

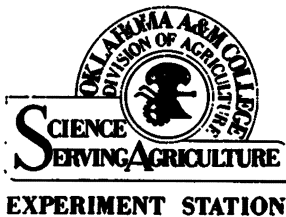
# Beef Cattle Prices

## Seasonal Movements and Price Differentials on the Oklahoma City Market

by

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# Errata Slip

## Bulletin B-486

These errors have been found in Oklahoma Experiment Station Bulletin No. B-486 and should be corrected as follows:

**Page 8.** Last line of paragraph 1 was left off, add as follows:  
with the season and can not be predicted by seasonal indexes.

**Page 9.** Figure 3, "patters" should be "patterns."

**Page 13.** Figure 7 cut line should be changed to read as follows:

**Fig. 7.** Normal Price Relationship Between Classes, Grades and Weights of Slaughter Steers and Heifers, Oklahoma City, 1949-54. There tends to be a rather marked and consistent spread between steers and heifers of a given grade and between steers and heifers of different grades. During the period analyzed there was no apparent difference in price associated with weights for the grades and weights reported.

**Page 16.** Third paragraph should read as follows:

Figure 10 summarizes normal price differentials for choice and prime slaughter calves, 700-900 lb. choice slaughter steers, and two weights and grades of stocker-feeder steers.

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# Beef Cattle

## Seasonal Price Movements and Price Differentials Oklahoma City Market<sup>1</sup>

James S. Plaxico and Jackson L. James

Prices play an important role in the management of cattle on Oklahoma farms and ranches. The individual cattleman can do little to change the general level of cattle prices. However, he can influence the prices he pays or receives, given the general level of cattle prices, by adjusting his cattle system and management practices to seasonal price movements. It is therefore important that producers have knowledge of cattle prices, so that cattle systems and management practices can be adjusted to current and expected price conditions.

There is a rather large and dependable seasonal variation in the price of certain classes and grades of beef cattle caused largely by seasonal variations in supply. Therefore the time a producer buys and sells cattle may have an important effect on the price he pays and receives. In like manner, a producer may, within limits, control the price he pays and receives for cattle by his selection of the type, class, grade, and weight of cattle which he buys and/or produces. This bulletin presents an analysis of normal seasonal price movements and normal price differentials between type, class, grades, and weights of beef cattle on the Oklahoma City market.

### Underlying Causes of Seasonal Movements of Beef Prices

Due to the heavy concentration of beef cattle calving in the spring and the dependence of the industry on the grass season, large proportions of certain classes of cattle are marketed during the fall months. Therefore, there are peaks in the market supply of these classes of cattle during the fall months. As a result prices undergo a seasonal fall drop. With a relatively constant demand for beef, seasonal price movements result directly from seasonally fluctuating beef supplies.

Those classes of cattle most dependent upon the grass season are subject to the greatest degree of seasonal variation. Stocker-feeder cattle are produced almost entirely on grass and therefore are subject to large seasonal movements. On the other hand, high grade finished slaughter cattle can be produced at any time during the year and the supply tends to be relatively uniform throughout the year. Lower grade slaughter steers and heifers are mostly finished on grass, so their prices tend to

<sup>1</sup> This research was carried out as a part of Southern regional project S-27 "An Economic Evaluation of Forage Production and Use on Beef and Dairy Farms." The cooperation and assistance of the cooperating States and Agencies are acknowledged with appreciation.

fluctuate by seasons in the same manner as stocker-feeder cattle. In fact many animals sold in the fall off grass have conformation and degree of fleshiness to make them "two-way" animals; that is, they can be classified as either feeders or slaughter cattle, depending on market conditions. If feeding prospects are favorable they will likely be sold as feeders. Otherwise they tend to be sold for slaughter.

Since seasonal movements of cattle prices are based on fundamental physical and biological factors, there is little reason to expect drastic shifts in the nature or amplitude of seasonal price movements during the foreseeable future. New technologies may be developed which greatly reduce the cost of wintering cattle. If this should occur it would have the effect of dampening or reducing the magnitude of seasonal fluctuations. However, developments over the past 15 year period have had no perceptible effect on the seasonal pattern of beef prices. Therefore, it appears wise to plan farm operations under the assumption that the basic seasonal price relationships described in this bulletin will continue.

## Using Seasonal Price Information in Farm and Ranch Planning

In planning and organizing a farm or ranch business, the goal is to use resources in such a way that the farm family will derive the maximum satisfaction possible from the resources employed. Monetary profit is a very important part of family satisfaction, and prices received and paid are an extremely important determinant of farm profits. Thus a serious study of price relationships is an important part of the managerial function.

In planning and operating their businesses, farmers and ranchers need to understand three over-all types of price data:

- Long term price trends for various items (including cycles).
- The relative prices of various items.
- Seasonal price patterns.

Each type of price data is important in forming expectations of future prices in both long-term and short-term planning. Thus each type of price data is useful in selecting the basic production and marketing system and in making yearly and daily production and marketing decisions.

The data presented in this bulletin relates to long-term normal or average seasonal price relationships. They provide a basis for long-term planning and for evaluating short time shifts and changes in price movements and relationships. However, it is essential that these data be supplemented with short-term outlook information such as may be found in *The Meat and Livestock Situation* which is published by the U.S.D.A., in *Current Farm Economics* published by Oklahoma A. and M. College, or in various commercial publications. This in-

formation will help producers anticipate abnormal relationships and adjust their plans of operation accordingly.

In considering seasonal price and price differential data it is well to keep in mind that price is only one part of the profit equation. Cost of production is the other element involved. It is not always profitable to sell at the season when prices are at their peak. Rather, it is necessary to budget alternative production and marketing schedules in order to ascertain the period when the greatest net returns can be realized.

## **Seasonal Price Movements by Class and Grade**

In this section the data relating to seasonal price movements are presented in terms of index numbers. The yearly average index for each class and grade is 100. In like manner, the price index for any month expresses the normal relationship between the price for that month and the normal yearly average price for that class and grade. That is, the price index for a given month is the normal price for that month expressed as a percentage of the annual average price. For example, an index number of 107 in May would imply that normally the May price of the particular class and grade concerned is 7 percent above the average price for the year.

### **Slaughter Cattle**

The various classes and grades of slaughter cattle exhibit quite different seasonal price patterns. This is to be expected since animals ranging from highly finished steers to poorly conditioned cull cows and bulls comprise the slaughter cattle category.

### **Steers and Heifers**

There is apparently no significant seasonal price movement associated with high-grade slaughter steers and heifers on the Oklahoma City market. (Figures 1 & 2) This applies to the 900-1100 lbs. and the 700-900 lbs. choice slaughter steers and the 800-1000 lbs. choice slaughter heifers. There is apparently slightly more seasonal variation associated with the lower grade animals. The monthly index for choice steers range from only 98 to 101 while the index for the good and commercial steers range from 96 to 102. Prices of slaughter heifers varied slightly more by seasons than did prices of slaughter steers. (Figure 2) The seasonal price index for 800-1000 lb. choice heifers range from 98 to 102 while 700-900 lb. good and commercial heifers ranged from 96 to 104 percent of the annual average. Price variations associated with factors other than the season are sufficiently great to render the greater difference between high and low prices of the lower grades of slaughter steers and heifers.

The greater seasonal variation in prices of lower grade animals is due to the fact that on the average, or typically, the production of lower grade finished slaughter animals is more dependent on the grazing

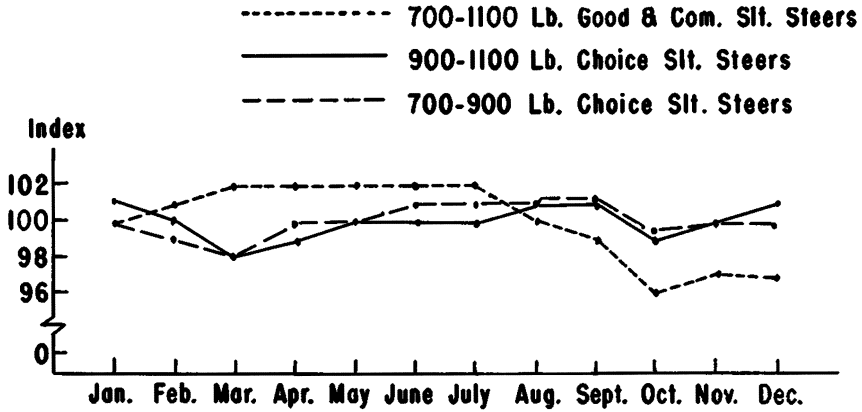


Fig. 1—Normal Seasonality of Slaughter Steer Prices, by Weight and Grade, Oklahoma City, 1949-54. There appears to be no significant degree of seasonal variation associated with the choice grade of slaughter steers reported. There is however a degree of seasonal variation associated with the lower grades, and the difference in the price of the good and commercial grade during the high and low months is significant.

season. These data and analyses suggest that the month in which slaughter steers and heifers of the choice grades are marketed does not, over the long run, significantly affect the price received. It is important to recognize, however, that prices of slaughter cattle and steers have varied significantly between months within a year and can do so again. However, these shifts are not caused by factors associated

### Slaughter Calves

Slaughter calf prices are subject to significant seasonal variations. Furthermore, over the periods analyzed, these monthly price differences have been quite consistent and dependable. Typically, slaughter calves reach a price peak in May (index of 108) and drop to a low in October (index of 91 or 92), and the decline from the May high tends to be quite rapid (Figure 3). It is apparent, however, that the price peak and low in a given year can differ somewhat from the average, due to factors such as grazing prospects.

### Slaughter Cows and Bulls

Slaughter cow and bull prices differ significantly by seasons (Figures 4 and 5). Typically, the months of peak prices of slaughter cows and bulls have been March and April, with October and November being the months of lowest prices. The difference between the prices during the high and low months has typically been from 14 to 20 percent of the annual average price.

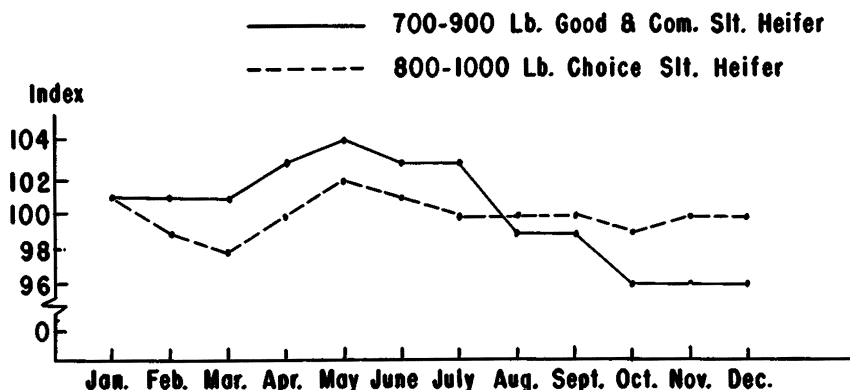


Fig. 2—Normal Seasonality of Slaughter Heifers Prices, by Grades and Weight, Oklahoma City, 1949-54. There appears to be no significant degree of seasonal variation associated with choice slaughter heifer prices reported. However there is a significant degree of seasonal variation in prices of the good and commercial slaughter heifers.

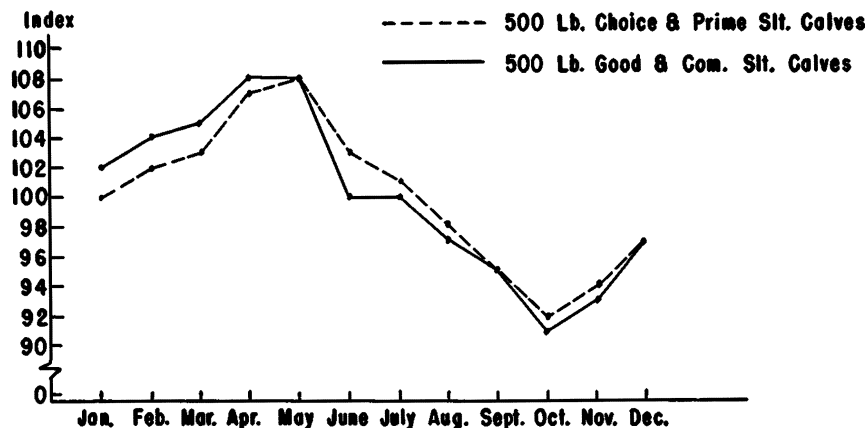


Fig. 3—Normal Seasonality of Slaughter Calf Prices, by Grade, Oklahoma City, 1949-54. There is a significant seasonal price movement associated with each of the grades of slaughter calves reported. The amplitude of fluctuation is the same for the two grades but the seasonal patterns of the higher grades appear to be somewhat more dependable (less variable).

### Stocker and Feeder Cattle

Stocker and feeder cattle prices exhibit an important degree of seasonal variation. This is because stockers and feeders are produced largely on grass and are sold in heavy numbers during the fall months at the end of the grazing season.



Stocker and feeder steer prices reach their seasonal peak in April and May and fall to their annual low in October (Figure 6). This same pattern applies to all five of the weights and grades for which continuous price series are available. However, there is apparently an importance in the magnitude of the seasonal variation associated with the different grades of stockers and feeders. The difference between the prices of the high and low months for the three grades of stockers and feeders is: good, 12 percent of the annual average; medium, 15 percent; and common, 17 percent. There appears to be no important difference in the seasonal pattern of different weights of stocker and feeder steers of the same grade.

Data relative to heifer stocker and feeder cattle on the Oklahoma City market are not available. However there is no reason to expect the seasonal pattern of heifer stocker and feeder cattle to differ significantly from that of steers.

## Price Differentials Between Classes and Grades

This section presents data relating to normal price differences for the animals involved in selected systems of production important in Oklahoma. It should be emphasized that the price differentials pre-

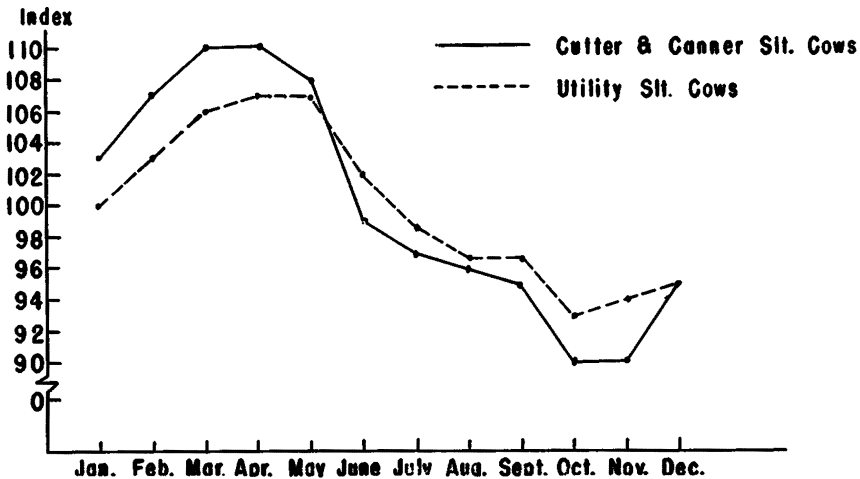


Fig. 4—Normal Seasonality of Slaughter Cow Prices by Grade, Oklahoma City, 1949-54. There is a significant seasonal price movement associated with slaughter cows. The pattern of movement is similar for the two grades reported but the degree of variation is greater in the case of the lower (canner-cutter) grade.

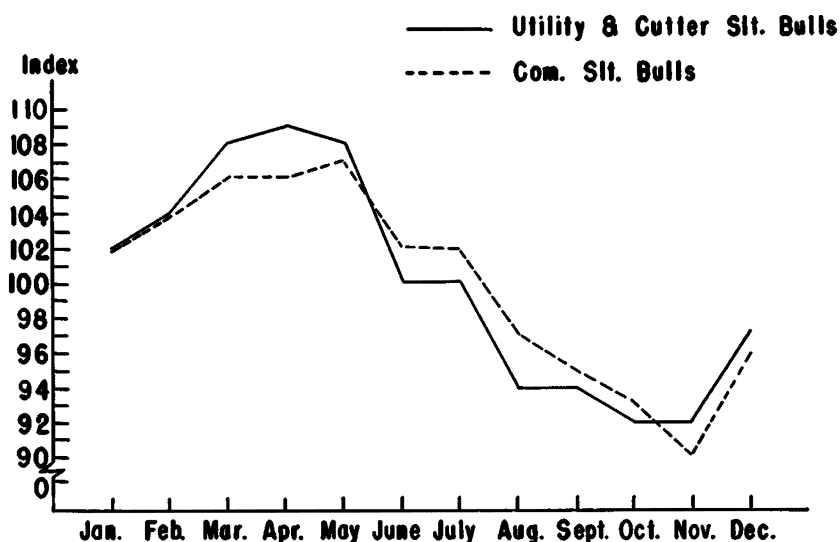


Fig. 5—Normal Seasonality of Slaughter Bull Prices, by Grade, Oklahoma City, 1949-54. Slaughter bull prices vary significantly by seasons. The amplitude of variation is slightly greater for the utility-cutter grades but the pattern of the season movement is similar for the two grades reported.

sented are typical or normal relationships, and that the relationship for any given year may deviate from normal.

In planning cattle operations, one needs an estimate of the price differences between classes, grades and weights of cattle. Usually it is necessary to consider simultaneously the differences due to grade, weight and season. For example, a person who is considering a system of production involving the purchase of stocker calves in the fall and the sale of feeders the subsequent spring must estimate the price differentials between fall stockers and spring feeders.

## Slaughter Steers and Heifers

Feed lot operators can introduce a considerable degree of flexibility into their operations by the manner in which feeder animals are selected, the manner in which they are fed, and the time and grade at which they are marketed. For example, a feeder may elect to buy either heifers or steers. He can buy at light or heavy weights. The animals can be immediately put on a feed lot ration, or they can be "grown out" on various pastures and roughages and later put on a feed lot ration. The cattle can be sold at various grades and weights. Since the range of alternative systems of organization are so diverse, it is necessary to consider likely price movements in selecting a system of feeding.

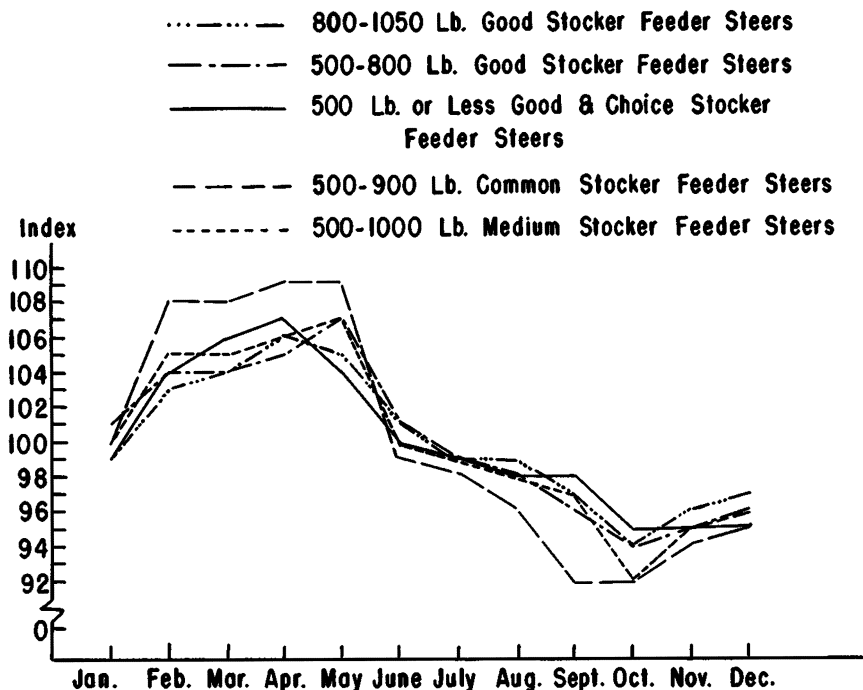


Fig. 6—Normal Seasonality of Stoker-Feeder Prices, Oklahoma City, 1949-54. There is an important seasonal variation in the price of stoker-feeder cattle and the seasonal pattern is similar for the various grades. The lower grade animals exhibit the greater degree of seasonal variation.

Figure 7 indicates the normal price differences, by season, for several grades and weights of slaughter steers and heifers. In this chart the normal price for each month for each class of cattle is expressed as a percent of the annual average price of 700-900 lb. choice of slaughter steers. This method of presentation permits a comparison of normal seasonal movements and differentials between the base class (700-900 lb. choice steers) and the other classes of cattle considered. For example, during January, 800-1000 lb. choice slaughter heifer prices are normally 98 percent of the price of the annual average price of 700-900 lb. choice slaughter steers.

Figure 7 suggests that there is normally no significant difference between prices for 700-900 lb. choice slaughter steers and 900-1100 lb. choice slaughter steers, but that 800-1000 lb. choice slaughter heifer prices normally average about 3 percent below choice steers. In a similar manner, 700-1100 lb. good and commercial steers average about 14 percent below choice steers, while good and commercial heifers average about 19 percent lower.

Information such as presented in Figure 7 can be used by a feeder who has animals that will grade good but have the potential to grade choice, in deciding whether or not to feed to the choice grade. To make such a decision, one would need to compare the additional income resulting from the additional gain and the margin, with the cost of the additional feeding period.

The information in Figure 7 can also be used to decide whether to buy feeder heifers or steers. In making this decision, one needs to compare the estimated difference between the expected value of the finished animal and the cost of the feeder animal and feeding for both heifers and steers. Figure 7 should prove helpful in estimating the relative value of the finished slaughter animal.

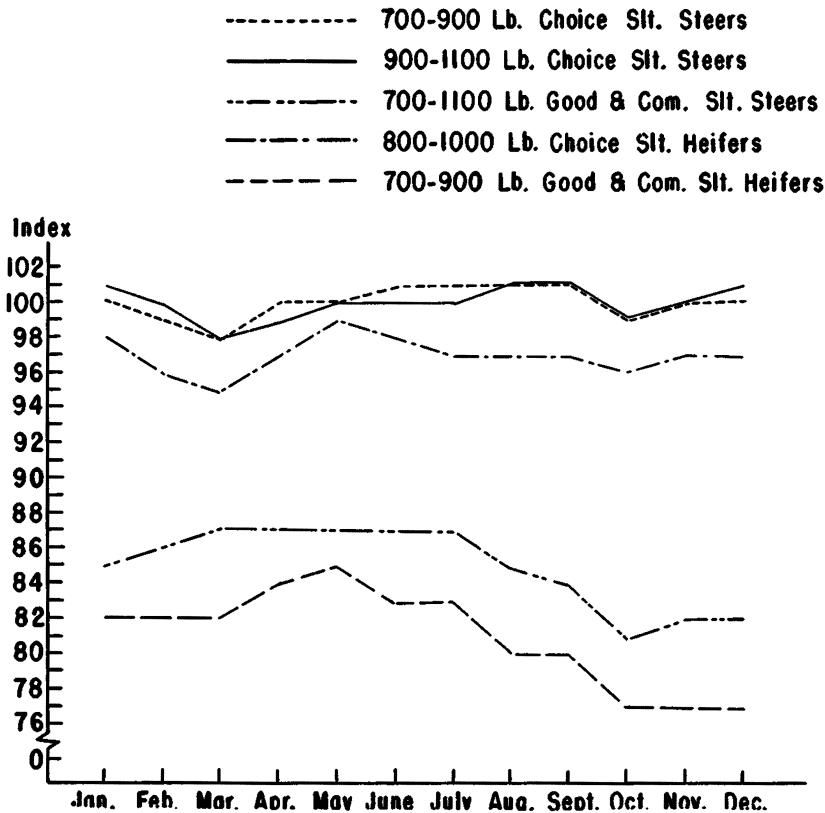


Fig. 7—Normal Price Relationships Between Weights and Grades of Stocker-Feeder Steers, Oklahoma City, 1949-54. Lighter cattle within a grade of stocker-feeder demand a higher price. The difference is particularly great between cattle weighing less than 500 lbs. and those weighing 500-800 lbs. Also there is a large difference between grades of a given weight and the differential widens during periods of low prices.

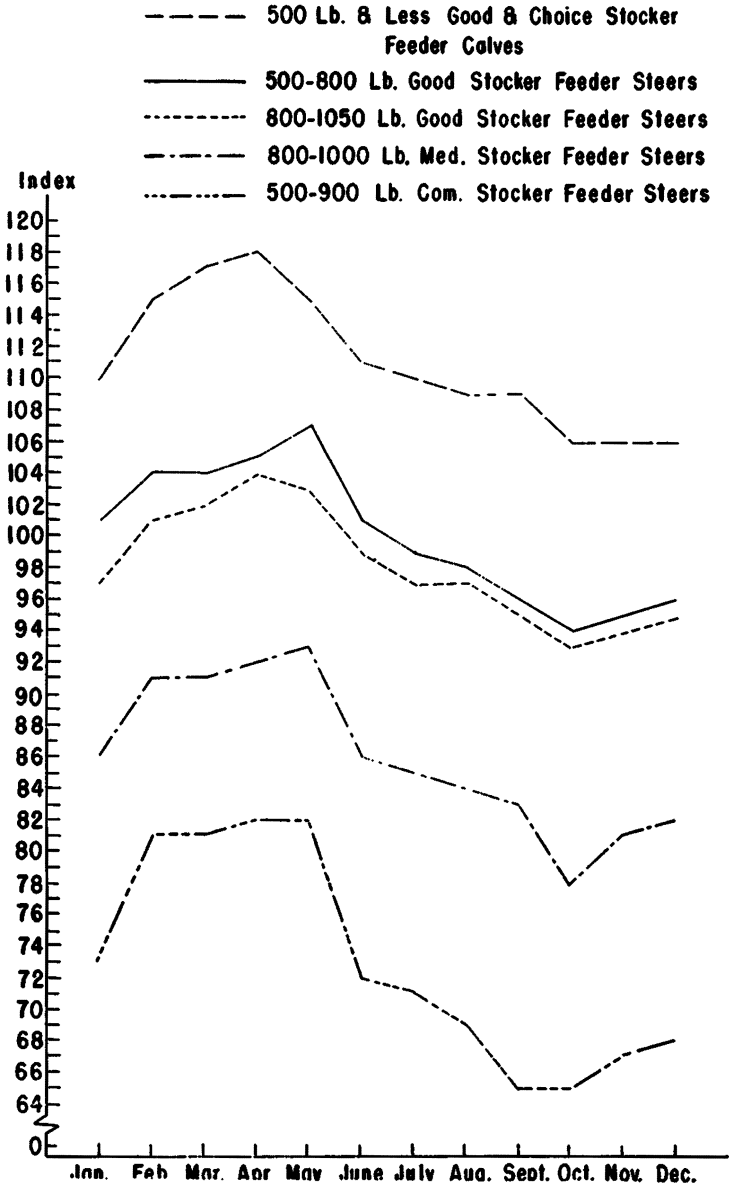


Fig. 8—Normal Price Relationships Between Weights and Grades of Stocker-Feeder Steers, Oklahoma City, 1949-54. Lighter cattle within a grade of stocker-feeders demand a higher price. The difference is particularly great between cattle weighing less than 500 lbs. and those weighing 500-800 lbs. Also there is a large difference between grades of a given weight and the differential widens during periods of low prices.

## **Stocker-Feeder Steers**

In Figure 8 the various grades and weights of stocker feeder steers are expressed as a percent of the annual average price of 500-800 lb. good stocker-feeders. These data show again that the different weights and grades of stocker-feeder steers are subject to essentially the same pattern of seasonal variation. However, since the magnitude of seasonal variation is greater in the case of the lower grades, the price differential between the higher and lower grades tends to narrow during the spring (high price) months and widen during the fall (low price) months.

It is significant to note that within the good grade the heavier cattle (800-1050 lb.) are priced slightly lower than the base weight (500-800 lb.) but the lighter weights (500 lb. and less) are priced appreciably higher. In fact, on the average, the less-than-500 lb. group is priced 11 percent higher than the 500-800 lb. group.

Steers in the 500-1000 lb. medium grade group averaged 14 percent less, while those in the 500-900 lb. common grade averaged 27 percent less than the base grade. Thus it can be seen that the price premium accruing to the production of the higher grade stocker-feeder animals is very considerable. For example, when the annual average price of 500-800 lb. good stocker-feeders is 18 cents, the annual average price of 500-900 lb. common stocker-feeder steers is normally about 13 cents. This is a difference of \$30 per head on a 600 lb. animal.

The information in Figure 8 should be of value in deciding whether or not it would be profitable to upgrade a herd for the production of better grade animals. Also it should be useful in estimating the cost and returns involved in either buying or retaining calves to be wintered and sold in the spring. For example, the data would suggest that a good and choice calf weighing less than 500 lb. purchased in the fall and sold the following spring as a 500-800 lb. good feeder would normally sell for about the same price per pound in the spring as was paid the previous fall. This being the case, any profit from wintering such cattle would result from gains produced at a cost lower than the sale price. On the other hand, 800-1050 lb. good feeder and stockers are normally considerably higher in the spring than are 500-800 lb. good animals in the fall. Thus under normal circumstances one could anticipate a price margin in addition to the profit from the weight gain from this grade and weight animal.

## **Stocker-Feeder Steers and Slaughter Steers**

Figure 9 provides a basis for estimating the expected price differential, by months, between 500-800 lb. good stocker-feeder steers and 900-1100 lb. choice slaughter steers. As was pointed out earlier, there is no significant seasonality associated with slaughter steer prices, while the magnitude of seasonal variation characteristic of stocker-feeder

prices is rather pronounced. Thus it is obvious that the price differential between the two classes of cattle normally varies during different months.

During May, the month of peak prices, 500-800 lb. good stockers and feeders are normally 93 percent of the annual price of choice steers, while during October, the low month, they are only 80 percent of choice slaughter steers. The impact of the season that feeders are purchased on the price margin in feeding is obvious.

### Stocker-Feeder Steers, Slaughter Calves and Slaughter Steers

Figure 10 summarizes normal price differentials for choice slaughter calves, 700-900 lb. choice slaughter steers, and two weights of choice slaughter steers, and two weights of choice stocker-feeder steers. These data show that normally the price of choice stocker-feeder steers weighing less than 500 lb. exceeds the price of choice and prime

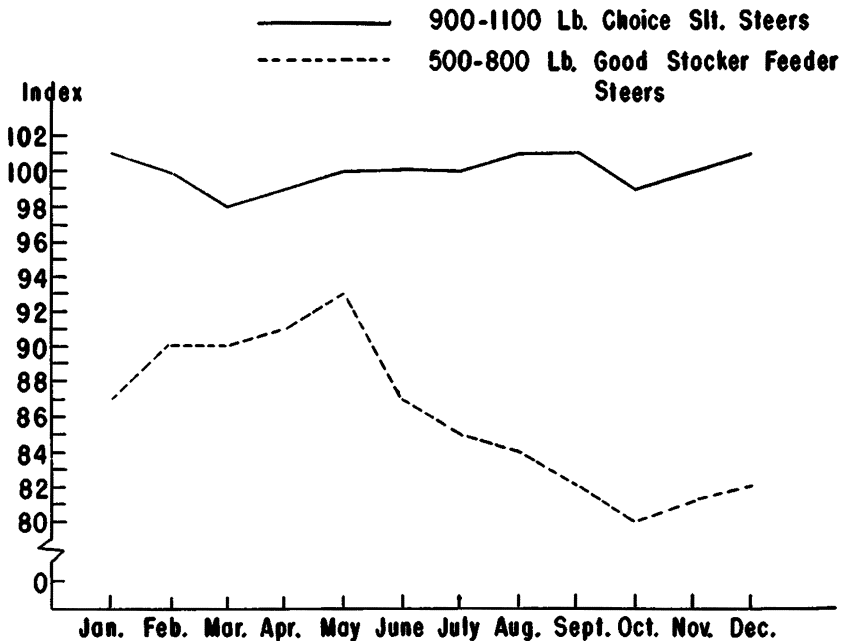


Fig. 9—Normal Price Relationship Between Stocker-Feeder Steers and Slaughter Steers, Oklahoma City, 1949-54. The normal spread (margin) between good and choice stocker-feeder steers and choice slaughter steers varies significantly with the season. The price differential varies with the expected level of slaughter steer prices.

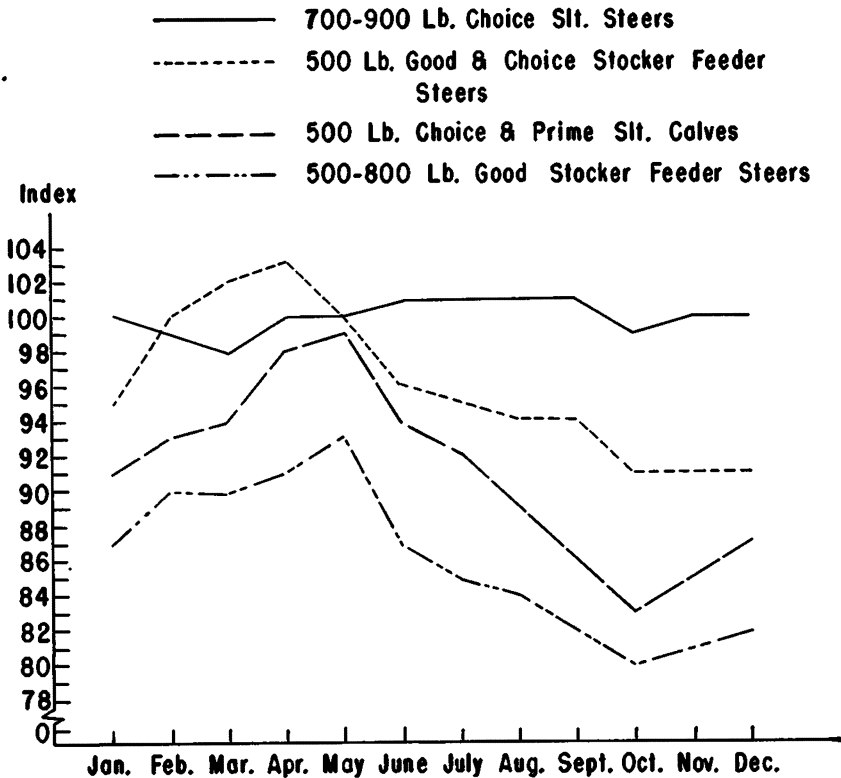


Fig. 10—Normal Price Relationship Between Slaughter Calves, Stocker-Feeder Steers, and Slaughter Steers, Oklahoma City, 1949-54. Stocker-feeder Steers weighing less than 500 lbs. are normally priced higher than choice and prime slaughter calves of similar weight during each month of the year. However 500-800 lb. good stocker-feeder steers are normally lower priced than the choice and prime slaughter calves.

slaughter calves of similar weight during each month of the year. However, the differential between the two groups is quite narrow during the spring.

Unfortunately, no data are available on heifer stocker and feeder animals. However, observation indicates that there tends to be a considerable price discount of stocker-feeder heifers as compared with steers. Thus it is likely that during several months of the year good quality heifers would return a higher price as slaughter calves than stocker-feeders.

These data also indicate again that there normally is a larger price differential between heavy stocker-feeder and slaughter steers than between light stocker-feeders and slaughter steers. In fact, stocker-feeders weighing less than 500 lb. normally return a higher price during their



peak than they bring as finished steers. Thus it is clear that light-weight stocker-feeder steers fed out and sold as slaughter steers must benefit from cheap gains in order to return a profit.

Price differentials between stocker-feeder cattle and slaughter cattle are especially subject to variation. This is because the demand for stocker-feeder cattle is largely generated by the demand of feeders. The price which feeders are willing to pay depends on the expected price for slaughter cattle after a feeding period, and upon the cost of feeds.

With given feed prices, feeders are willing to pay relatively more for feeder cattle when high prices are expected for slaughter cattle. Thus during periods when high slaughter cattle prices are expected, the price of stocker-feeder cattle may equal or exceed the expected price of slaughter animals. This is the case because, with given feed costs, gains can be put on at costs below the selling price when cattle are priced at high levels. Thus the feeder can afford to take a negative price margin (pay more for the feeder animal than he expects for the finished animal) because he expects a gain or profit on the weight added.

On the other hand, feeder cattle prices will tend to be substantially lower than expected slaughter cattle prices when feeders expect low slaughter cattle prices. Normally, the cost per pound of gain in finishing animals in this case exceeds the expected selling price of the finished steers. Therefore, the feed does not buy feeder steers unless he anticipates a positive price margin sufficiently larger to overcome the amount lost per pound of gain plus a profit.

## Methods of Analysis<sup>1</sup>

The analysis in this bulletin is based on data from the Oklahoma City market. The basic data were collected by representatives of the Agricultural Marketing Service of the U.S.D.A., and the mimeographed reports presenting average monthly prices by class and grade were secured from that agency. The absolute prices reported for the Oklahoma City market are not necessarily applicable to other markets in Oklahoma. However, it is reasonable to expect that the seasonal pattern and the differential between classes and grades that have characterized prices on the Oklahoma City market are typical for the state. The annual averages of these prices are given in Appendix I.

Seasonal price indexes were computed for the 1910-51, and the 1949-54 periods (Table 1). Most of the data presented relate to the 1949-54 time period. This particular period was selected because it is a recent period during which direct price controls or rationing were not dominant market factors. However, the seasonal pattern apparently has not changed since 1940. The moving average method of computing

<sup>1</sup> This section relates to the technical details of the analysis. Thus the reader who is primarily interested in the results may wish to ignore this part of the bulletin.

**Table I.—Index of Seasonal Variation and Standard Deviation Beef Cattle by Grade, Oklahoma City Market, for Two Selected Time Periods.**

Month	Standard Deviation		Standard Deviation		Standard Deviation		Standard Deviation	
	Index	1949-54	Index	1949-54	Index	1949-54	Index	1949-54
	Choice	Slaughter Steers	900-1100 Lb.		Choice	Slaughter Steers	700-900 Lb.	
Jan.	101	4.1	101	3.8	100	5.1	100	4.5
Feb.	100	4.1	100	2.9	99	4.4	100	3.1
March	98	6.9	100	5.6	98	6.8	101	5.2
April	99	6.8	102	5.5	100	6.4	102	5.0
May	100	4.1	101	4.6	100	3.7	101	4.1
June	100	3.4	101	3.5	101	4.2	101	3.7
July	100	1.7	100	1.4	101	2.1	101	1.7
Aug.	101	2.3	101	2.5	101	2.6	101	2.2
Sept.	101	1.4	100	2.4	101	2.9	99	2.6
Oct.	99	4.1	98	3.7	99	3.9	97	4.1
Nov.	100	4.8	99	5.3	100	3.9	98	5.1
Dec.	101	4.1	97	6.7	100	3.6	98	5.6
Ave.	100	4.0	100	4.0	100	4.1	100	3.9
	Good and Commercial	Slaughter Steers			Choice	Slaughter Heifers	800-1000 Lb.	
		700-1100 Lb.						
Jan.	100	6.8	99	4.6	101	4.8	99	3.8
Feb.	101	7.4	99	5.3	99	7.1	98	4.7
Mar.	102	3.1	101	3.2	98	5.2	100	4.6
April	102	3.5	102	3.1	100	5.1	101	4.5
May	102	2.1	102	3.6	102	3.3	102	4.2
June	102	3.8	103	4.3	101	2.9	102	5.1
July	102	2.9	102	3.3	100	1.2	102	4.2
Aug.	100	3.6	100	3.1	100	1.5	101	3.5
Sept.	99	4.1	99	4.1	100	1.9	100	3.5
Oct.	96	3.6	97	2.9	99	3.0	98	2.9
Nov.	97	3.5	98	3.5	100	3.5	98	4.5
Dec.	97	3.1	98	2.4	100	3.8	98	3.9
Ave.	100	4.0	100	3.6	100	3.6	100	4.1
	Good and Commercial	Slaughter Calves			Choice and Prime	Slaughter Calves		
		700-900 Lb.				500 lbs.		
Jan.	101	6.5	98	5.1	100	2.7	99	2.3
Feb.	101	6.1	99	4.3	102	3.0	102	2.5
Mar.	101	3.2	102	3.7	103	2.4	104	2.9
April	103	3.7	104	3.4	107	3.2	105	2.7
May	104	4.1	105	4.0	108	3.9	106	3.1
June	102	3.7	104	4.3	103	3.2	105	2.9
July	102	3.0	103	4.2	101	1.9	103	3.7
Aug.	99	2.6	100	3.8	98	2.6	99	3.9
Sept.	99	3.7	98	3.5	95	5.3	96	4.3
Oct.	96	3.1	96	3.0	92	5.0	93	4.2
Nov.	96	2.9	95	3.9	94	3.8	93	3.5
Dec.	96	2.7	96	2.0	97	2.4	95	2.1
Ave.	100	3.8	100	3.8	100	3.3	100	3.2
	Good and Commercial	Slaughter Calves			Slaughter Cows	Utility		
		500 lbs.						
Jan.	102	2.3	100	3.1	100	4.0	99	4.1
Feb.	104	2.2	103	1.8	103	4.2	101	4.0
Mar.	105	2.5	105	2.9	106	2.5	104	3.8
April	108	2.8	106	2.6	107	2.1	106	2.8
May	108	4.7	107	3.6	107	5.6	107	5.0
June	100	6.0	103	4.8	102	5.8	103	4.6
July	100	2.4	101	3.3	99	3.1	100	3.5
Aug.	97	2.3	98	3.7	97	5.3	98	4.1
Sept.	95	5.5	96	4.4	97	5.7	96	4.1
Oct.	91	7.1	93	5.6	93	5.7	94	4.4
Nov.	93	4.5	93	3.8	94	4.8	95	5.5
Dec.	97	3.1	95	2.6	95	3.9	97	3.8
Ave.	100	3.8	100	3.5	100	4.4	100	4.1

Table I.—(Cont'd.)

Month	Index	Standard Deviation		Index	Standard Deviation		Index	Standard Deviation		Standard Deviation
		1949-54	1940-54		1949-54	1940-54		1940-54		
		Slaughter	Cows-Canner	and Cutter		Slaughter	Bulls	Commercial		
Jan.	103	2.4	101	3.8	102	3.0	102	3.3		
Feb.	107	5.2	104	5.1	104	4.0	102	3.9		
Mar.	110	3.2	107	5.0	106	2.8	104	3.5		
April	110	3.9	108	4.4	106	3.9	105	3.0		
May	108	8.5	108	6.0	107	5.3	106	4.2		
June	99	8.2	103	7.0	102	4.5	103	3.6		
July	97	4.0	99	4.7	102	3.0	101	3.9		
Aug.	96	5.2	96	5.3	97	4.9	98	4.0		
Sept.	95	4.9	94	5.0	95	4.6	96	3.9		
Oct.	90	6.8	92	4.9	93	4.9	94	3.8		
Nov.	90	4.7	92	6.7	90	11.1	93	7.5		
Dec.	95	4.4	96	4.6	96	3.3	96	2.8		
Ave.	100	5.1	100	5.2	100	4.6	100	4.0		
		Slaughter	Bulls	Utility	Cutter	Stocker and Feeder	Steers	Good-Choice	500 lbs.	
Jan.	102	4.1	102	4.5	99	2.3	97	4.1		
Feb.	104	4.3	102	4.7	104	3.8	102	3.4		
Mar.	108	3.1	105	3.9	106	4.2	105	3.2		
April	109	3.5	107	3.0	107	3.8	106	3.0		
May	108	4.6	107	3.9	104	4.3	105	3.3		
June	100	5.0	103	4.1	100	4.5	103	4.3		
July	100	4.7	101	4.3	98	3.2	101	4.1		
Aug.	94	5.7	96	4.5	99	2.4	100	3.6		
Sept.	94	4.9	95	4.3	98	4.4	98	3.6		
Oct.	92	5.1	93	4.0	95	5.1	95	4.6		
Nov.	92	3.7	93	3.4	95	3.7	94	4.1		
Dec.	97	2.7	96	3.0	95	2.4	94	2.2		
Ave.	100	4.3	100	4.0	100	3.7	100	3.6		
		Stocker and Feeder	Steers	Good		Stocker and Feeder	Steers	Good		
		500-800 lbs.				800-1050 lbs.				
Jan.	101	3.5	98	3.8	99	3.4	98	4.0		
Feb.	104	5.5	101	4.0	103	5.6	101	4.0		
Mar.	104	2.8	104	2.5	104	2.0	103	2.0		
Apr.	105	2.2	106	2.3	106	2.4	105	2.2		
May	107	3.9	106	3.2	105	4.4	105	3.2		
June	101	4.9	104	4.1	101	5.3	104	4.0		
July	99	4.5	101	4.4	99	3.6	101	3.7		
Aug.	98	5.3	99	4.2	99	6.8	100	4.7		
Sept.	96	7.4	97	4.8	97	6.7	98	4.4		
Oct.	94	5.4	94	3.9	94	4.8	94	3.4		
Nov.	95	3.1	95	3.7	96	3.8	95	3.6		
Dec.	96	3.2	95	2.8	97	4.1	96	2.8		
Ave.	100	4.3	100	3.6	100	4.4	100	3.5		
		Stocker and Feeder	Steers	Medium		Stocker and Feeder	Steers	Common		
		500-1000 lbs.				500-900 lbs.				
Jan.	100	2.7	97	4.1	100	3.3	98	5.0		
Feb.	105	6.1	102	4.4	108	5.8	104	4.9		
Mar.	105	3.4	104	2.7	108	5.3	106	4.2		
April	106	2.1	106	2.7	109	3.9	107	4.1		
May	107	4.6	107	3.8	109	5.0	108	3.8		
June	100	5.6	104	5.6	99	7.5	104	6.9		
July	99	4.1	101	4.5	98	4.0	100	5.7		
Aug.	98	6.5	99	5.3	96	7.7	98	6.3		
Sept.	97	8.5	97	5.7	92	9.2	95	6.6		
Oct.	92	6.8	93	5.2	92	7.8	93	6.1		
Nov.	96	3.8	95	4.1	94	6.6	93	5.4		
Dec.	95	6.2	95	3.7	95	7.4	94	4.3		
Ave.	100	5.0	100	4.3	100	6.1	100	5.3		

the index of seasonal price was used.<sup>1</sup> Standard statistical procedures and measures (analysis of variance, correlation, standard deviation) were utilized to test the significance and reliability of the seasonal movements and differentials.

Seasonal price indexes and certain other measures of variation were computed for each class and grade of beef animal for which prices are available over the period considered. The change in grading standards effective January 1, 1951, made it impossible to secure a continuous set of data for certain grades and classes. All grades referred to in this publication relate to the current federal grades. A listing of the old and current grades and their relationship one to the other, and an explanation of adjustments made, is given in Appendix II.

In this publication no quantitative analysis of the causative factors underlying seasonal price variation has been made. Neither have the factors which cause deviations from the typical seasonal pattern been dealt with. Thus the data presented relate to normal or typical seasonal price patterns and are of most use in long-term farm and ranch planning.

## Statistical Tests of Significance<sup>2</sup> and Reliability

In order to statistically test the conclusions reached regarding seasonal price movements by class and grade, an analysis of variance was performed for each class and weight of cattle for the periods 1949-54 and 1940-54. These tests show that, as would be expected, variation between means of years has been much greater over the two periods than variation between months. Thus a greater degree of variation has been associated with factors other than the season (e. g. price level, cattle numbers, etc.) than with the month of the year. However, for certain classes and grades of livestock there has been a seasonal pattern which is statistically significant at relatively high levels of probability.

The "F" ratios from the analysis of variance for the two time periods are presented in Table 2. It can be seen from these statistics that the variation between means of years has been very highly significant in all cases. This fact is indicated by the magnitude of the "F" value for the years for each class and grade. In all cases the "F" ratios of variation between mean of years indicate that the variation is sufficiently great so that an "F" ratio of this magnitude would be obtained less than .001 percent of the time in sampling from a population in which there was no true difference between the mean of year. Thus the variation between means of years is significant at the 99.99 percent probability level.

<sup>1</sup> This procedure is described in U.S.D.A. Agricultural Handbook No. 48, Sept., 1952

<sup>2</sup> This section relates to the technical details of statistical measurements of the significance and reliability of conclusions reached in this bulletin. Thus the reader who is primarily interested in the results may wish to ignore this section.

Table II.—“F” Ratios from the Analysis of Variance, Beef Cattle Prices, Oklahoma City Market for Two Time Periods.

Class, Grade and Weight	1940-54		1949-54	
	Years	Months	Years	Months
<b>Slaughter Steers</b>				
Choice 700-900	663	.72	133	.18
900-1100	653	.76	125	.14
Good and Comm. 700-1100	372	1.31°	96	.79
<b>Slaughter Heifers</b>				
Choice 800-1000	428	1.64°	134	.19
Good and Comm. 700-900	291	1.76-	102	.90
<b>Slaughter Calves (less 500 lb.)</b>				
Choice and Prime	267	3.01**	91	2.50**
Good and Comm.	219	2.26*	76	1.99*
<b>Slaughter Cows</b>				
Utility	225	1.90*	107	2.30*
Canner and Cutter	189	3.93**	89	4.0**
<b>Slaughter Bulls</b>				
Comm.	209	1.96*	96	2.38*
Utility Cutter	182	2.06*	85	2.62**
<b>Stocker and Feeder Steers</b>				
Good and Choice 500 lb.	237	1.94*	83	1.2 °
Good 500-800	228	2.05*	72	1.3 °
Good 800-1050	248	1.79-	69	.90
Medium 500-1000	199	1.51°	68	1.07
Common 500-900	151	2.19*	67	1.58°

Legend: Significant at the

- 99 percent level
- 95 percent level
- 90 percent level
- ° 70 percent level

On the other hand for the period 1949-54 the difference between mean of months was not significant for high grade slaughter steers and slaughter heifers. In like manner for the period 1940-54 there was no significant variation between mean of months for slaughter steers and heifers at the 99 or 95 percent probability levels. However, slaughter steers weighing 700-1100 lbs. and grading good and commercial exhibit a seasonal variation significant at the 70 percent level, and 700-900 lb. good and commercial slaughter heifer prices showed a seasonal variation significant at the 90% level for the 1949-54 period.

Slaughter calves weighing less than 500 lbs. exhibited a rather uniform and highly significant pattern of seasonal variation over both the periods studied. Choice and prime calves showed a seasonal variation significant at the 99 percent level, while the seasonal variation of good and commercial slaughter calves was significant at the 95 percent level. In like manner seasonal variation in slaughter cows and bulls was highly significant with the lower quality animals exhibiting the greater seasonal change.

For the period 1940-54 the price of stocker and feeder steers exhibited seasonal variations significant at a probability level of 70 percent or higher, with the variation of good 500-800 lbs. and common 500-900 lbs. animals being significant at the 95 percent level. For the period 1949-54 these three classes showed seasonal variation significant at the 70 percent level. Since preceding analysis indicate that there has apparently been no significant change in the nature of the seasonal pattern over the 1940-54 period, it appears that the level of significance is higher for the longer time period due to the larger number of observations involved (allowing a greater number of degrees of freedom) rather than being due to changes in the nature of the seasonal pattern over the periods studied.

As was indicated previously, the seasonal pattern of prices varies between years due to factors such as prospective feed supplies, cattle numbers, etc. For example, in some cases and for certain years during the period 1949-52 when prices of cattle were rising rapidly, the price during any month was higher than the preceding month due to the strong upward trend in prices. Obviously the same type of situation can exist during periods of declining prices. During such periods the "normal" seasonal movement is obscured by other factors. Thus it is important to estimate regularity or dependability of the seasonal movement.

The computed seasonal indexes and their standard deviations for the 1940-54 and the 1949-54 periods are presented in Table 1. The respective standard deviation are measures of the reliability and regularity of the seasonal price indexes. If conditions in the cattle industry during future years are similar to conditions existing during the period considered, then about 67 percent of the monthly indexes for the different years would be expected to fall within the range defined by the computed index plus or minus one standard deviation.

For example, under the stated conditions, about 67 percent of the January prices for choice 900-1100 lb. slaughter steers would be expected to fall between  $101 \pm 4.1$  (105.1 — 95.9) percent of the annual average price. Thus if the standard deviation for a given class, grade and weight is relatively small, one would have considerable confidence in the repeatability of the seasonal pattern. The standard deviations presented are considered to be relatively low i. e. the seasonal patterns relatively reliable, but there is considerable variation in the standard deviations associated with class, grade and weight.

The reliability of the normal differentials between grades and classes was tested by the coefficient of correlation. A coefficient of correlation of 1.0 between the prices of any two grades or classes would indicate the price movements of the two grades or classes have been perfectly correlated over the period studied. That is such a result would indicate that the differential between the two series was stable over the period analyzed.

Table 3 presents the correlation coefficients between the annual average prices of each pair of class, grade and weights reported in this bulletin for the period 1949-54. The same statistics for the 1940-54 period are given in Table 4. In all cases the correlations ( $r$ 's) are higher for the longer period. This is due to the greater number of observations, which allow a greater number of degrees of freedom.

Table 3 and 4 indicate a very consistent relationship between the prices of slaughter steers and heifers of the different grades and weights. Also there is apparently a very consistent relationship between stocker-feeder steers of different grades and weights. In fact, there is apparently a remarkably stable relationship between the annual prices of slaughter animals. However the relationship between slaughter steers and heifers and stocker-feeders is not nearly so consistent. The basic reason for this was explored in a previous section.







Appendix I.—Annual Average Prices Cattle and Calves by Class, Grade and Weight, Oklahoma City, 1940-55.

Class, Grade and Weight		1940	1941	1942	1943	1944	1945	1946	1947
Slaughter Steers	Choice 700-900	9.39	10.45	12.31	13.43	13.73	14.56	15.99	*
	900-1100	9.40	10.43	12.35	13.57	13.87	14.74	16.21	*
	Good and Comm. 700-1100	7.98	9.13	11.07	12.14	12.00	12.59	14.46	19.48
Slaughter Heifers	Choice 800-1000	9.02	10.08	11.74	12.77	13.04	13.74	16.31	21.38
	Good and Comm. 700-900	7.68	8.68	10.26	11.05	11.18	11.56	13.35	17.16
Slaughter Calves	Prime and Choice 500 lbs. and less	8.27	9.49	11.50	12.31	12.20	12.98	14.79	20.09
	Good and Comm. 500 lbs.	6.63	7.73	9.26	10.10	9.62	10.53	11.13	15.17
Slaughter Bulls	Comm. all weights	5.63	7.33	9.58	10.87	9.14	10.13	11.61	14.54
	Utility and Cutter all weights	4.91	6.47	8.36	9.15	7.63	8.49	9.77	12.49
Slaughter Cows	Utility all weights	4.66	5.76	7.54	8.54	7.54	8.32	9.31	12.04
	Canner and Cutters all weights	3.58	4.63	5.98	6.65	5.66	6.48	7.35	10.02
Stocker and Feeder Steers	Choice and Good 500 lbs. less	9.51	11.36	12.58	13.16	12.13	13.12	15.28	19.30
	Good 500-800 lbs.	8.29	9.81	11.29	12.15	11.30	12.22	14.46	18.59
	Good 800-1050 lbs.	7.86	9.44	10.94	11.92	11.48	12.44	14.56	18.93
	Medium 500-1000 lbs.	6.89	8.36	9.80	10.58	9.64	10.70	12.40	15.97
	Common 500-900	5.84	7.23	8.62	9.26	8.06	9.18	10.36	13.35

Source: Agricultural Marketing Service, USDA.

\* Data not available

## Appendix I.—(Continued).

Class, Grade and Weight		1948	1949	1950	1951	1952	1953	1954	1955
Slaughter Steers	Choice 700-900	*	24.32	28.29	34.81	32.07	22.50	22.31	21.83
	900-1100	*	24.20	28.42	35.04	31.99	22.57	22.72	22.06
	Good and Comm. 700-1100	24.08	20.76	24.79	30.91	26.63	17.80	18.26	17.72
Slaughter Heifers	Choice 800-1000	26.58	23.48	27.30	34.08	30.92	21.72	21.28	21.06
	Good and Comm. 700-900	22.38	19.96	24.00	29.94	25.66	16.83	16.63	16.54
Slaughter Calves	Prime and Choice 500 lbs. and less	25.61	23.05	26.83	33.48	29.03	18.76	18.07	18.40
	Good and Comm. 500 lbs.	20.30	19.21	22.49	29.78	25.21	15.65	15.01	15.93
Slaughter Bulls	Comm. all weights	20.14	17.84	20.84	28.05	22.94	14.10	13.26	13.64
	Utility and Cutter all weights	17.55	16.05	18.70	24.96	19.81	11.85	11.29	11.66
Slaughter Cows	Utility all weights	16.35	14.52	18.00	23.50	18.04	11.51	10.54	10.76
	Canner and Cutters all weights	13.60	12.41	15.54	19.34	14.49	9.15	8.39	8.82
Stocker and Feeder Steers	Ch. and Good 500 lbs. less	25.61	24.04	28.48	36.69	30.22	19.19	18.95	19.79
	Good 500-800 lbs.	23.90	21.26	26.25	32.39	27.26	17.25	17.67	18.28
	Good 800-1050 lbs.	24.10	20.66	25.27	31.34	26.24	16.96	18.13	18.11
	Medium 500-1000 lbs.	20.75	18.37	23.15	28.38	23.22	14.20	14.94	15.48
	Common 500-900 lbs.	17.63	16.50	20.32	25.15	19.23	11.21	11.55	12.37

\* Data not available

Appendix II.—Federal Grades as Revised Effective January 1, 1951 and the Corresponding Designation the "Old" Grades

Stocker and Feeder Steers

Prior to Jan. 1951	Effective Jan. 1, 1951
Fancy	Fancy
Choice	*Choice
Good	*Good
Medium	*Medium
Common	*Common
Inferior	Inferior

Slaughter Steers and Heifers

Prior to 1951	Effective Jan. 1, 1951
Prime	-----
Choice	Choice
Good	*Good (Top half)
Medium	*Commercial (Bottom half)**
Common	Utility
Cutter	Cutter
Canner	Canner

Slaughter Cows

Prior to Jan. 1951	Effective Jan. 1, 1951
Good	Commercial**
Medium (upper 1/2)	Commercial**
Medium (lower 1/2)	*Utility
Common	*Cutter
Canner	*Canner

Slaughter Bulls

Prior to Jan. 1951	Effective Jan. 1, 1951
Choice	Good
Good	Good
Medium	*Commercial**
Common	*Utility
Cutter	*Cutter

Slaughter Vealers and Calves

Prior to Jan. 1, 1951	Effective Jan. 1, 1951
Prime	*Prime
Choice	*Prime
Good	*Choice
Medium (top 1/2)	*Good
Medium (lower 1/2)	*Commercial**
Common	Utility

\* Continuous data available.  
 \*\* Effective June 1, 1956, the Federal grade standards were revised to divide the commercial grade into two grades designated as "standard" and "commercial." The standard grade applies to beef from younger animals and the commercial grade designates beef from mature animals.

The revised grading standards make it impossible to secure a continuous price series for certain grades from 1910-51. In some cases the old grades were split into two new grades. For example, the top half of the old Medium grade slaughter steers and heifers was regarded as Good; the bottom half as Commercial. Therefore, to secure a continuous price series the grades Good and Commercial were averaged from 1951-54 with the old Medium grade used up to that time. Consequently for these cases, this necessitated taking an average price of two grades in order to secure a continuous price series through the grading system change. Listed below are the old grades that were split into two new grades of which an average price was used in this bulletin.

<b>Old (1940-51)</b>	<b>New (1951-1954)</b>
Medium slaughter calves	Good and Commercial
Medium slaughter steers and heifers	Good and Commercial