prices of feeder pigs and slaughter hogs.

There is, of course, little likelihood that all farmers accept the indications of the present relative price of feeder pigs and slaughter hogs as a mandate to purchase. While these relationships are important, many other considerations enter into the final decision to purchase feeder pigs. The need to integrate feeder-pig purchases with other farm enterprises, involuntary capital rationing, timing of purchases and sale of other livestock all are intervening considerations motivating the timing of the purchase of feeder pigs. Also, estimates of the relative cost of feeding out at different times of the year and their relative accuracy, and ideas as to the future price of corn may enter the final decision. However, the price relationship between feeder pigs and slaughter hogs is weighed carefully by the majority of farmers contemplating the purchase or sale of feeder pigs.

THE WEIGHT-PRICE RELATIONSHIP FOR FEEDER PIGS

The relationship between average weight and price of feeder pigs shows a definite shift has taken place since 1949 in the price pattern between the lightweight and heavyweight feeder pigs. The change in the relationship of average weight to price has been substantially in favor of the lightweight feeder pigs.

The weight-price relationship shows considerable variation with extreme values closely related to the general movement of the hog cycle.

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[10]Such conclusions are based purely on averages of price relationships between the two classes of swine and take no account of other factors which affect profits, such as differences in cost of gain, or relative availability of corn. Further, the comparisons were made during a period when the general price level moved approximately 27 percent and the influence of the general price level has not been removed from the results.

Fig. 23.--Average Ratio of Prices of Feeder Pigs (40-79 lb.) to Prices of Slaughter Hogs (181-220 lb.) Three Months Later at Five Kentucky Auction Markets, 1949-62.

The range of the extreme values is as follows: (1) the largest premiums for heavy feeder pigs were paid in February 1951, when prices paid for 140-159-pound feeders averaged $1.76 more per 100 pounds than the prices paid for 40-59-pound feeders on the Central Kentucky auctions; (2) the largest premium for lightweight feeder pigs was paid in September 1958, when prices paid for 40-59-pound feeders averaged $13.31 more per 100 pounds than the prices paid for 140-159-pound feeder pigs. In March 1954, March 1961, and April 1962, prices paid for 40-59-pound feeder pigs averaged $13.30, $13.04, and $12.83 more per 100 pounds, respectively, than prices paid for 140-159-pound feeder pigs. These price extremes correspond closely with the price cycle in feeder pigs and hogs. The hog-price cycle was high in 1954, 1958, and 1961-62, which coincides with the highest premiums paid for lightweight feeder pigs. The hog-price cycle was low in 1951-52, 1956, and 1959, and this also corresponds with the slight premium paid for heavy feeder pigs in February 1951. Also the weight-price regression reveals that during 1956 and 1959, the premium paid for lightweight feeder pigs was slight, equal to only $0.04 more per 100 pounds than heavy pigs in June 1956 and $0.26 more per 100 pounds in October 1959.

These weight-price differences, while admittedly extreme, do show a significant downward trend and serve to emphasize the importance that average weight may have for farmers who market pigs as feeder animals.

Feeder-pig sales were classified into six groups according to the average weight of pigs. These classifications were made so that the relationships between average weight and sale prices of feeder pigs could be set forth for analysis.

The weight groups[11] used were 40-59, 60-79, 80-99, 110-119, 120-139, and 140-159 pounds. Monthly average prices were computed for each group by using a separate regression for each weight group by months for each year.

Regression Analysis of Weight-Price Relationships

The weight-price relationship was determined for each month during 1949-62 by means of a regression equation. The regression coefficient shows the direction and rate of change in the relationship of price to weight as the weight of feeder pigs is increased by increments of 20 pounds from a low-weight group of 20-39 pounds to a high-weight group of pigs weighing 140-159 pounds (Table 4).

An illustration of the nature of the regression coefficient is given in Fig. 24 which shows average prices for each of the average weight categories of feeder pigs for January 1955. The slope of the regression line between these average weights and prices measures the change in price per unit increase in average weight. In this example, on the average, the

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[11]Feeder pigs under 40 pounds were omitted because monthly sales in this category tended to be of such small numbers as to give no representative price until 1955. A representative price is available after 1955.

Fig. 24.--Weight-Price Relationship for Feeder Pigs at Five Kentucky Auctions for January 1955, Showing the Change in Average Price per Unit Increase in Average Weight.

Note: See Table 19 for data for this figure.

TABLE 4.--REGRESSION EQUATIONS RELATING MONTHLY PRICES TO WEIGHT[a]

Estimated Price for		Regression Constant[b]	Regression Coefficient
January	=	22.672	- .88
February	=	22.268	- .80
March	=	22.324	-1.12
April	=	24.057	-1.09
May	=	24.570	- .77
June	=	21.829	- .42
July	=	18.592	- .47
August	=	17.752	- .63
September	=	18.598	- .77
October	=	17.202	- .65
November	=	14.646	- .56
December	=	12.782	- .43

[a]Where X = weight in units of 20 lb.
[b]Origin = 100 lb.

price per 100 pounds was $0.88 lower for each 20-pound increase in average weight; hence the regression coefficient for January 1955 was negative (-0.88). If the prices of feeder pigs had been greater as average weight increased, the sign of the regression coefficient would have been positive.

The regression coefficient is generally fairly reliable as an indicator of the average direction of movement of the relationship between price and average weight, but it does not portray changes of direction within the weight categories. If prices per 100 pounds in the lightest-weight categories were progressively higher as average weight increased while prices became successively lower in the heavier-weight groups, the regression coefficient will indicate only whether, on balance and considering all the weight groups, the net difference of average price as average weight increased is positive or negative.

Other studies have shown that the trend in annual average price of feeder pigs was negative for each of the six weight groups used in the tabulation of prices and average weights of feeder pigs. Also, there is a direct relationship between weight and average price. The decreasing trend becomes greater in absolute value in each case as weight is increased from one weight group to another.

The relative changes in price as weight increases are illustrated in Fig. 25. These relative changes can be described by a function that decreases at a decreasing rate as weight increases by constant increments of 20 pounds. The meaning of the relationship described by Fig. 25 is that there is relatively more price discrimination between contiguous lightweight groups of

Fig. 25.--Annual Change in Deflated Average Price of Feeder Pigs by Weight Groups, Five Kentucky Auctions, 1949-62.

feeder pigs than there is between adjacent heavier-weight groups, but if the lightest-weight weight group (40-59 pounds) is used as a base, the relative price discrimination becomes progressively greater as average weight increases. It is possible, however, that comparisons of individual months would show cases of increasing average price as average weight increased. This aspect was measured by the aforementioned weight-price regression and the month of February 1951 shows the only positive regression coefficient. The price for February 1951 was $0.10 per 100 pounds higher on the average for each 20-pound increase in average weight.

Trends in the Weight-Price Relationship

The regression coefficients which express the relationship between price and average weight show a significant downward trend, an average of 0.40 percent decrease monthly for the period 1949-62 (Fig. 26).

The downward trend in this case means that the relative price difference between lightweight and heavyweight feeder pigs is increasing over time in favor of the lighter-weight feeder pigs. For the period 1950-60, the price of feeder pigs weighing 40-59 pounds was progressively higher on the average than the price of feeder pigs weighing 140-159 pounds.

Seasonal Changes in the Weight-Price Relationship for Feeder Pigs

The seasonal movements of the weight-price regression were isolated by two methods: first, a seasonal index was calculated for the weight-price regression and, second, the seasonal movements were expressed as monthly averages of the absolute monthly regressions. The same conclusions are evident from either method, that the greatest price discrimination against heavyweight feeder pigs occurs in April while the least price discrimination against heavy feeder pigs occurs in July (Fig. 27).

The month-to-month changes in the movements of the weight-price regression are best explained by the fact that the bulk of feeder pigs ultimately reaches consumption channels as slaughter hogs. Therefore, the relative intensity of the demand for feeder pigs in different weight categories is directly related to the demand for and the price of slaughter hogs. Hog producers are fairly well aware of the critical points of the seasonal movement of hogs prices. They know of the high in price in July, the steady decline to a low in November, the increase in price from December to February with a slight leveling off in March followed by a steady increase to the summer high again in July. The June slump evident in seasonal movements of hogs prices before 1949 was not present in the seasonal movements of slaughter-hog prices at the Central Kentucky market or for seasonal price movements at seven midwest terminal markets for which the seasonal price indices were calculated.

A comparison of the seasonal movement of the relation of weight to price of feeder pigs with the average seasonal index of slaughter-hog prices

Fig. 26.--Monthly Movement and Trend in the Weight-Price Regression and the Feeder Pig-Slaughter Hog Price Ratio for Feeder Pigs and Slaughter Hogs at Five Central Kentucky Auctions, by Months, 1949-62.

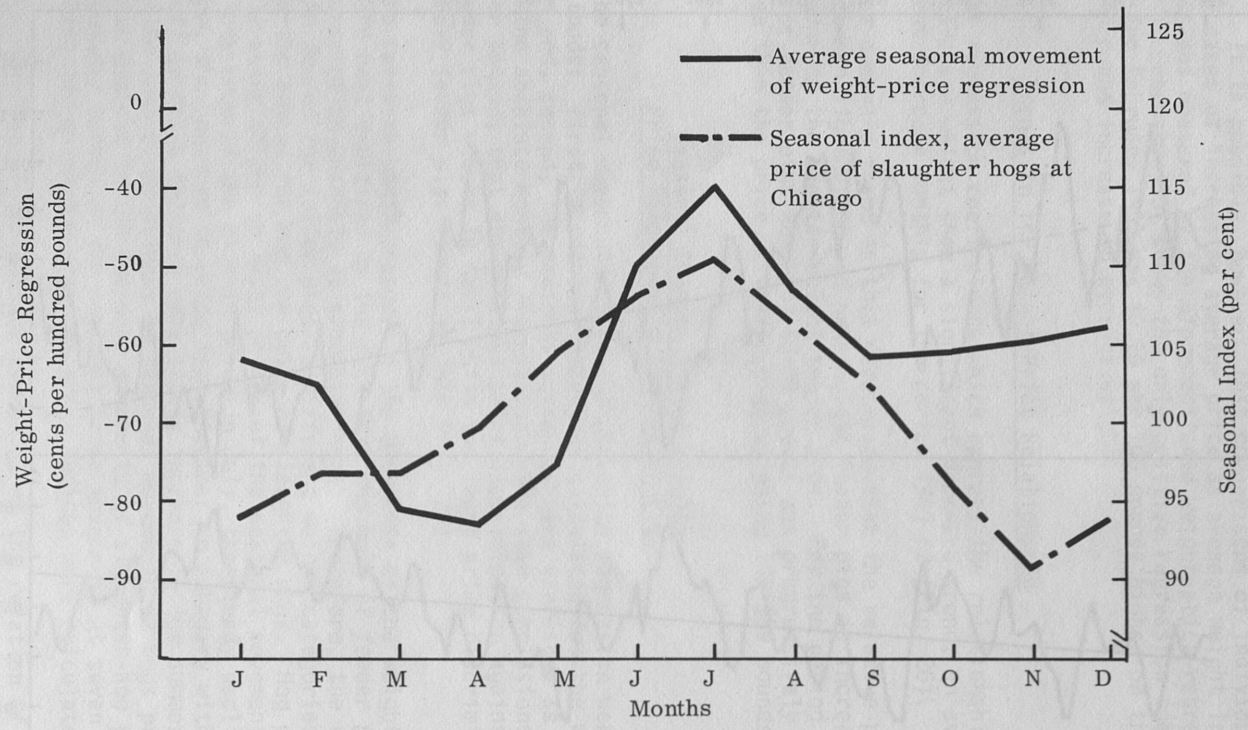

Fig. 27.--Average Seasonal Movement of Regression of Weight on Price of Feeder Pigs, Kentucky Auctions, Compared with Seasonal Index: Average Price of Slaughter Hogs (200-220 lb.) at Chicago, 1949-62.

at Chicago shows that the application of the general knowledge of seasonal movements of hog prices to the buying of feeder pigs gives a logical explanation for the seasonal movements of the weight-price relationship (Fig. 27). If it is assumed that 3 months are required to bring feeder pigs to slaughter weight and if this time differential is applied to the seasonal index of hog prices at Chicago, it can be seen that there is some degree of association between the weight-price regression and the seasonal index of slaughter-hog prices at Chicago lagged in this fashion (Fig. 27).

The greatest price advantage for lightweight feeder pigs as shown by the lowest negative regression coefficient occurred in April and the seasonal price peak for slaughter hogs came three months later in July. However, the lag indicated between the seasonal high in the weight-price regression and the November low in slaughter-hog prices is 4 months and can best be explained in terms of the seasonally large numbers of slaughter hogs going to market in October and November.

Seasonal movements in the market receipts of feeder pigs also help explain the movements of the weight-price regression. A comparison of the average seasonal movements of feeder-pig receipts in the three major weight categories shows that the seasonal low in the weight-price regression coefficient, indicating the price premium for lightweight feeders, found in April is associated with a low for the season in receipts of lightweight feeders in March, for medium-weight feeders in April and May, and a secondary rise in market receipts for heavyweight feeders in April. Likewise, the two lightweight groups of feeder pigs show a seasonal high in market receipts in July, while the heavyweight feeder pigs reveal a secondary seasonal peak in receipts for August. This relationship also helps to explain the relatively less discrimination in price toward heavy feeders in July. However, the demand factor, expected price of slaughter hogs, is an important influence upon seasonal movements of the weight-price relationship for feeder pigs.

Influence of the Hog-Corn Price Ratio on Weight-Price Relationships

The shifts from month to month in the weight-price regression for feeder pigs appeared to be associated with the monthly movements of the hog-corn price ratio.[12] Price differentials favoring the lightweight feeder were associated with a favorable hog-corn price ratio and price differentials least unfavorable to heavyweight feeders were associated with an unfavorable hog-corn price ratio. The relationship between the weight-price regression and the hog-corn price ratio is illustrated in Fig. 28, where each series has been smoothed by a three-month moving average. The scales of this chart were superimposed upon each other so that a regression coefficient of zero coincides with a hog-corn price ratio of 12.5:1. The "break-even" figure of 12.5 for the hog-corn price ratio is an arbitrary choice but helps to in-

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[12]Based on Chicago wholesale prices.

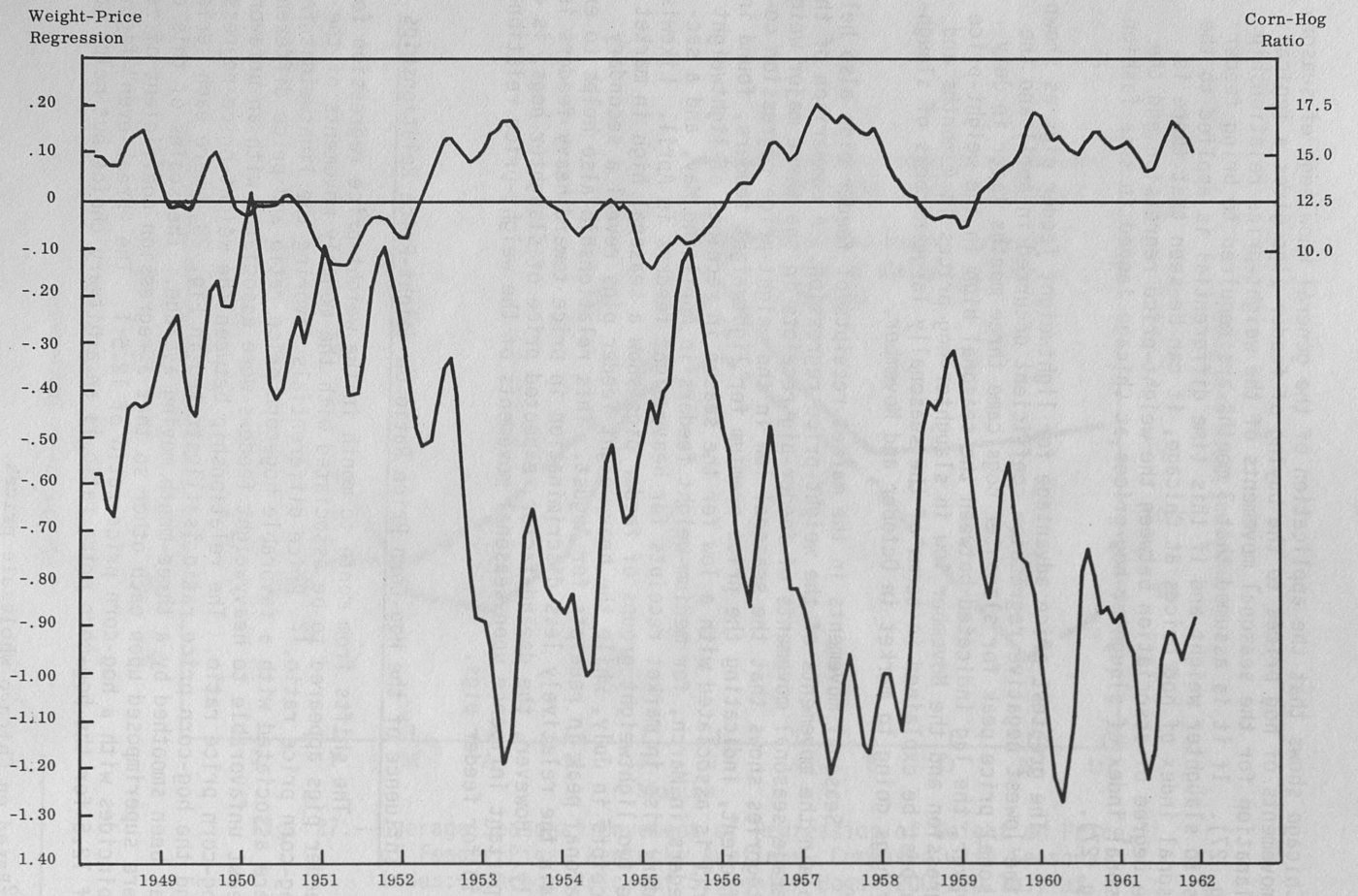

Fig. 28.--Monthly Movement of the Weight-Price Regression for Feeder Pigs Compared with the Monthly Movements of the Hog-Corn Price Ratio (Smoothed by a 3-Month Moving Average), 1949-62.

dicate more clearly the inverse nature of the relationship between the weight-price regression coefficient and the hog-corn price ratio.

The inverse relationship of the movements of the two series is broad in nature and corresponds to the movements of the hog-price cycle. The hog-corn price ratio tends to follow the hog-price cycle and the weight-price regression coefficient for feeder pigs tends to move inversely to the movements of the hog-price cycle. If movements of the hog-corn price ratio and the weight-price regression coefficients are compared in individual months, the relationship is not so striking as a comparison of the general movements because there are several instances in which the weight-price regression coefficients and the hog-corn price ratio move in the same direction from one month to the next.

A comparison of simple correlations between the weight-price regression coefficients and the hog-corn price ratio, using first the original values and next the values smoothed by a 3-month moving average, shows that the smoothed data give a higher coefficient of correlation than the unsmoothed data. The coefficients of correlation are for the data smoothed by a 3-month moving average, $r = -0.645$; and for the original data $r = -0.579$.[13] These coefficients of correlation are not high but do indicate strength in the relationship between the weight-price regression coefficients and the hog-corn price ratio.

Movements of the Feeder-Pig, Slaughter-Hog Price Ratio Related to Changes in the Weight-Price Regression

The monthly movements in the weight-price relationship of feeder pigs is much more closely associated with the month-to-month shifts in the feeder-pig, slaughter-hog price ratio than it is with the monthly shift in the hog-corn price ratio. The close relationship between the weight-price regression coefficients and the feeder-pig, slaughter-hog price ratio is indicative of the substantially higher prices paid by buyers of feeder pigs for the lightweight animals in preference to the heavier weight pigs over the period from 1949-62 (Fig. 26).

The general relationship of the two series shows that price differentials favoring lightweight feeder pigs are associated with high feeder-pig, slaughter-hog price ratios and price differentials least unfavorable to heavyweight feeder pigs are associated with low feeder-pig, slaughter-hog price ratios.

The inverse relationship of the two series is cyclical in nature. The movements of the feeder-pig, slaughter-hog price ratio follow the general movements of the hog-price cycle, and the monthly shifts in the weight-price regression move inversely to the hog-price cycle. Individual monthly comparisons of the two series show that the directional shift corresponds very closely.

Fig. 28.--Monthly Movement of the Weight-Price Regression for Feeder Pigs Compared with the Monthly Movements of the Hog-Corn Price Ratio (Smoothed by a 3-Month Moving Average), 1949-62.

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[13] Significantly different from zero at 0.001 level.

A simple correlation of monthly observations of the weight-price regression coefficient and the feeder pig–slaughter hog price ratio for the period 1949-62 yielded a coefficient of correlation r = -0.949, indicating that about 90 percent of the variation in the feeder pig–slaughter hog price ratio was associated with variation in the weight-price relationship for feeder pigs.

Both the feeder pig–slaughter hog price ratio and the coefficients of the weight-price regressions show significant trends. The trend in the monthly data for the feeder pig–slaughter hog price ratio (Fig. 26) indicates a general upward movement of the ratio for the 1949-62 period compared with the downtrend monthly trend in the weight-price regressions.

Seasonal Changes in the Weight-Price Relationship As Influenced by Hog-Corn Ratio

The level of the hog-corn price ratio appears to have a long-run influence on movements of the weight-price regression coefficients for feeder pigs. To test this relationship a comparison was made of the seasonal movements of the weight-price relationship during years of high and of low hog-corn price ratios to determine whether the relative level of the hog-corn price ratio is associated with differences in the seasonal movements of the weight-price regression coefficient. The "break-even" point for the hog-corn ratio was set equal to a ratio of 12.5:1; the years in which the actual hog-corn ratio, Chicago basis, was greater than 12.5 were taken as high years, and an annual average ratio less than 12.5 was taken as low years.

The principal change in the seasonal movement of the weight-price regression coefficients between years of high and low values for the hog-corn ratio was the difference in the magnitude of the regression coefficients for the two sets of years (Fig. 29). During years of high values for the hog-corn ratio, the weight-price regression shows much more price discrimination in each month than for years of relatively low values for the hog-corn price ratio. However, the years of favorable hog-corn price ratios correspond closely to years of cyclical high hog prices and years of low values for the hog-corn price ratio coincide with years of low hog prices. The reason for the close association between the hog-corn price ratio and the cycle in hog prices is that the hog-corn price ratio has been influenced more by changes in hog prices than changes in corn price over the period from 1949 to 1962. A check of the annual price per bushel for corn at Chicago over this period reveals that there has been no significant trend in the price of corn[14] while the price of hogs at Chicago reveals a significant downward trend for the same period.[15] Owing to the close association between the hog-corn price ratio and the price cycle for hogs, it is very difficult to say whether the

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[14]The annual trend value b = -0.022 for the years 1949-62 was not significant at 95 percent probability level with 12 degrees of freedom.

[15]Price of barrows and gilts (200-220 pounds) at Chicago shows an annual trend value b = -0.1347 which was significant at the 95 percent probability level.

Fig. 29.--Seasonal Variation of Regressions of Weight on Price of Feeder Pigs, Years of High Hog-Corn Price Ratio Compared with Years of Low Hog-Corn Price Ratio, For the Period 1949-62.

*Years of high hog-corn ratio were: 1949, 1950, 1953, 1954, 1957, 1958, 1960, 1961, 1962, Chicago basis.

**Years of low hog-corn ratio were: 1951, 1952, 1955, 1956, 1959.

anticipated profit of feeding corn to hogs as revealed by a high hog-corn price ratio or the general upswing in slaughter-hog prices had the greater influence on the buyers' decision to pay a higher premium for lightweight feeder pigs during years of high hog-corn ratios.

Limitations of Interpretation of the Weight-Price Relationship

The regression coefficients of the weight-price relationship for feeder pigs average -$0.63271 for the entire period (1949-62), which means that generally heavier feeder pigs were discriminated against at the rate of $0.63 per 100 pounds for each 20-pound increase in weight. This compares with the average rate of discrimination against heavy feeders reported by Rudd [4] to be about 3.5 cents per 100 pounds for each 20-pound increase in weight for the period 1927-47.

However, the seasonal pattern of the regression coefficients of weight on price as measured by the simple averages for each month will not occur exactly as indicated for any one year, and may be obscured by longer run or episodic movements of greater magnitude. Also,the seasonal movements of the weight-price regression coefficients,as measured by the seasonal index,represent deviations from the season's average regression coefficient and are not the actual magnitude of the regression coefficient. The study of the weight-price relationship for feeder pigs is useful in that some of the basic underlying tendencies which help explain feeder-pig price phenomena are revealed and analyzed.

SUMMARY

The primary data for this study were complete records on five local livestock auction market sales at four Central Kentucky towns: Danville, Lexington, Paris and Winchester. The records of these auctions, which are believed to be representative of the Central Kentucky market area for feeder pigs, cover the years 1949 to 1962 inclusive and include all pigs sold under 160 pounds, except pigs sold in single lots or pigs sold with sows.

The average seasonal index of prices received for feeder pigs on the five Central Kentucky auctions reached a seasonal high during April and declined to a low for the season in July, with November and December equally low. However, July is the more consistent low month in prices of feeder pigs.

A comparison of the seasonal price index for feeder pigs during the three years when the general farm price level rose by 10 percent shows that the seasonal price index for feeder pigs reaches a high in July with the months of May, June and August nearly as high. The seasonal low comes in December during years of rising farm prices. During the four years of falling farm product prices the average seasonal price index was highest in May and lowest in December.

There was evidence of a systematic shift in the seasonal movement of feeder-pig prices during the period 1949-62. The increased importance of March and April as months of seasonally high feeder-pig prices at the expense of June and July is the most pronounced change in the seasonal index for the period of this study.

The principal cause of the change in the seasonal index of prices for feeder pigs can be found in observing that the lightweight feeders, under 80 pounds in weight, make up an increasing percentage of all feeder pigs used in this study. In 1962, lightweight feeder pigs made up 72 percent of the total number of feeder pigs marketed at the five Central Kentucky auctions which supplied data for this study. This is in contrast with the 27 percent represented by pigs under 80 pounds in weight in 1949. Lightweight feeder pigs characteristically reach a seasonal price peak in the spring months.

The seasonal price pattern for feeder pigs and slaughter hogs reveals very little similarity between the two seasonal price indices. The slaughter-hog seasonal price index reached a high in July and a low in November in contrast to the April high and July low in the seasonal index of feeder-pig prices. The differences between the seasonal movement of feeder-pig and slaughter-hog prices are explained primarily by differences in the seasonal indices of market receipts and the differences in the use of the two classes of swine--one for further feeding and the other for immediate slaughter.

The principal characteristics of the seasonal index of market receipts of feeder pigs were: (1) the seasonal low came in February and March--a two-month period just prior to the seasonal high in feeder-pig prices in April; and (2) the seasonal high in feeder-pig receipts occurred in July, which corresponds with the seasonal low in feeder-pig prices which also occurred in July.

The most important shifts in receipts of feeder pigs have been the upward trend in receipts for two distinct groups of months--the May-June increases which appear to be the most important in the over-all weight group, and the December-January increases which are nearly as great as the mid-year increases. These upward trends in feeder-pig receipts occur at the expense of July, August and October. July and October were the two seasonally high months for market receipts during the period studied.

The feeder pig-slaughter hog price ratio obtained by expressing the price of feeder pigs as a percent of slaughter-hog price represents one of the influential factors in decision-making by farmers with respect to the hog enterprise. The feeder pig-slaughter hog price ratio was seasonally highest in April and lowest in July. Therefore, according to seasonal movements of the feeder pig-slaughter hog price ratio, the stimulus for farmers to buy feeder pigs was least in April. The seasonal low in feeder-pig sales at the Kentucky auctions occurred in the two preceding months of February and March.

A definite shift has occurred since 1949 in the price pattern between lightweight and heavyweight feeder pigs. Prices of lightweight feeder pigs have increased relative to heavier pigs. The rate of increase in lightweight pigs relative to heavyweight groups has been at the rate of 0.4 percent per month over the 1949-62 period.

The relationship existing between the current feeder-pig price and the expected price of slaughter hogs three months later allows for the time necessary to bring purchased feeder pigs to slaughter weight and finish. On the basis of this ratio, feeder pigs bought in February and sold as slaughter hogs in May afforded the greatest per-pound increase in price. The greatest price disadvantage came to purchasers of feeder pigs in September for sale as slaughter hogs in December.

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[5] U.S. Department of Agriculture, Agr. Marketing Service, *Daily Livestock Market Reports*, South St. Paul, Minn., 1963 and earlier issues.

[6] U.S. Department of Labor, Bureau of Labor Statistics, *Index of Wholesale Prices of Farm Products*, 1964 and earlier issues.

APPENDIX

TABLE 1

VARIABILITY OF SEASONAL INDICES OF PRICES AND RECEIPTS, BY MONTHS (1949-62, UNLESS OTHERWISE INDICATED) $(\frac{\sigma}{\bar{x}})$[a]

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Prices by Weight Groups (%)												
Feeder Pigs												
Kentucky												
Under 160 lb.	7	6	7	6	3	5	8	5	5	5	4	7
Under 160 lb.[b]	6	6	2	2	1	4	5	2	4	4	5	6
Under 80 lb.[b]	6	7	2	2	2	5	4	1	5	4	4	6
80-99 lb.[b]	6	6	3	3	1	4	5	2	3	3	4	6
100-159 lb.[b]	5	6	3	3	1	3	5	3	3	3	6	5
So. St. Paul, Minn.	7	7	5	4	5	4	4	5	5	4	5	6
Slaughter Hogs												
Chicago												
200-220 lb.	6	5	5	5	4	4	4	5	4	4	5	6
Receipts by Weight Groups (1949-62) (%)												
Feeder Pigs												
Kentucky												
Under 160 lb.	13	9	9	11	17	15	11	13	9	14	6	16
Under 80 lb.	12	12	13	22	26	13	18	18	12	11	12	13
80-99 lb.	12	9	15	14	18	20	12	18	16	20	8	22
100-159 lb.	22	8	9	15	17	13	11	14	8	18	9	19
Slaughter Hogs												
Kentucky												
181-220 lb.	17	18	10	7	12	10	7	13	8	13	14	16
Chicago												
200-220 lb.	10	6	8	8	8	6	7	7	7	11	9	9
Feeder Pig-Slaughter Hog Price Ratio	3	4	5	3	3	5	4	4	2	3	3	3

[a]The coefficient of variation of the individual annual seasonal index indicates the percentage amount of variation of the monthly indices from year to year.

[b]1954-1962

Example: A relative variability of 2 per cent for April means that in two years out of three, the relative price will be the same as indicated by the index plus or minus 2 per cent.

APPENDIX—*Continued*

TABLE 2

DIRECTION[a] AND SIGNIFICANCE OF MONTHLY CHANGES IN SEASONAL INDICES OF RECEIPTS, PRICES AND PRICE RATIOS USED IN THIS STUDY—1950-1961

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		Seasonal Index of Market Receipts											
Feeder Pigs, Kentucky Auction Markets													
Under 80 lb.	Up	7	1	3	7	9	8	4	1	4	11	7	2
	Down	5	11	9	5	3	4	8	11	8	1	5	10
	Significance %	--	5	22	--	22	--	--	5	--	5	--	12
80-99 lb.	Up	9	1	3	5	6	12	9	5	2	7	8	4
	Down	3	11	9	7	6	0	3	7	10	5	4	8
	Significance %	22	5	22	--	--	1	22	--	12	--	40	40
100-159 lb.	Up	8	3	9	5	3	5	9	8	4	9	6	2
	Down	4	9	3	7	9	7	3	4	8	3	6	10
	Significance %	40	22	22	--	22	--	22	40	40	22	--	12
Under 160 lb.	Up	10	1	6	8	7	8	7	4	1	10	8	3
	Down	2	11	6	4	5	4	5	8	11	2	4	9
	Significance %	12	5	--	--	--	--	--	--	5	12	--	22
Hogs, Chicago													
200-220 lb.	Up	3	0	7	4	7	3	2	5	8	10	10	8
	Down	9	12	5	8	5	9	10	7	4	2	2	4
	Significance %	22	1	--	--	--	22	12	--	--	12	12	--

(Continued)

[a] Number of times change from previous month was upward or downward.

APPENDIX—*Continued*

TABLE 2—*Continued*

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		Seasonal Index of Prices											
Feeder Pigs, Kentucky Auction Markets													
Under 80 lb.	Up	9	8	10	12	5	0	3	7	6	3	3	5
	Down	3	4	2	0	7	12	9	5	6	9	9	7
	Significance%	22	--	12	1	--	1	22	--	--	22	22	--
80-99 lb.	Up	7	9	10	11	5	0	1	5	7	2	2	7
	Down	5	3	2	1	7	12	11	7	5	10	10	5
	Significance %	--	22	12	5	--	1	5	--	--	12	12	--
100-159 lb.	Up	9	8	10	12	5	3	3	3	5	4	2	5
	Down	3	4	2	0	7	9	9	9	7	8	10	7
	Significance %	22	40	12	1	--	22	22	22	--	40	12	--
Average All Pigs													
Under 160 lb.	Up	9	7	10	12	6	2	2	5	6	3	2	6
	Down	3	5	2	0	6	10	10	7	6	9	10	6
	Significance %	22	--	12	1	--	12	12	--	--	22	12	--
Feeder Pigs St. Paul	Up	8	8	10	9	7	9	4	1	3	3	3	9
	Down	4	4	2	3	5	3	8	11	9	9	9	3
	Significance %	--	--	12	22	--	22	--	5	22	22	22	22
		Seasonal Index of Feeder Pig-Slaughter Hog Price Ratio											
Kentucky Auction Markets	Up	8	8	11	7	3	0	2	9	10	9	3	3
	Down	4	4	1	5	9	12	10	3	2	3	9	9
	Significance %	--	--	5	--	22	1	12	22	12	22	22	22
So. St. Paul	Up	3	5	8	11	5	2	2	3	6	10	11	6
	Down	9	7	4	1	7	10	10	9	6	2	1	6
	Significance %	22	--	--	5	--	12	12	22	--	12	5	--

APPENDIX—*Continued*

TABLE 3

MONTHS OF OCCURENCE[a] OF HIGHEST AND LOWEST SEASONAL INDEX ANNUALLY, FOR SEASONAL MOVEMENTS OF RECEIPTS, PRICES, AND PRICE RATIOS USED IN THIS STUDY—1950-1961

		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Seasonal Index of Receipts													
Feeder Pigs, Kentucky Auction Markets													
Under 80 lb.	Highest	0	0	0	0	1	4	3	0	0	1	2	1
	Lowest	0	3	4	3	2	0	0	0	0	0	0	0
80-99 lb.	Highest	1	0	0	0	0	3	5	3	0	0	0	0
	Lowest	0	1	2	3	4	0	0	0	0	0	0	2
100-159 lb.	Highest	3	0	1	1	1	0	1	0	0	2	2	1
	Lowest	0	0	0	2	3	4	1	0	0	0	0	2
Under 160 lb.	Highest	2	0	0	0	1	4	0	1	0	3	1	0
	Lowest	0	2	3	2	2	0	0	0	2	0	0	1
Hogs, Chicago	Highest	4	0	0	0	1	0	0	0	0	0	1	6
	Lowest	0	0	0	0	1	1	4	3	3	0	0	0
Seasonal Index of Prices													
Feeder Pigs, Kentucky Auction Markets													
Under 80 lb.	Highest	0	0	0	7	4	0	1	0	0	0	0	0
	Lowest	1	1	0	0	0	0	3	1	1	0	0	5
80-99 lb.	Highest	0	0	1	6	4	0	1	0	0	0	0	0
	Lowest	1	1	0	0	0	0	3	1	1	0	0	5
100-159 lb.	Highest	0	0	0	6	3	1	2	0	0	0	0	0
	Lowest	2	1	1	0	0	0	2	0	0	0	3	3
Under 160	Highest	1	0	0	6	3	1	1	0	0	0	0	0
	Lowest	2	1	1	0	0	0	3	0	0	1	2	2
Feeder Pigs, So. St. Paul													
70-130 lb.	Highest	0	1	0	2	1	6	2	0	0	0	0	0
	Lowest	4	1	0	0	0	0	0	0	1	0	4	2
Hogs, Chicago													
200-220 lb.	Highest	0	0	0	1	0	2	5	2	1	1	0	0
	Lowest	3	0	0	1	0	0	0	0	0	2	3	3

[a]Number of times highest or lowest index occurred in each month.

1.5M/1-70