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STEER PRICES IN RELATION TO IDAHO BEEF PRODUCERS' PROBLEMS

by

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*In co-operation with U. S. Department of Agriculture.

Steer Prices in Relation to Idaho Beef Producer's Problems.

By R. B. HEFLEBOWER*

Purpose of the Study

The purpose of this study is to analyze the causes of changes in beef steer prices. The effect of these causes is measured wherever it is possible. Thus definite forecasts of probable future prices can be made, which should aid the beef producers to increase their profits. The difference between the price received for beef cattle and the cost of production is the net income of the producer. Efficient production methods may offset the relatively low prices and leave the producer a margin of profit. However, production methods and costs are beyond the limits of this study. The purpose of this bulletin is to analyze beef steer prices, so that by the use of the results the producer can obtain more favorable prices. To that end the study will analyze those variations in beef steer prices which cover several years, the year fluctuations, and the month to month changes in beef steer prices.

First, the producer needs information on the general movement of beef prices over a period of years. This information will assist the producer in forming those production plans which require several years for development to the point that the number of steers ready for market is affected. Such problems are whether to acquire more range or whether to make preparations for a larger or smaller breeding herd. This study presents the long time variations in beef prices, or cycles, explains their cause and shows how the producer may benefit by this analysis.

Second, the relation of steer prices in the middle western and in the far western states are analyzed. This discussion will give the reader a knowledge of the price situation in the leading beef producing centers.

Third, beef producers need information on the probable beef price the next year as a guide to those short-time production and marketing plans which can be completed within a year. Such a production problem is, for example, whether to keep yearling steers until they are two-year-olds. By the consideration of the effect of factors which can be known before cattle go to the spring range, it is possible to know the probable level of steer prices for the twelve months succeeding the June of that year. The short-time production policy can be adjusted to such probable price movements.

Fourth, when the steers are ready for market, the producer would welcome information on the probable price in various months. The third part of this study is to analyze the causes of month to month variations in steer prices, insofar as the effect of the causes can be measured.

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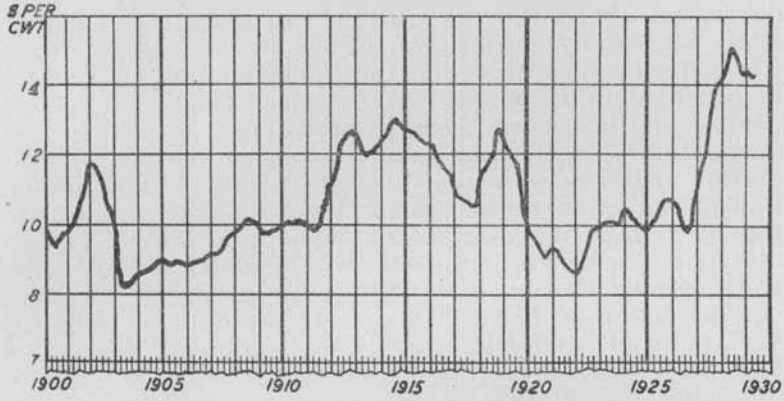
PART I

Long-Time Variations in Beef Steer Prices

Beef Steer Prices Since 1900

Beef steer prices vary in cycles covering from twelve to eighteen years. This fact is clearly sustained by a study of the history of beef steer prices since 1900 as shown in Chart 1. Fifteen years elapsed between the high prices of 1915 and of 1928. Sixteen years passed between the low prices of 1905 and of 1921. Thie prices presented in Chart I are quoted from the Chicago market but they represent the general

CHART I.
MONTHLY PRICES OF BEEF STEERS AT CHICAGO 1900—1930.



Source of data: Fig. 26 P. 586. U. S. Dept. of Agric—Yearbook, 1930. Beef steer prices vary in long time cycles covering from twelve to eighteen years. Prices in the above chart have been adjusted for price level changes.

movement of prices received by Idaho producers. Beef steer prices in all parts of the United States are tied together by inter-regional shipments of cattle. The close relationship in price fluctuations between the Chicago and the Portand markets is brought out by Chart III.

Why do beef steer prices vary in these long time cycles? The answer lies in the necessary nature of beef cattle production. Four years are required to expand beef production. If a producer wishes to expand production in response to high beef prices, he must keep heifers, which may have calves when they are about two years old. Two more years are required to mature these calves into two-year-old steers. Thus four years are required to begin the process of increased production. As a result prices usually move upward for several years at a time before the rise is checked by markedly increased production. Pro-

duction could be rapidly decreased by selling breeding stock for slaughter. But a good beef cow is ordinarily worth much more for breeding purposes than she is for slaughter. Producers will not sell good cows for slaughter unless the price of beef declines considerably. Decline in production usually comes through the failure to replace old cows with heifers. A larger number of heifers than usual are sold for slaughter. These facts point out that the decline in beef production in response to low prices is relatively slow, requiring several years to greatly reduce the number of beef cattle available for slaughter. As a result, several years usually pass before falling or low beef steer prices are replaced by rising prices.

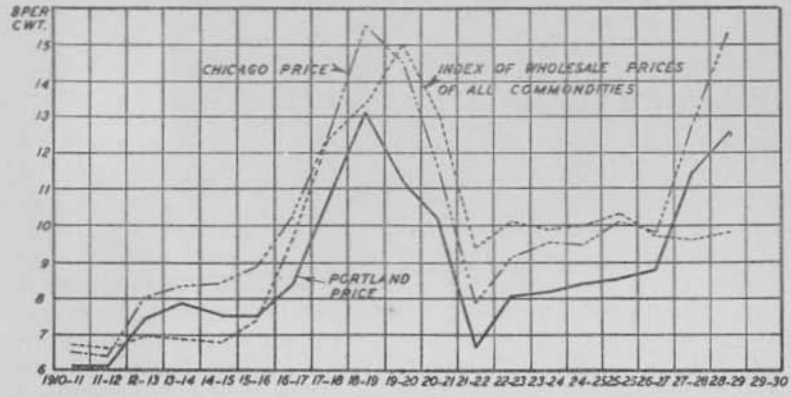
The beef producer's chief interest should be in future prices. Present profitable prices will turn to lower prices in a few years. Present low prices will improve within a few years. Producers should not expand heavily when prices are high for by the time the producer can market more stock, prices will have dropped. Producers should not be unduly discouraged by low prices for in the past low prices have been followed by better prices within a few years.

Adjustment of Beef Steer Prices for Changes in General Level of Wholesale Prices.

Beef producers who were in business before the war

CHART II.

ANNUAL AVERAGE PRICES OF BEEF STEERS AT CHICAGO AND AT PORTLAND AND THE INDEX OF WHOLESALE PRICES, 1910-1929.



Source of data: Chicago Prices, Table 359, 1930 U. S. Dept. Agric. Yearbook. Portland Prices Table I. this bulletin. Wholesale price index furnished by U. S. Bur. Lab. Stat.
The relation of the wholesale price index and steer prices shows that many of the important changes in steer prices were only a part of general changes in wholesale prices of all commodities.

may declare that prices during the period from 1912 to 1914 were not high as was stated in the previous section. Chart II shows that in actual dollars beef steer prices in Chicago from 1912 to 1914 were lower than in 1921. Yet beef producers were prosperous in the former period and were facing bankruptcy in 1921. Beef steer prices were high relative to the prices of other commmodities from 1910 to 1914, and hence producers were prosperous. On the contrary, beef steer prices were low relative to other commodities in 1921. These facts are clearly shown in Chart II. The larger part of the rise in beef steer prices from 1914 to 1918 was due to a change in the price of all commodities, not of beef alone. War-time expansion of the volume of money and credit reduced the amount of commodities which a dollar could buy at wholesale. Contraction of credit in 1920 and 1921 increased the buying power of each dollar. In other words the general level of wholesale prices fell but not to the level of prices prevailing from 1912 to 1914. But beef steer prices fell even more rapidly than the prices of other commodities.

In order to make pre-war and post-war beef steer prices comparable it is necessary to adjust these prices for changes which occurred in the general level of all wholesale prices. The beef steer prices presented in Charts I and III have been so adjusted, and are shown in relation to the general level of wholesale prices which existed in 1926. When steer prices have been so adjusted, the long time cycles in prices are readily noticed.

PART II

Relation of Chicago and Portland Beef Steer Prices

Feeder and Slaughter Steer Prices

Feeder steer prices are of interest to the majority of Idaho prodcers, but for reasons explained below, it was found advisable to use the prices of slaugher steers at Portland as representatives of the beef situation in this state.

Range beef producers in Idaho market feeders as well as grass fat cattle for slaughter. Monthly prices of feeder steers at Kansas City the leading feeder steer market, were studied in relation to variations in supply and demand factors. No results of significance were obtained for two reasons. First, the prices of feeder steers depends to a great extent upon the condition of the steers. The price statistics available include all steers, common to choice, and therefore there is no method of deciding what the price of a certain grade of feeder steers is at a particular

time. The price statistics do not adequately represent what the producer receives from sale of his feeders. Second, the number and condition of feeder steers depends on two factors, beef population and the condition of the range. If the range is unusually good, many range steers will be sold for slaughter. If the range is poor, many steers which were to have been fattened on the range for slaughter will be sold for feeders. Furthermore, if the range is poor, feeders will be sold earlier in the season and will be in poorer condition. As a result of these factors. the movement of feeder steer prices are erratic, having little relationship to supply and demand factors known in advance.

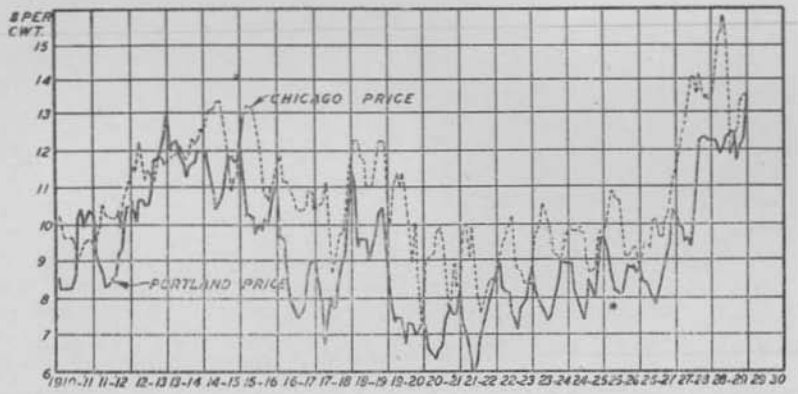
Due to the unrepresentative character and erratic movement of feeder steer prices, the remainder of this study will deal with slaughter steer prices. These latter prices should show, in general, the returns which producers of all classes of beef cattle are recceiving.

Portland Prices Selected for Further Analysis

Price quotations for slaughter steers on the Chicago market, are not fully representative of the Idaho situation.

CHART III.

MONTHLY PRICES OF BEEF STEERS AT CHICAGO AND AT PORTLAND, 1910-1929, ADJUSTED FOR CHANGES IN WHOLESALE PRICE LEVEL.



Source of data: Chicago Prices, Table 359, U. S. Dept. of Agric. Yearbook, 1930. Portland Prices, Table II this bulletin.

Chicago prices are usually higher than Portland prices. Portland prices are more representative of the Idaho situation.

Idaho is in close touch with the Chicago market only during the late summer and the fall when the range states are sending grass fat steers and feeders to the Middle West. Either Chicago or far Western prices would be represen-

tative of the Idaho situation during these months. During the remainder of the year the fluctuations of prices in Chicago are not affected by the Idaho or Far Western situation, nor are the Far Western states particularly interested in Chicago prices. Shipments of beef cattle between the two regions are insigsificant during the winter and spring. The study of a Far Western market would be of more value to Idaho beef producers during this latter period. Moreover for the year as a whole Far Western prices are of more interest to Idaho producers.

The prices of beef steers at Portland have been selected to represent the Far Western markets, for Portland is the only market where organized stock yards reporting prices have been in continuous operation for a long period. The Portland Union Stock Yards began operations in September, 1909. The organization has consistently reported the monthly range of top prices for steers (as well as of other livestock) from the month of its establishment. It is realized that the range of top prices accurately indicates the market situation for the better stock only. However, except over short periods of time, the price of lower grade stock bears a fairly constant relationship to the price of better stock. The fact that these are the only prices available makes their adoption necessary.

Seasonal Movement of Chicago and Portland Beef Steer Prices

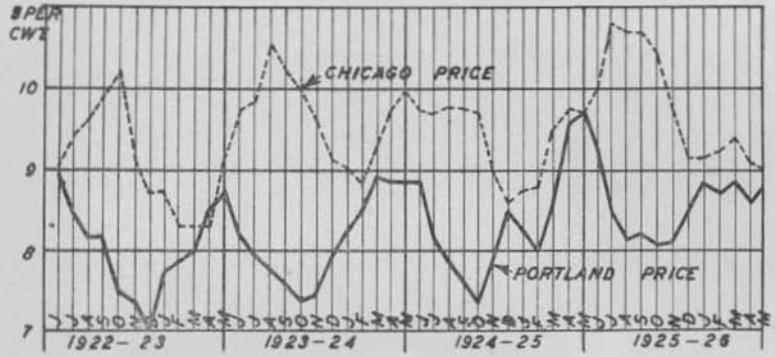
Chicago beef steer prices are usually higher than Portland prices. There are two reasons for this sitation. First, most of the cattle originally came from the West, although they may be fattened in the Corn Belt. Consequently, there is a relatively greater supply available for Pacific Northwest markets than for Middle West markets during most months of the year. Second, the Chicago prices are quoted for higher grade beef which has been produced at high costs. Corn-fed beef is the most important type on the Chicago market. Grass and hay-fed cattle produced at lower costs predominate in Pacific Coast markets.

Frequently, however, the Portland price approaches or even surpasses the Chicago price. Close examination of Chart IV will show that Portland prices usually become higher in the months of March, April, and May. At this season of the year beef steers are relatively scarce on the Pacific Coast. The cost of fattening cattle for the spring market definitely limits the number marketed. On the contrary, the late winter and early spring months compose the period of heaviest marketings in the corn belt. The greatest proportion of the range feeders purchased in the

previous fall have been fattened by spring and are marketed. As a result beef prices in Chicago usually fall during the late winter and early spring.

Further observation of Chart IV will show that Chicago prices rise relative to Portland prices from June to Sep-

CHART IV.
SEASONAL MOVEMENT OF BEEF STEER PRICES AT CHICAGO AND PORTLAND, 1922-1925.



Seasonally high prices prevail in Chicago in the summer, but in Portland during the late winter.

tember. The peak of the receipts of grain fed cattle at Chicago is past by June and prices on that market begin to rise. During the summer months Far Western markets are abundantly supplied with grass fed stock. As a result Portland prices are usually lower during those months.

The "Crop Year" in the Idaho Beef Industry

In some parts of this analysis it is necessary to consider annual average prices rather than monthly prices. The range method of production in Idaho justifies averaging the monthly prices from June until the following May to obtain an annual average rather than averaging the monthly prices for the calendar year. The price of steers usually starts the summer decline as the first grass-fed stock reaches the market in June. Range and pasture stock supply the slaughter market until late fall. Then feeders from the range, as they are finished, supply the markets during the winter. Thus between June and the following May range or grass fattened stock, or range feeders later fattened supply the market. The period from June of one calendar year to May of the following calendar year seems to be the nearest approach to a "crop year."

PART III

Forecasting Average Steer Beef Prices One Year in Advance

A large number of factors cause the variations in beef steer prices. Some of these factors are very important and are well known to the producers. This study goes further than to list the important factors. The effect of the factors is measured, which makes possible a definite forecast of the most probable price. A definite forecast of next year's probable average beef steer price will assist the producer in determining his production and marketing plans.

The factors considered in this study must have two qualities; First, the factors must be of sufficient importance so that their effect over the past twenty years can be measured. Second, in order that a forecast can be made the factors must be such that they can be known before the "crop year", June to May, begins. Study has shown that the factors which meet these qualifications are (1) beef population, (2) direction of price change, (3) mid-west corn-hog ratios the previous fall and (4) the previous spring (showing the future of the hog industry within the next year), and (5) the growth of demand for beef. By measuring the effect of these five factors it is possible to make forecasts of the annual average price of beef steers at Portland which will inform the producer as to the outlook for the coming season.

Relation of Numbers of Beef Cattle to Beef Prices

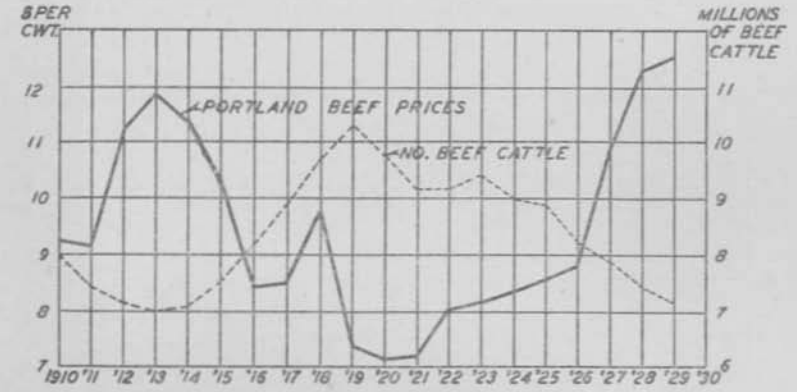
Production of beef is the most important factor determining the prices which producers receive. The receipts of cattle at markets from month to month cannot be used as the measure of production, since the purpose of this part of the study is to forecast future prices. A measure of production which will be available long before marketing time, must be obtained. Numbers of beef cattle in the eleven western states is such a measure of future market supply. Each January the United States Department of Agriculture releases data on the number of cattle in each state of the United States. From this sum should be subtracted the number of dairy cows two years old or over. The remainder is the number of beef cattle and young stock. Since the situation in Idaho and Pacific Northwest is intimately tied up with the situation in other range states, it seems advisable to study the relation of Portland beef prices to the numbers of beef cattle in the eleven Far Western states.

Chart V illustrates the fact that when the numbers of beef cattle are large, the tendency is for the price of beef cattle to be low. On the contrary, as occurred from 1924

to 1929, when the numbers of beef cattle decline, the tendency is for the price of beef cattle to rise. Beef population will probably increase for several years following 1929, since producers have received high prices from 1927 to 1929. In response to this increased production, steer

CHART V.

ANNUAL AVERAGE PRICE OF BEEF STEERS AT PORTLAND, 1910-1929 AND THE NUMBER OF BEEF CATTLE IN THE FAR WESTERN STATES THE PRECEDING JANUARY.



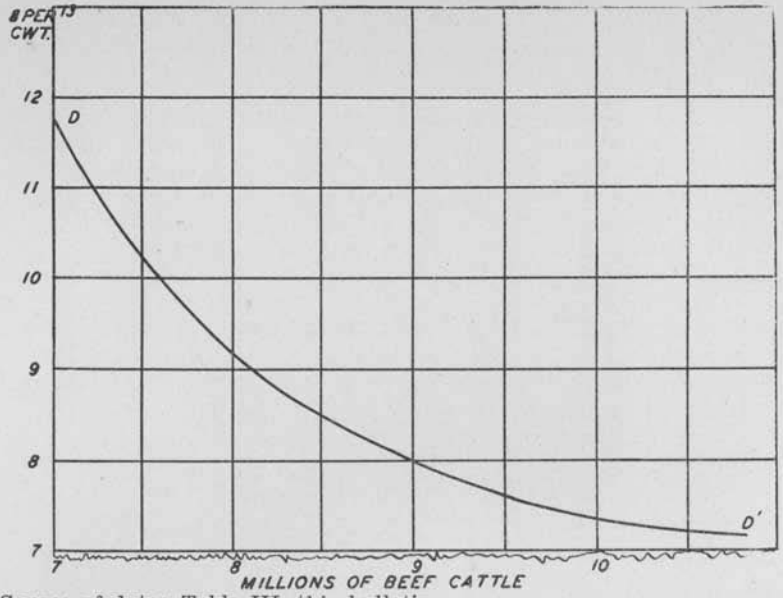
Source of data: Prices from Table III. this bulletin. Beef numbers from current issues of the U. S. Dept. Agric. Yearbook.
Beef prices change in a direction opposite to beef numbers.

prices can be expected to move downward for a few years, following 1929.

The degree of relationship between the two factors, beef steer price and numbers of beef cattle, can be measured. It is possible to forecast prices when the production or numbers of beef cattle is known. In this case, it was found that when the data on numbers of beef cattle, released in January, are studied. it is possible to forecast the general movement of beef prices in the following "crop year"; that is, from the following June to May. By a study of Chart VI the producer can estimate the probable effect of a given number of beef cattle on the price of beef steers at Portland the following "crop year." For instance, the number of beef cattle in the Far West on January 1, 1926, was 8,266,000. To make an estimate of the probable price in 1926 one should read along the base of Chart VI until he comes to slightly over half way between the point marked 8.0 million and the point marked 8.5 million. Then he should read up on the chart until the line DD' is touched. Then he should read horizontal to the left until the scale on the left side of the chart is touched. The point at which the scale is touched is the probable

CHART VI.

THE RELATION OF THE NUMBERS OF BEEF CATTLE IN THE FAR WESTERN STATES TO PORTLAND STEER PRICES.



Source of data: Table III, this bulletin.

From this chart the reader can estimate the probably steer prices, in so far as that price is affected by beef numbers.

price found by this method for "crop year" 1926. This price would be approximately $8.70 per cwt. at Portland. This estimate is made from an examination of beef population factor only and must be modified for the effect of factors considered below. However, beef population is the most important factor, and if producers will watch the general movement of this supply factor, they will have a fairly definite idea of the future movement of beef prices.

Effect of the Direction of Price Change on Future Beef Prices

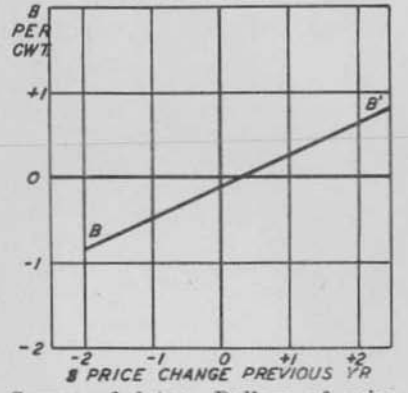
The beef population data considered above is made up of a mixture of all types of beef cattle. The data does not indicate the number of steers ready for market, of heifers being kept back for production purposes, of calves, or of old cows. The incomplete nature of the data may be corrected as explained below. When prices are rising producers hold back more heifers for production purposes and hold their steers to a more mature age. The result will be that the marketed supply of beef cattle will be smaller in proportion to the beef population than usual. On the contrary, as the steer prices fall, the tendency will be to reduce production. Fewer heifers will be kept for breeding

purposes and steers sold at a younger age. Therefore, it seems that if a measure can be made of whether the general movement of beef steer prices is up or down, that this will give an indication of the proportion of the beef population which producers will market.

The general up or down movement of steer prices may be measured by the difference between the price of the year before and of two years before. For instance, if the effect of the general movement of beef steer prices on the price of the particular "crop year," June 1926 to May 1927, is to be studied, the difference between the 1924-1925 price and the 1925-1926 price should indicate the direction of price change.

The difference between the 1924-25 and the 1925-26 prices was $0.18 per cwt. To measure an effect of a previous price change of $0.18 per cwt. on the 1926 price one should read along the base of Chart VII until $0.18 is reached and then read up until the line BB' is reached and then read horizontal to the left until the scale on the left side of the chart is reached. The effect of direction of price change is measured on this latter scale. In the case of 1926 where the previous price change was only $0.18 per cwt. the effect of this factor was so small as to be unmeasurable. Thus far the estimate of $8.70 per cwt. based on numbers of beef cattle, remains unchanged. If the increase in beef price the preceding year had been $1.00 per cwt. this would have tended to raise the beef price the following year by about $0.30 per cwt. In that case the estimated price would now stand $8.70 plus $0.30 or $9.00 per cwt.

CHART VII.
THE EFFECT OF THE DIRECTION OF PRICE CHANGE ON BEEF PRICES.



Source of data: Dollars of price change previous year from Table IV. this bulletin.

When the general movement of beef prices is upward, producers hold back more stock for breeding purposes, forcing prices still higher. The opposite is true when the general movement of beef prices is downward.

Relation of the Hog Situation to Beef Prices

The hog situation affects Far Western beef prices in two ways. First, if Corn Belt feeders are feeding a larger than usual number of hogs, there is a less active demand for Western feeder steers. As a result more beef cattle are

left in the Far West to supply the markets of this area, and therefore, Far Western prices are depressed. Second, if hog prices are low, consumers will be inclined to substitute pork for beef in the diet. These two factors tend to work together to reduce or raise Far Western beef prices. When large numbers of hogs are being fed, the resulting heavy marketings reduce the hog prices. This coincidence is particularly true over a period as long as the twelve months, June to May.

The future hog situation can be known quite accurately by the study of past and present corn-hog ratios. It has been found that over a period of about twenty years, one hundred pounds of heavy hogs at Chicago equals in price about eleven and four tenths bushels of corn. When the price of hogs rises relative to corn so that one hundred pounds of hog sells for more than eleven and four tenths bushels of corn, producers in the Corn Belt have more sows farrowed. When hogs become cheap relative to corn, Corn Belt farmers find it more profitable to reduce hog production and sell their corn (or feed it to beef or sheep). The response of producers to the relation of hog and corn prices is due to the fact that corn is the feed upon which the hog is grown and fattened.

It takes from a year to a year and a half for a change in the relation of corn and hog prices to bring about changes in the number of hogs in Middle West and in the market supply. For example. if hog prices are unusually high relative to corn in a given fall, producers will usually increase spring farrowings. The result is that producers must use much of the next fall's corn crop to fatten these spring pigs. As a consesuence, there will be a less active demand for feeder steers. At the same time the winter supply of fat hogs will increase, leading to lower hog prices and a substitution of pork for beef in the diet.

If hog prices are high relative to corn prices in a given spring, fall farrowings of pigs will be increased. Corn belt farmers must store corn to fatten these pigs for the following spring and summer market. As a result the demand for feeder steers will be less active when sufficient time has elapsed for the corn-hog ratio to affect hog production. The opposite of all of this will be true if corn is high relative to hogs. Producers curtail hog production and the demand for feeder steers will be more active.

If it were possible to forecast next fall's corn production and price this factor would also affect the demand for feeder sters. If corn prices were low, Corn Belt farmers can afford to bid up the price of feeder steers and fatten

these steers on a smaller margin between the price of feeder and fat cattle. At present it is impossible in the spring to forecast the corn price of the following fall. The relation of actual corn prices to actual steer prices is presented in Part IV.

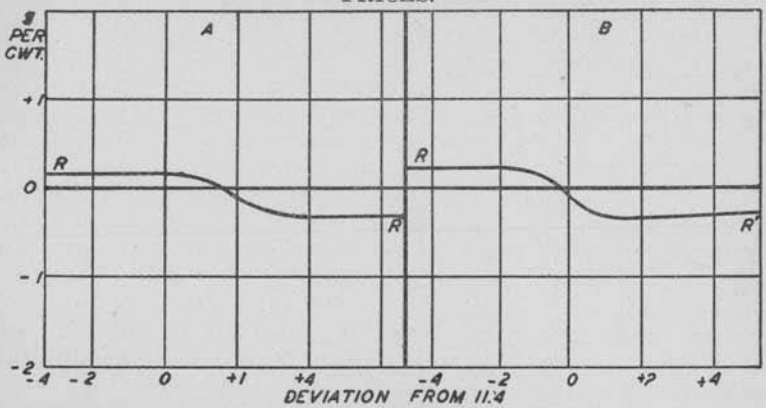
Changes in the market supplies of hogs in the Middle West affect hog prices on the Pacific Coast through interregional shipments of cured pork products. If hog marketings are heavy at Chicago, the Far Western markets will be flooded with low-priced, high grade ham and bacon. Pacific Coast demand for beef will decline as a result.

The market supply of hogs can be forecast by the analysis of corn-hog ratios explained above. It seems, therefore that fall and spring corn-hog ratios should accurately forecast the affect of the hog situation on the demand for feeder steers the following fall.

The measurement of the effect of Middle West corn-hog ratios on Portland steer prices will be made clear by analysis of the season of 1926. In the fall of 1925 (Aug-Nov.) the corn hog ratio was 13.3 or +1.9 deviation from the twenty year average of 11.4. Reading along the horizontal base line of Chart VIII-A until about +1.9 is reached and then reading up until the line RR' is touched, it seems that the corn-hog ratio of 13.3 will lead to a $.25 per cwt. decrease in the average annual Portland beef prices, June 1926 to May, 1927. Considering the factors of beef popula-

CHART VIII.

THE EFFECT OF MIDDLE WEST CORN-RATIOS THE PREVIOUS FALL (A) AND THE PREVIOUS SPRING (B) ON PORTLAND STEER PRICES.



Source of data: Table IV, this bulletin.

As hog prices become high in relation to corn prices, hence raising the corn hog ratios, the demand for Western feeder steers declines. This reacts unfavorably on Portland steer prices.

tion. direction of price change, and the corn-hog ratio the previous fall, the forecast of Portland beef steer prices in 1926 would be 8.45 per cwt.

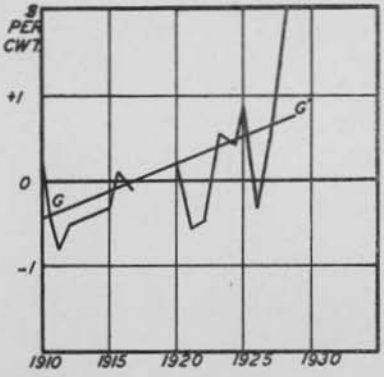
Apparently the corn-hog ratio of 12.4 (11.4+1.0) has the maximum effect on steer prices. Corn-hog ratios higher than this have no greater effect. Also corn-hog ratios of less than 10.4 (11.4–1.0) have no greater effect than ratios of 10.4. Changes in the ratio between 10.4 and 12.4 are very important and their effect should be noted.

The corn-hog ratio in the spring of 1926 was 17.9 or deviation of +6.5 from 11.4. Reading along the horizontal base line of Chart VIII-B until about +6.5 is reached and then reading up until the line RR′ is touched, it seems that the corn-hog ratio of 17.9 in the spring of 1926 will lead to $.22 per cwt. decrease in Portland steer prices the following "crop year."

Thus far the effect of beef numbers, the direction of price change, and the hog situation, on steer prices has been analyzed and the average effect measured. Forcasts for the "crop year" 1926-27 have been used as an example. Beef numbers on January, 1926, showed the most probable price would be $8.70 per cwt. No change in this estimate was made necessary by direction of price change since the price change between 1924-25 was only $.18 per cwt. The corn-hog ratio for the fall of 1925 required $–.25 change in the beef price estimate. The corn-hog ratio of the spring of 1926 required a further change of $–.22. Thus far the estimate of beef prices in 1926 would be $8.23 per cwt. One factor remains to be considered—growth of demand.

Effect of Growth of Demand on Beef Prices

CHART IX.
THE GROWTH OF DEMAND FOR BEEF STEERS.



Pacific Coast consumers are now willing to buy more beef at a higher price than before the war.

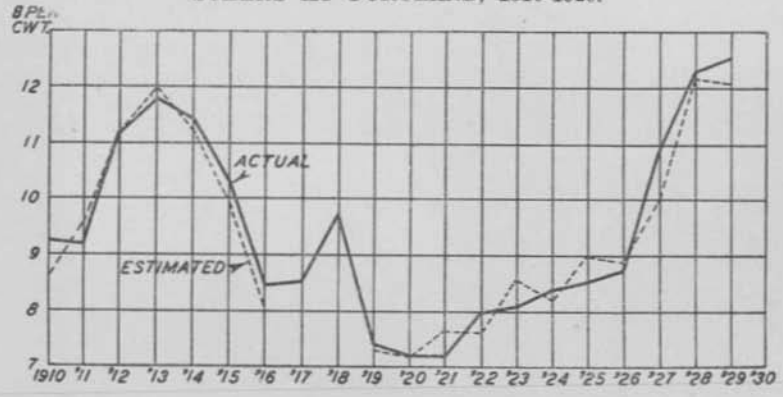
Increasing population and increasing per capita wealth have led to growth in demand for beef. The same number of beef cattle in the Far West would sell for more in terms of Portland prices of 1928 than in 1912. The average effect of the growth of demand is presented in Chart IX by the line GG′. The growth of demand had been such that by 1926, the estimated price of steers would be increased by $.64 per cwt. Combining the effect of this factor with the effect of the factors

previously considered, results in a price estimate of $8.87 per cwt. for the "crop year" 1926-27, the actual price being $8.76.

Summary of Part III

The estimated price for each year from 1910 to 1929 was found in the same way that the 1926 estimate was made. The years 1917 and 1918 were omitted because of the artificial demand of war times. The actual and es-

CHART X.
ACTUAL AND ESTIMATED ANNUAL AVERAGE PRICES OF BEEF STEERS AT PORTLAND, 1910-1929.



Source of data: Table V, this bulletin.
By consideration of factors known in advance it has been possible to anticipate the annual average steer price before the "crop year" begins.

timated prices for each year from 1910 to 1916 and from 1919 to 1929 are presented in Chart X. As a rule the forecasted price was close to the actual price.

The methods of forecasting beef prices as described above is not such that forecasts always will be correct. Unusual factors which cannot be known in advance will enter in particular years. The result will be that the average effect of known forces may be offset by an unusual force. The fact that the actual price was higher than that estimated in 1919 was influenced by business prosperity of the period. Prices lower than that estimated in 1921-22 and in 1929-30 were due to the severe business depression of those two seasons. Another illustration of an unusual situation was in 1923, 1924, and 1925 when actual prices were below estimates. Producers had suffered such severe financial losses previous to these three years that instead of increasing their herds as prices arose, they were forced to market heavily to avoid bankruptcy. But

by 1926-27 to a certain extent, and to a great extent in 1927-28, producers held back stock to increase their herds and as a result prices rose greatly in 1927-28.

Price forecasts based on Charts VI to IX cannot be used blindly. Such forecasts show the average effect of the most important forces which can be known before the crop year begins. These forecasts should be modified for such other factor as are applicable at a particular time. For example, the probable state of business activity can be known fairly accurately several months in advance. The price of lamb no doubt had some effect on beef prices. A study of lamb prices published in 1927 (Ezekiel Mordecai, Factors Related to Lamb Prices, Journal of Political Economy, April 1927 P. 257) shows that for every ten per cent variation in beef steer prices there has usually been a three per cent variation in lamb prices. The latter prices probably affect steer prices, although no measurable relationship was found in the case of the prices of the two products at Portland. Lamb is becoming increasingly important in the diet, although up until recently, the consumption of lamb has been small in the Pacific Coast states. Beef producers should watch the movement of the lamb price cycle. It is a shorter cycle than the beef cycle, since the production of lambs can be increased or decreased more quickly.

The dairy situation is also significant. If dairy products prices are low, old cows will be dumped on the market for slaughter. If dairy products prices are high, some cows may be diverted from dairy production to beef production; particularly east of the Rocky Mountains where dual purpose cows are abundant. Usually the dairy cycles and beef cycles move together. However, the dairy industry did not feel the depression of 1920 to 1925 due to a greatly expanded demand for dairy products. The dairy cycle moved independently of the beef cycle during that period. As a result it was not possible to find a measurable relationship between beef prices and dairy products prices. Indications at present show that the dairy industry has expanded to meet the increased demand for its products, and close relationship between the dairy cycle and the beef cycle will return. Beef producers should watch the dairy situation.

The forecasts of steer prices based upon the use of Charts VI to IX, will show the average effect of forces known in advance. Unless there is a strong reason to modify these forecasts, these estimated prices form the best basis for planning future production of beef cattle in Idaho.

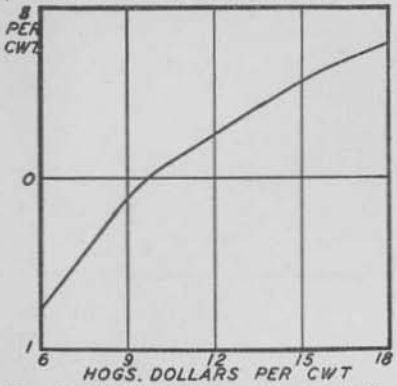
PART IV
Month to Month Movement of Portland Prices

The producer frequently has a choice of the particular time within the year when he will sell his cattle. Therefore, he will be anxious to know what factors cause month to month changes in prices. Definite forecasts of monthly prices are not possible for two reasons. First, some factor affecting monthly beef prices are not known sufficiently in advance to forecast prices even a month ahead. Second, even if factors current with the prices quoted are used, the monthly price estimates based on the measurement of the effect of important factors are only fairly reliable. The factors considered below are important as affecting the general movement of monthly prices, but do not lead to definite forecasts of a certain price for steers in a certain month. One should not consider the effect of just one of these factors ifluencing actual monthly prices, but the net effect of all of the forces considered in this section.

Effect of Current Hog Prices on Portland Beef Prices

Hog prices affect the demand for beef. In Part III, hog prices were forecast by use of corn-hog ratios. In studying the monthly beef prices, the effect of the hog situation can be better measured by using the actual hog prices.

CHART XI.
THE RELATION OF HOG PRICES TO THE MONTHLY STEER PRICES AT PORTLAND.



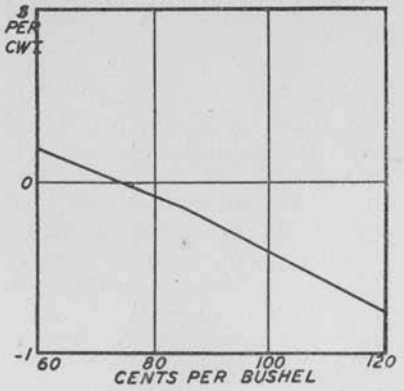
Source of data: Hog prices obtained from annual reports of the Portland Union Stock Yards.
High hog prices assist in raising beef prices and vice versa.

The relation of hog prices to deviations of monthly beef prices above and below forecasts of annual average beef prices as presented in Chart X and explained in Part III, is shown in Chart XI. When hog prices are high, beef prices tend to be higher than would be expected otherwise. When hog prices are low, pork is substituted for beef in the consumers' diet and the price of beef steers is lowered. At times whes hog prices are unusually low, beef producers cannot expect as high prices for their steers. When hog prices at Portland are over 112 per cwt., the influence on the price of beef is markedly toward higher prices than would otherwise be expected.

Effect of Middle West Corn Prices on Portland Steer Prices

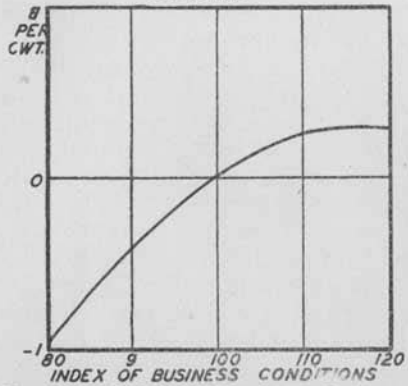
The price of corn in the Middle West seems to influence the price of beef in the Far West in all months of the year. If the price of corn is very low, the demand for western feeder steers is very active. So many cattle are shipped out of the Far Western states that the Pacific Coast markets are relatively undersupplied. As a result prices are higher in Portland, not only in the fall but in the winter and spring as well. The average effect of Middle West corn prices on Portland beef prices in all months of the year is presented in Chart XII.

CHART XII.
RELATION OF FALL CORN PRICES IN THE MIDDLE WEST TO PORTLAND STEER PRICES.



Source of data: Corn prices, Table IV., this bulletin.
High corn prices reduce the demand for Western Feeder steers.

CHART XIII.
THE RELATION OF BUSINESS ACTIVITY TO PORTLAND STEER PRICES.



Source of data: Clearings Index of Business published in "Business Cycles and Business Measurements" Snyder, Carl, used 1910-1918. Index of National Business, published by Silberling Business Service, Berkeley, California, used 1919-1929.
Consumers buying power, as reflected in the demand for beef, varies directly with business activity.

Effect of Business Activity on Monthly Beef Prices

The relation of business conditions to the deviation of monthly beef prices from the forecasted annual average price is shown in Chart XIII. Normal business activity is represented by 100 on the scale on the base line of the chart. When business activity falls below normal, the demand for beef falls considerably. Such was the case in 1921 and for several months following October, 1929. When business is active, as in 1919, 1923, and part of 1928 and 1929, the demand for beef is stimulated. In planning the time of marketing the producer should consider the effect of probable business conditions.

Normal Seasonal Movement of Beef Prices

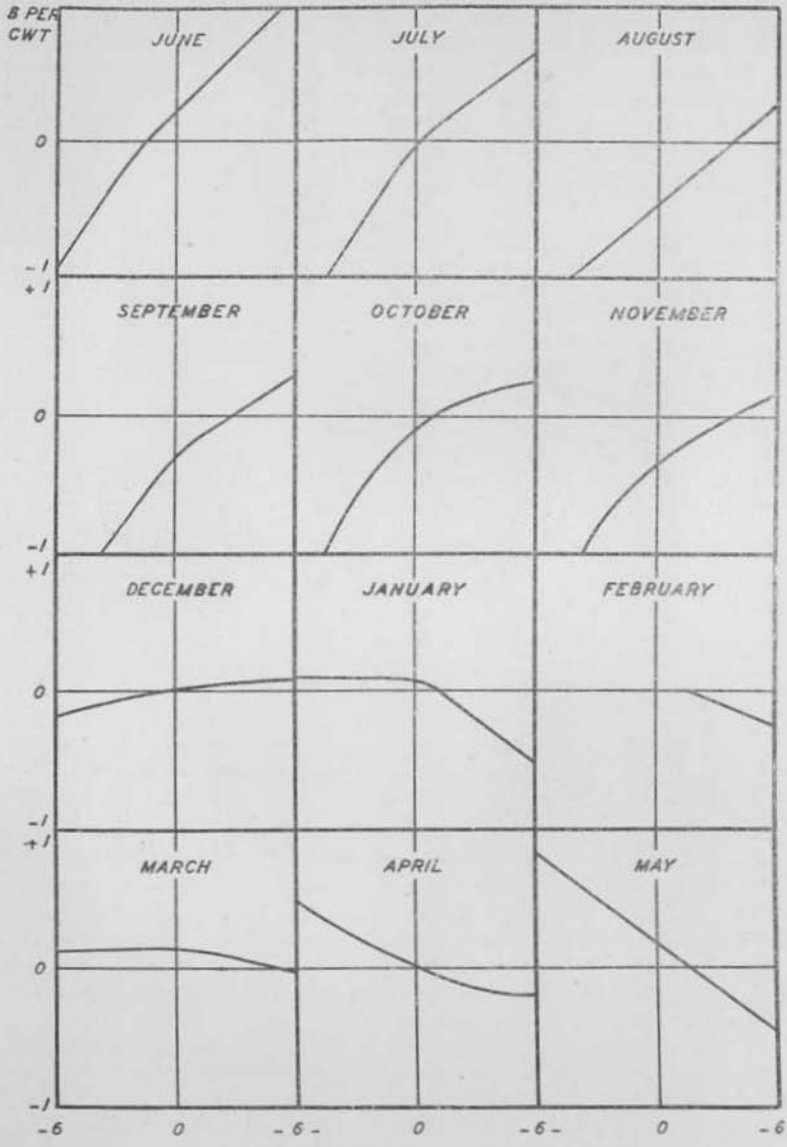
The first three parts of this study analyzed primarily the movement of annual average beef prices at Portland. Factors considered so far in Part IV are those causing monthly prices to vary from the forecasted annual average. All months of the year are affected similarly by each of the factors: Portland hog prices, national business conditions, and Middle West corn prices. Hence these factors can also influence the actual annual beef price. The most important factor causing monthly prices to vary from the annual average price is the normal seasonal movement. Summer and fall prices are usually lower than the winter and early spring prices. The method of raising and fattening beef cattle in the Far West leads to this fact.

The analysis of monthly prices does not support the conclusion that winter beef prices are always higher than summer prices. Furthermore, even if winter prices are higher, they are not always higher to the same degree. There is no single normal seasonal movement of Portland beef prices. The normal seasonal movement is different when the general year to year movement of beef prices is downward than when the general movement is upward.

When the beef price cycle is in the declining stage, summer and fall beef prices are higher than usual in relation to the annual average. There seem to be two reasons for this situation. First, no single beef crop year "June to May" is completely separated from another crop year as would be true of the potato "crop year." Therefore, the increase of market supplies does not come suddenly with the opening of a new "crop year" in which the total annual supply is to be larger and the annual average price lower. The increase of marketings is gradual, but by winter the increased supply is noticeable and prices fail to climb as high in relation to the annual average as is usual in this latter season. Second, there seems to be a resistance to price declines. If, during the summer and fall, prices at any time start to decline sellers feel that it is a temporary situation, and hence hold some stock for higher prices. These latter accumulate so that by winter and spring the markets are so liberally supplied that prices either do not rise as is usual at this season or may even fall below the prices of the previous summer.

When the beef price cycle is in the upward stage the opposite events occur. The prices of summer and fall are lower than usual in reference to the annual average. These lower prices so stimulate consumption that by spring such a shortage exists that prices are raised far above their usual relation to the annual average. This seasonal movement, occuring when the price cycle is rising, is due in

CHART XIV.
THE SEASONAL MOVEMENT OF MONTHLY STEER PRICES AT PORTLAND.



The normal seasonal movement of steer prices changes with the various stages of beef price cycle.

part to the fact that there is no completely distinct "crop year" for beef. Also it appears that when beef prices are improving, in general, every slight increase is met by heavy marketings. Such is the course of events during the summer and fall when the price cycle is moving upward. Cattle are sold so freely during these months that the market is sparsely supplied during the winter. Prices rise unusually high in relation to the annual average in the latter period.

Chart XIV enables one to make an estimate of the probable seasonal movement of beef prices. In this chart the deviation from the annual average of the price for each of the twelve months is analyzed separately. Since it has been shown that the amount which any particular price will ordinarily vary from the annual average depends on the stage of the beef price cycle, it is necessary to find some factor which will indicate the stage of the cycle. In Part III it was shown that the chief factor back of the price cycle is change in the the beef population. Therefore changes in beef population should indicate the type of seasonal movement which will hold true of monthly prices in a particular year.

Chart XIV presents the average effect of changes in beef population on the amount that the price in any particular month will deviate from the annual average, other things being equal. For instance, it is found that if the beef population increased in a certain January over the preceding January, the following July price would probably be greater than the annual average, June to May, other factors being equal. On the contrary, increasing beef population indicates that the price in the April which follows the above July would usually be below the annual average for the crop year.

The variations of the normal seasonal movement of beef prices with the various stages of the beef cycle should be of great assistance to producers in interpreting the price situation at any particular time. If the forecast for the annual average price as made in Part II is for lower prices, the producers should not lose confidence in these forecasts if the summer and early fall prices remain satisfactory. That is usual when the price cycle is declining. If no interfering forces enter, the following winter and spring prices will be unusually low. Producers should not discredit forecasts of rising prices even though summer and fall prices do not seem to be better than in the previous year. The chances are that winter and spring prices will be unusually high in such cases. This analysis of changes

in the seasonal movement of beef prices with the price cycle should be of great value to those who feed for winter marketing.

Effect of Idaho Hay Prices on Portland Beef Prices

The normal seasonal movement of Portland beef prices was presented in the preceding section. This usual movement of beef prices within the year may be upset by the feed situation. The availability of feed, including the condition of the range, should be well represented by hay prices. Therefore the relation of Idaho hay prices to Portland beef prices were analyzed. The results are presented in Chart XV.

When hay is high priced between the months of June to November the tendency of the producer is to dump unusually large numbers of cattle on the market. Stock which would ordinarily be held, or sold, for finishing during the winter are fattened somewhat and dumped on the market in the summer and fall. Stock which would ordinarily have been held to a greater maturity is sold rather than carried through the winter on high priced feed. Probably more breeding stock is sold for slaughter than usual. The effect of these heavy marketings is lower beef prices during the period between June and November than would be expected otherwise.

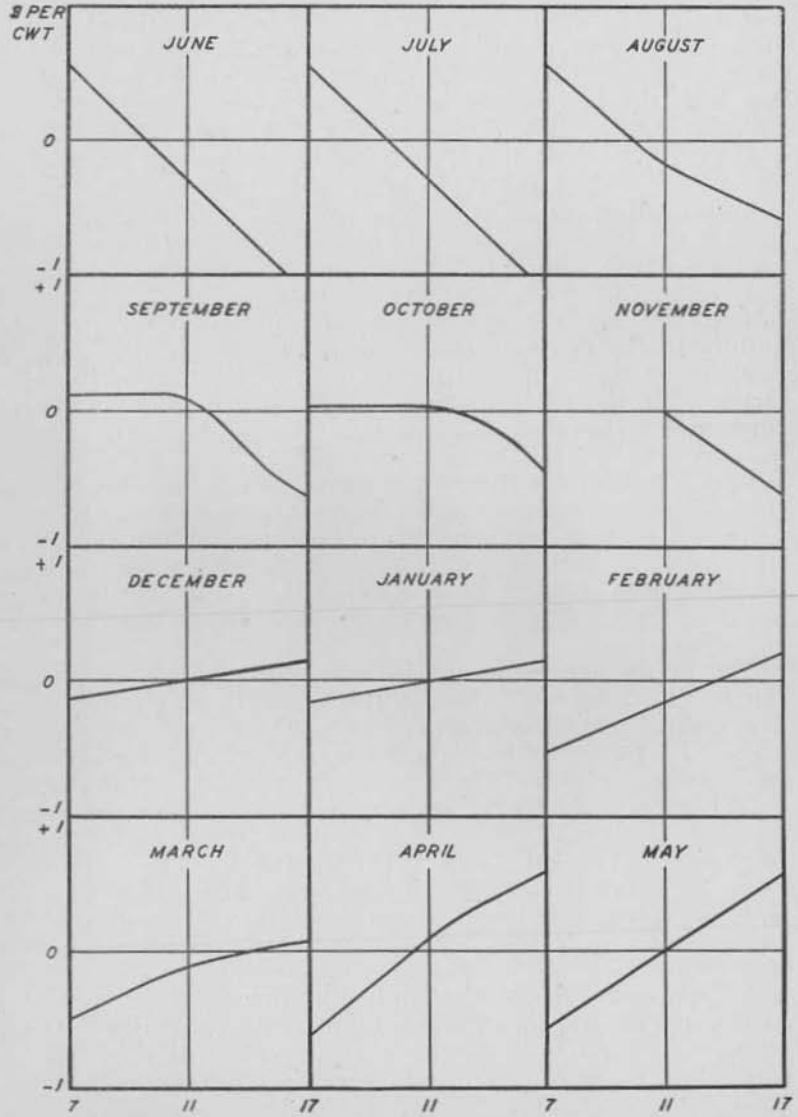
If the price of hay during the summer and fall is high, winter fattening for slaughter is discouraged. In such seasons the price of beef is unusually high the following winter and spring.

If the price of hay, as representative of the feed situation, is low during the summer and fall, the opposite effects on the beef prices are noticed. The demand for steers for winter feeding is active. Cheap feed encourages the holding of yearlings and breeding stock. When the price of hay is low, the summer and fall price of beef is higher than would be expected otherwise.

The fact that low feed prices encourage the feeding of a large number of cattle for the winter and early spring market depresses the price of finished beef at Portland from December to May. These lower prices probably indicate a narrower feeder margin. Feeder prices were bid up in the fall, and slaughter prices were depressed in the winter. Yet the feed-lot owner may not lose due to low feed prices.

The relation of Idaho hay prices to Portland beef prices in each month of the crop year are presented in Chart XV. Each month must be analyzed separately. The relations brought out in this chart should be of some value to the range producers and of great value to any one who feeds steers for the winter market.

CHART XV.
THE RELATION OF IDAHO HAY PRICES TO MONTHLY PRICES OF STEERS AT PORTLAND.



Source of data: Hay prices, Table IV., this bulletin.
The feed situation as represented by hay prices, may cause the usual seasonal movement of steer prices to change.

One caution is necessary in interpreting Chart XV. If in September, low hay prices indicate higher fall beef prices and lower winter beef prices, it should not be concluded that the fall prices quoted will be higher than the winter prices in dollars per cwt. Almost without exception fall prices in dollars per cwt. are lower than winter prices. What Chart XII indicates is that if hay prices are low, the fall prices in relation to the annual average will be higher than they usually are, and winter prices will be lower than usual in relation to the fall price.

STATISTICAL APPENDIX

The limitations of the data on beef numbers are fully realized. They are, at best, only a rough approximation of beef cattle numbers. They should be looked upon as only indicating the general movement of beef supply. It is also realied that if the general movement of the beef supply in the region east of the Rocky Mountains were to vary from the supply situation in the Far West the consistency of the relationships here found would be greatly impaired. However, considering the width and relative homogeneity of the beef cattle market, any difference in supply situation in the two regions will be of short duration. The beef numbers data for states east of the Rockies were not included due to the importance of the dual purpose cow in this region. A clear demarkation between a dairy cow and a beef cow, such as exists in the range areas is essential if beef numbers data are to indicate beef supply.

The relationships found in this study were all worked out by the briefer method graphic curvilinear correlation. The validity and usefulness of this method has been exemplified by past studies in agricultural prices. The index of multiple correlation found between annual deflated Portland beef prices and the supply and demand factors which seemed to forecast these prices was .916 for the period 1910-1927, with 1917 and 1918 omitted. The standard error of estimates was $.57 per cwt. The index of multiple correlation between monthly deflated Portland steer prices and supply and demand factors for the same period was found to be .892. The standard error of estimate was $.73 per cwt. However, definite forecasts of monthly prices are so inaccurate as to be of little value. The curves shown in charts indicate the average effect of these forces, but actual cases departed considerably from these averages.

The practical future use of this study depends upon two conditions. First, the same, and no other, basic forces must be working in the beef market. The relative importance of these forces must not change. The author at pres-

ent knows of no reason why this assumption should not be valid, except in so far as qualifications have already been made in the text. Second, the representative character of the data on beef cattle numbers must not change. If there has existed a constant bias in these data, this bias must continue.

Table I.

Price of Beef Steers at Portland and at Chicago and the Index of Price Level. Annual Average 1910-1929. (Months May to June Averaged.)

Year	Portland Price dollars per cwt.	Chicago Price dollars per cwt.	Index of price level
1910-11	6.18	6.47	67.1
1911-12	6.11	6.35	66.3
1912-13	7.50	8.08	69.8
1913-14	7.90	8.34	69.0
1914-15	7.55	8.43	68.3
1915-16	7.58	8.83	74.2
1916-17	8.40	10.28	97.9
1917-18	10.79	12.61	124.8
1918-19	13.15	15.59	133.8
1919-20	11.18	14.45	150.4
1920-21	9.15	11.54	130.3
1921-22	6.66	7.83	93.4
1922-23	8.07	9.17	100.8
1923-24	8.13	9.53	98.6
1924-25	8.37	9.38	99.8
1925-26	8.53	10.08	102.7
1926-27	8.76	9.84	97.4
1927-28	11.36	12.79	96.2
1928-29	12.35	14.96	97.5

Source of data: Portland prices averaged from monthly quotations in Annual reports of Portland Union Stock Yards. Chicago prices averaged from monthly quotations in Table 359, U. S. Dept. Agriculture Yearbook for 1930.

Table II.

Prices of Beef Steers at Portland, Monthly, 1910 to 1930, Adjusted to 1926 Price Level Base.

Year and month	Portland price per cwt.	Year and month	Portland price per cwt.
1910-11	8.75	June	11.97
June	8.25	1913-14	12.20
	8.25		12.27
	8.25		11.82
	8.18		11.63
	8.75		11.25
	10.13		11.63
	10.50		11.70
	9.95		11.70
	9.80		12.00
	10.35		12.00
May	10.25	May	12.00
June	9.30	June	11.82
1911-12	9.00	1914-15	11.25
	8.67		10.88
	8.33		10.43
	8.33		10.62
	8.52		10.88
	8.63		11.25
	9.20		11.82
	9.38		11.82
	9.80		11.67
	10.43		11.63
May	10.70	May	11.97
June	10.50	June	11.16
1912-13	10.13	1915-16	10.28
	10.70		10.25
	10.68		10.22
	10.58		9.78
	10.58		9.97
	10.80		9.82
	11.82		10.13
	11.82		9.97
	12.00		10.54
	12.23		10.96
May	12.87	May	10.83
1916-17	9.62	June	7.99
June	9.55	1919-20	7.30
	8.26		7.51
	7.90		7.45
	7.52		7.15
	7.24		6.74
	7.67		7.42
	8.61		7.35
	8.58		7.06
	8.91		7.07
	9.02		7.38
May	8.[illegible]	May	7.62

Table II. (Continued)

Year and month	Portland price per cwt.	Year and month	Portland price per cwt.
1917-18		1920-21	
June	8.34	June	6.97
	7.82		6.43
	6.72		6.37
	7.39		6.27
	7.97		6.54
	7.75		6.66
	7.78		7.30
	8.59		7.71
	8.93		7.59
	9.08		7.58
	10.57		7.86
May	11.43	May	8.11
1918-19		1921-22	
June	11.15	June	7.25
	9.30		6.88
	9.54		6.50
	9.57		6.00
	9.31		6.00
	8.99		6.30
	9.29		6.95
	9.64		7.63
	10.28		7.63
	10.53		7.88
	10.01		8.38
May	8.92	May	8.63
1922-23		1925-26	
June	8.95	June	9.25
	8.25		8.50
	8.13		8.13
	8.13		8.20
	7.50		8.08
	7.38		8.13
	7.00		8.50
	7.75		8.88
	7.88		8.75
	8.00		8.88
	8.50		8.63
May	8.75	May	8.83
1923-24		1926-27	
June	8.18	June	8.43
	7.93		8.30
	7.75		8.10
	7.63		7.93
	7.38		7.75
	7.43		8.18
	7.88		8.45
	8.25		8.83
	8.50		9.13
	8.93		9.50

Table II. (Continued)

Year and month	Portland price per cwt.	Year and month	Portland price per cwt.
	8.88		10.38
May	8.88	May	10.15
1924-25		1927-28	
June	8.88	June	9.88
	8.13		9.88
	7.88		9.50
	7.63		9.63
	7.38		9.38
	7.88		19.12
	8.50		11.13
	8.25		12.25
	8.00		12.30
	8.63		12.30
	9.63		12.13
May	9.75	May	12.13
June	12.10		
1928-29	11.93		
	12.13		
	12.43		
	12.58		
	12.58		
	12.43		
	12.00		
	11.68		
	12.00		
	12.83		
May	13.50		
1929-30			
June	12.63		
	12.38		
	12.00		
	11.30		
	10.75		
	11.13		
	11.18		

Source of data: Annual reports of the Portland Union Stockyards.

Table III.

Prices of Beef Steers (adjusted) at Portland and numbers of Beef Cattle in Eleven Far Western States 1910-1929.

Year	Price per cwt.	Number beef cattle preceding Jan. (thousands)
1910-11	9.28	8,000
1911-12	9.19	7,466
1912-13	11.23	7,148
1913-14	11.85	7,030
1914-15	11.34	7,131
1915-16	10.33	7,605
1916-17	8.48	8,235
1917-18	8.53	8,903
1918-19	9.71	9,718
1919-20	7.42	10,389
1920-21	7.12	9,767
1921-22	7.17	9,223
1922-23	8.02	9,216
1923-24	8.14	9,401
1924-25	7.76	9,076
1925-26	8.56	8,900
1926-27	8.76	8,225
1927-28	10.89	7,928
1928-29	12.27	7,542
1929-30	12.67	7,252

Source of data: Prices taken from the annual reports of the Portland Union Stock Yards and adjusted for price level changes. Numbers of beef cattle taken from current U. S. Dept. Agric· Yearbooks.

Table IV.

Miscellaneous factors used in the analysis of Annual and Monthly Fluctuations of Beef Prices.

Year	Price Change Preceding Year	Preceding Fall	Preceding Spring	Price of Corn	Beef Population Change	Price of Hay*
1910	+ .90	+ .55	+3.00	.77	–166	13.65
1911	– .30	+2.07	+ .30	1.11	–534	11.29
1912	– .09	–1.20	–1.06	.90	–318	10.46
1913	+2.04	+ .48	+2.13	1.06	–118	11.10
1914	+ .62	– .27	+ .54	1.07	–101	11.09
1915	– .51	– .52	–1.45	.97	–474	11.99
1916	–1.20	– .84	+1.44	1.00	–630	13.51
1917	–1.66	– .51		1.59	–668	13.13
1918	– .05		–1.64	1.07	–185	13.41
1919	+ .78	+1.27	+1.13	1.04	–671	16.07
1920	–1.97	–2.25	–6.35	.71	–622	10.91
1921	– .22	+ .56	+1.49	.51	–544	8.68

TABLE IV. (Continued)

Year	Price Change Preceding Year	Preceding Fall	Preceding Spring	Price of Corn	Beef Population Change	Price of Hay
1922	+ .05	+1.84	+3.26	.67	– 7	10.75
1923	+ .85	+ .64	–1.55	.87	+165	9.16
1924	+ .10	+2.99	–1.78	1.13	–385	12.14
1925	+ .24	–3.14	– .40	.79	–116	9.19
1926	+ .18	+1.88	+6.50	.75	–655	9.22
1927	+ .20	+1.62	+1.58	.87	–317	9.52
1928	+2.13	– .33	–2.58	.90	–386	10.75
1929	+1.49	+ .70	+1.00		–290	
1930						

Source of data: All of above data not derived as explained in text, except hay prices obtained from U. S. Dept. Agric. Year Books.
Hay prices obtained from Stat. Bul. 17 U. S. Dept. Agric, for 1910-1925. Prices 1925-1929 from current issues of Crops and Markets.
Corn price is for No. 3 Yellow at Chicago, average, August to November.
*Price of hay in Idaho was considerably below this U. S. average.

Table V.

Actual and Estimated Annual Average Top Price of Beef at Portland 1910-1929 (adjusted prices).

Year	Actual price per cwt.	Estimated price per cwt.	Error per cwt.
1910	9.28	8.68	+ .60
1911	9.19	9.60	– .41
1912	11.23	11.33	– .10
1913	11.85	12.00	– .15
1914	11.34	11.32	+ .02
1915	10.33	9.93	+ .40
1916	8.48	8.06	+ .42
1917	8.53		
1918	9.71		
1919	7.34	7.25	+ .09
1920	7.12	7.18	– .06
1921	7.17	7.68	– .51
1922	8.02	7.62	+ .40
1923	8.14	8.60	– .46
1924	8.38	8.24	+ .14
1925	8.56	9.01	– .55
1926	8.76	8.87	– .11
1927	10.89	9.05	+1.84
1928	12.27	12.17	+ .10
1929	12.67	12.11	+ .56