MARKETING FEEDER CATTLE IN ARIZONA

by

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STATEMENT BY AUTHOR

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Associate Professor of Agricultural Economics

July 23, 1959
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The author also wishes to express his thanks to Miss Alice Guinan for the typing of the final copy.
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CHAPTER I

INTRODUCTION

Statement of the Problem

Arizona is the seventh largest state in the Union in land area. Excluding metropolitan and irrigated areas, the entire state may be considered a grazing domain for livestock. Beef cattle are the principal type of stock utilizing this range area.

The physical nature of a large part of the state precludes its use for anything other than the grazing by domestic livestock. For the most part, the area is more favorable for the production of feeder cattle than grass fat cattle, and as a result, most ranches are kept on a cow and calf or cow-calf-yearling basis, marketing calves and/or yearlings as stockers and feeders.

The problems related to the marketing of feeder cattle in Arizona cannot be dissociated from those of the cattle industry in general. The variation in marketing procedures and practices can also be the result of national conditions or policy as well as problems specifically inherent to the state.

Numerous changes have occurred in the cattle industry in recent years, necessitating related changes in the production and marketing practices employed by range cattle producers, and creating specific problems for the industry. Some of the more important problems affecting Arizona producers will be outlined below.
Shifts and Increases in Human Population

As a result of increased population in the western United States, packer-buyers are going further eastward to satisfy the consumer demand for fresh beef. This has obviously directed the market for slaughter animals and to an extent, the market for feeder cattle. Even though transportation facilities have improved tremendously over the past several years, proximity to market still gives a distinct advantage to the producer or feeder.

Changes in Consumer Preference

Changes in consumer preference have been evidenced by a change in the age of cattle sold from ranches during the past thirty-five years. In 1920, steers one year old or older constituted 22 per cent of the total number of beef cattle on farms and ranches in the western United States.¹ The 1948-1957 average shows 15 per cent of all beef cattle to be steers over one year of age.² This indicates a change in the production and subsequent marketing methods used by ranchers.

The principal demand "over the counter" seems to be for a lightweight, low-choice grade of beef. At times this has caused a partial reduction in the length of the feeding period and has tended to speed up the marketing process. The large demand for this grade of meat, and the


emphasis on the lighter market weights for slaughter cattle, have tended to increase the profitability of raising, marketing and feeding younger cattle that lack the quality formerly thought to be essential for feeder cattle. Although crossbred and "Okie" cattle predominate in Arizona feed lots, they do not command the premium paid for high quality feeder cattle. However, their presence in such sizeable numbers is evidence that the consumer demand for premium beef is not so great that it would exclude the profitability of feeding the typical crossbred type of steer.

Influence of Markets Outside of Arizona

Since Arizona cow numbers have failed to keep pace with the number of cattle fed locally, feeders increasingly have been forced to rely upon out-of-state sources to supply feeder cattle.

In 1957, approximately 700,000 head of dutiable cattle were imported into the United States from Mexico and Canada.¹ In recent years the influx of cattle from Mexico (approximately 350,000 head annually) has undoubtedly affected the market for feeder cattle in Arizona. Although imports may vary considerably depending upon the particular local market, the United States market, and the subsequent price differential, they can have a sizeable influence on local markets during a short period of time.

Lack of a Local, Organized Feeder Cattle Market

There is no organized feeder cattle market in Arizona. An agency of this type would help facilitate the more orderly marketing of feeder cattle.

Decentralization of Marketing

During the past several years, more and more feeder cattle have been sold directly to feeders without passing through some form of organized market such as an auction or terminal market. The direct method of marketing has some distinct advantages for the producer of a carload or more of uniform cattle, and has posed some problems for the small producer. The use of this market outlet places the producer in a bargaining situation with an acknowledged expert. For the producer to compete on even grounds, he must be completely informed as to the expected shrinkage of his cattle, their grade, and the current price for cattle of comparable quality as well as the particular transportation costs to various markets.

Increase in the Development of Feed Lots and the Local Fattening of Cattle

The increase in the development of commercial feed lots has been rather closely associated with the increase in direct marketing and in part, can help solve the problem of marketing Arizona feeder cattle. Closely associated with this is the necessity of an adequate amount of locally produced feeds necessary for the economical fattening of cattle. A suitable balance must be maintained between the production of feeder cattle, the production of feed grains, and the fattening and sale of slaughter cattle.

Market Fluctuations

The feeder cattle market is subject to substantial seasonal fluctuations and numerous minor day-to-day changes. The most desirable market today will not necessarily be the best market a week from today or even tomorrow. This uncertainty of market prices and conditions is an acknowledged part of the marketing of feeder cattle, and has resulted in a
considerable amount of forward sale contracts as an attempt to hedge against the possibility of an undesirable market at the anticipated time of marketing.

The degree to which ranchers are flexible enough to take advantage of a favorable early market, or hold their cattle for a more desirable late market, is of obvious importance. The general nature of the cattle business, however, will normally regulate the time of sale and can be considered flexible only to a rather limited degree. The weather, amount of feed available, and the length of time required for the marketing process will normally limit the possibility of most ranchers taking a strict advantage of a particular market.

Selection of a Market Outlet

To a degree, all of the above changes and conditions have been felt in the marketing of feeder cattle from Arizona ranges. Although these factors affect producers, the primary concern of the producer from a marketing standpoint, is which of the available market outlets to utilize in order to obtain the greatest net return for his cattle.

Even though there is no central market or organized feeder cattle market in Arizona, the average producer of feeder or stocker cattle has several different markets available for consideration. In the selection of a particular market, considerable time and effort must be spent by the rancher to obtain an unbiased, current evaluation and comparison of the available markets. The practicability of such an analysis will be limited only by the amount of time available to the rancher and his willingness to accept a less-than-maximum net return for his cattle.
Importance of the Arizona Range Cattle Industry

Arizona may be considered a range state. Lands used for grazing comprise some sixty-three million acres or approximately 85 per cent of the entire state (Table 1).

Table 1. Arizona Land Use, By Ownership

<table>
<thead>
<tr>
<th>Major Land Use</th>
<th>Federal Acres</th>
<th>Indian Acres</th>
<th>State Acres</th>
<th>Private Acres</th>
<th>Total Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cropland</td>
<td>115,000</td>
<td>67,000</td>
<td>1,018,400</td>
<td>1,200,000</td>
<td>1,200,000</td>
</tr>
<tr>
<td>Irrigated</td>
<td>105,000</td>
<td>67,000</td>
<td>978,400</td>
<td>1,150,000</td>
<td>1,150,000</td>
</tr>
<tr>
<td>Nonirrigated</td>
<td>10,000</td>
<td></td>
<td>50,000</td>
<td></td>
<td>50,000</td>
</tr>
<tr>
<td>Range Land</td>
<td>13,138,738</td>
<td>15,669,000</td>
<td>8,571,211</td>
<td>7,621,051</td>
<td>45,000,000</td>
</tr>
<tr>
<td>Forest &amp; Woodlands</td>
<td>12,861,438</td>
<td>2,788,000</td>
<td>672,538</td>
<td>1,678,000</td>
<td>18,000,000</td>
</tr>
<tr>
<td>Other Land</td>
<td>6,321,824</td>
<td>836,000</td>
<td>505,695</td>
<td>836,591</td>
<td>8,500,000</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>32,322,000</strong></td>
<td><strong>19,408,000</strong></td>
<td><strong>9,816,000</strong></td>
<td><strong>11,151,000</strong></td>
<td><strong>72,700,000</strong></td>
</tr>
</tbody>
</table>

Adapted from: Unpublished Data, Department of Agricultural Economics, University of Arizona, Tucson, Arizona.

Due to rough topography or limitations imposed by lack of precipitation, a large portion of the state is suitable only for the production of range cattle. These limitations, principally the lack of moisture and the subsequent lack of forage, can further limit the productiveness of an area to seasonal utilization by range cattle, or in some cases may prohibit
the use of the area entirely. Normally, however, even in the more arid sections, enough browse and stock water are present or may be developed, to sustain at least a few cattle on a seasonal basis.

Beef cattle are produced in practically all parts of the state on ranches varying in carrying capacity from 10 to 10,000 head. The Department of Agricultural Economics at the University of Arizona conducted a mail survey to determine various data for Arizona ranchers. The results indicated that as of January 1, 1958, a composite ranch in Arizona would have the following number of cattle:

- Cows: 225
- Replacement Heifers: 34
- Bulls: 17
- Yearlings: 125
- Calves: 50

Considering cows, bulls, and replacement heifers as one animal unit, yearlings as .7 animal units, and calves as .5 animal units, this composite herd would contain 388 animal units. The survey also placed the average-sized ranch at approximately 55 sections, and estimated that there were approximately 1,200 ranches in the state. Three mailings were sent out in conjunction with this survey, and a 47 per cent response obtained. A non-response sample of the remaining 53 per cent has not been taken, and the results must be interpreted with this in mind.

Nearly one million head of cattle and calves are maintained on inventory each year which results in the marketing of more than 100,000

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1 Unpublished Data, Department of Agricultural Economics, University of Arizona, Tucson, Arizona.
2 Ibid.
3 Ibid.
head of cattle annually. In addition, substantial numbers are shipped in for pasturing and feeding from out-of-state. In 1958, 410,000 head of cattle and calves were shipped in from out-of-state.¹ (This does not include cattle shipped in for immediate slaughter.)

The greatest income from the cattle industry in Arizona is from the sale of feeder and grass-fat cattle. In 1958, the value of cattle and calves sold totaled some 101.5 million dollars, second only to cotton in dollar value of all agricultural commodities.² Since 1933, the sale of beef cattle has accounted for an average of 22 per cent of the total agricultural income (Table 2). Although cattle ranching is the most important agricultural enterprise in the state from the standpoint of land area involved, returns from cotton grown on relatively small acreages have been larger in recent years.

The importance of cattle fattening has increased appreciably in Arizona during the past ten years. A larger proportion of the cattle raised in the state are now being fattened in local feed lots compared with a few years ago. Since cow numbers and the subsequent production of feeder cattle have failed to keep pace with the number of cattle on feed, feeders of necessity have become somewhat dependent upon out-of-state areas to supply feeder cattle. (Figure 1 compares cow numbers with cattle on feed as of January 1, 1946-1958.) This seems to indicate a continuing adequate local market for the sale and subsequent fattening of range-produced cattle.


² R. E. Seltzer, Arizona Agriculture 1959, Arizona Agricultural Experiment Station Circ. 270, Tucson, Feb., 1959, p. 2.
Table 2. Cash Income to Arizona Beef Cattle Producers, 1933-1958

<table>
<thead>
<tr>
<th>Year</th>
<th>Cattle Income (dollars)</th>
<th>Total Ag. Income (dollars)</th>
<th>Cattle Income as a Per Cent of Total Income</th>
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<tbody>
<tr>
<td>1933</td>
<td>5,200,000</td>
<td>26,730,000</td>
<td>10</td>
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<td>1934</td>
<td>6,500,000</td>
<td>34,650,000</td>
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<td>1935</td>
<td>10,755,000</td>
<td>44,510,000</td>
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<td>1936</td>
<td>10,000,000</td>
<td>48,000,000</td>
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<td>1937</td>
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<td>1938</td>
<td>13,600,000</td>
<td>50,000,000</td>
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<td>1939</td>
<td>15,000,000</td>
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<td>1940</td>
<td>16,000,000</td>
<td>58,000,000</td>
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<td>1941</td>
<td>23,000,000</td>
<td>89,000,000</td>
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<td>1942</td>
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<td>1943</td>
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<td>1955</td>
<td>66,000,000</td>
<td>335,000,000</td>
<td>20</td>
</tr>
<tr>
<td>1956</td>
<td>74,000,000</td>
<td>380,000,000</td>
<td>19</td>
</tr>
<tr>
<td>1957</td>
<td>85,000,000</td>
<td>378,000,000</td>
<td>22</td>
</tr>
<tr>
<td>1958</td>
<td>101,500,000</td>
<td>421,000,000</td>
<td>23</td>
</tr>
<tr>
<td>Av. 1933-1958</td>
<td>10,328,269</td>
<td>194,957,690</td>
<td>22</td>
</tr>
<tr>
<td>Av. 1949-1958</td>
<td>69,700,000</td>
<td>357,400,000</td>
<td>19</td>
</tr>
</tbody>
</table>

Source: Arizona Agriculture, 1933-1959, Arizona Agricultural Experiment Station, Tucson.
Figure 1. Number of Cows and Heifers on Farms and Ranches, and Cattle on Feed in Arizona January 1, 1946–1958.

The rapid expansion of population in California since World War II has resulted in a notable increase in the demand for beef. During the past ten years, approximately 80 per cent of Arizona's out-of-state beef cattle shipments have gone to California (Figure 2). Based on present estimated per capita beef consumption rates and projected population figures, the state of California by 1965 would require 35 per cent more beef than in 1955.\(^1\) Since the consumer demand for beef is relatively constant, these figures evince a growing market and demand for range cattle produced in Arizona.

The range cattle industry helps to maintain the balance and stability of agriculture as well as the general economy of the state. It is rather improbable that the size of the area now used as a grazing region for beef cattle will either increase or decrease in the foreseeable future. As long as the production and marketing practices related to range cattle can keep pace with the advancement in other agricultural enterprises, the range cattle industry should retain its position of relative economic importance to the state.

**Producing Areas**

For the purposes of this study, the state was divided into five main regions (Figure 3). Each region will be briefly discussed as to its location and comparative size, the range in elevation, the variation in precipitation, the dominant vegetation with emphasis upon browse species, and the more common types of ranching systems employed.

Figure 2. State of Destination of Outshipments of Cattle and Calves from Arizona, 1946-1958.

Source: Livestock and Poultry on Farms and Ranches, January 1, Crop Reporting Board, Agricultural Marketing Service, Washington, D. C.
Figure 3. Arizona Ranching Areas

Source: Adapted from Stubblefield, Thomas M., The Need For A Livestock News Service In Arizona, Arizona Agricultural Experiment Station Report No. 128, Tucson, 1956.
Mohave Strip

The portion of the state lying north of the Colorado River is termed the Mohave Strip. This area comprises approximately one-twelfth of the state's total area, and is isolated by the Colorado River which forms a natural barrier to the south.

The elevation varies from a few hundred feet to approximately 6,500 feet above sea level. The annual amount of precipitation varies, but will approximate 11 inches.

The dominant vegetational types are: short grass, pinon-juniper, sagebrush, and limited areas of chaparral. The grasslands constitute the most productive range areas, the dominant grasses being blue grama, sand dropseed, and sideoats grama. Although the pinon-juniper type is usually indicative of a partially depleted range area, it may support a good understory of desirable grasses. Sagebrush ranges in good condition will contain a relatively large proportion of good forage grasses. The chaparral type is a low forage producing area. In wet years, some annuals such as filaree and Indianwheat may produce rather abundant seasonal feed, but otherwise this is an unproductive area from a grazing standpoint.

Ranching in general is rather limited on the Strip. Normally, ranches are not operated on a year-around basis but are adapted to the utilization of seasonal forage.


2 Robert R. Humphrey, Mohave County A Study in Range Condition, Arizona Agricultural Experiment Station Bul. 244, Tucson, 1953, p. 10.
Navajo Reservation

The Navajo Reservation lies in the northeast corner of the state and comprises approximately one-sixth of the state's area.

The elevation varies from approximately 2,500 to 6,000 feet and the annual precipitation varies from 8 to 25 inches.

The principal vegetational types are: short grass, pinon-juniper, sagebrush, and Douglas fir-yellow pine. An understory of grasses is found in most of the forage types within the area. Some of the more important grasses are: Arizona Fescue, pine dropseed, blue grama, black grama, Indian ricegrass, and galleta. The sagebrush area is found in the northern part of the Navajo Reservation. The common browse species are: big sagebrush, black sage, and sand sagebrush, with an understory of more important grasses. The pinon-juniper area lies between the grassland and the conifer regions and comprises a considerable proportion of the Navajo Reservation. Ponderosa pine, and Douglas fir are the two dominant trees found at the higher elevations. At still higher elevations some true firs are found. In general, the timbered areas produce little forage. However, with proper management, they can be quite productive and play an integral part in a year-around grazing program. This is especially true of the ponderosa pine sub-type.

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1 A. A. Nichol, loc. cit.

2 Robert R. Humphrey, IV Forage Production on Arizona Ranges, Arizona Agricultural Experiment Station Bul. 266, Tucson, October, 1955, p. 7.

Ranching is not very intensive in this portion of the state. Most ranches are maintained on a cow and calf basis.

Southwestern Desert

The southwestern desert lies in the southwestern portion of the state, and has approximately one third of the state's area.

The elevation varies from 120 to 2,500 feet with the exception of a few isolated mountain areas.\(^1\) The rainfall varies from an average of 3.4 inches in the western portion to 11.3 inches in the eastern portion of this area.\(^2\) This relatively low annual precipitation distinctly separates this area from the remainder of the state.

The dominant vegetational types are: creosote bush-salt bush, palo verde-cacti, and mesquite-salt bush.\(^3\) The palo verde-cacti type is found at the higher elevations, the creosote bush-salt bush type on the lowlands, and the mesquite-salt bush in the drainages.

Generally, this area is not suited for a year-around grazing operation. During a "wet year," the seasonal moisture may promote sufficient growth of annuals to allow early spring grazing by steers. Alfilaria, Indianwheat, and various browse species are utilized by livestock for satisfactory gains during the spring months following adequate rainfall. A few permanent year-long ranches are located at the higher elevations where the annual precipitation is more certain and where there is adequate browse to maintain cattle on a year-long basis.

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\(^1\) Ibid., p. 2  
\(^2\) Ibid., p. 2  
\(^3\) Nichol, loc.cit.
Southeastern Area

The southeastern area lies in the southeastern corner of the state and comprises nearly one sixth of the state's area.

The elevation varies from approximately 2,200 feet in the western portion of the area to over 7,000 feet in the higher mountain ranges in the eastern portion. The precipitation has a corresponding variance between 11 and 20 inches annually.

The principal vegetative types are: mesquite-grass, chaparral, oak-woodland, creosote bush-salt bush, and ponderosa pine-Douglas fir.\(^1\) The creosote bush-salt bush type is found at the lower elevations with the mesquite and salt bush in the drainages. The mesquite-grass is composed of mesquite trees with an understory of curly mesquite, tobosa, hairy grama, slender grama, Rothrocks grama, and black grama.\(^2\) Adjacent to the mesquite-grass at the higher elevations is the chaparral which grades into the conifer type. The dominant vegetation in the chaparral consists of scrub oak and mesquite with various grasses as an understory. The ponderosa pine-Douglas fir type is located at the higher elevations, usually above 6,000 feet, with an annual rainfall of over 20 inches. The ponderosa pine may occur in relatively pure stands above the 6,000 foot level.

About one-third of the range cattle produced in Arizona are found in this area. The vegetation is suitable for a year-around grazing program with the higher mountain ranges utilized during the summer months.

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\(^1\) *Ibid.*, un-numbered map insert.

and the lower desert ranges during the winter. Most ranches in this area are maintained on a cow and calf basis. The normal climatic conditions are conducive to the production of early spring calves.

Central Mountain and Foothill Area

The central mountain and foothill area is surrounded by the other four areas. The elevation varies from approximately 3,000 to 8,000 feet with a few isolated areas as high as 12,000 feet. The annual rainfall is directly related to elevation change, and varies between 10 and 24 inches.

This area has several vegetative types. The more important of these types are: short grass and desert grass, chaparral-oak woodland, pinon-juniper, and ponderosa pine-Douglas fir. Palo verde-cacti-burr sage associations are common at the lower elevations.

Due to the climatic and topographic variations, all types of ranches are found within this area. Operations vary from strictly steer ranching to a cow and calf, or cow-calf-yearling type of operation. Most ranches in this area have a relatively distinct summer and winter range. The higher mountain ranges are grazed during the summer and the lower desert areas utilized during the winter months.

This is the most important area from the standpoint of number of cattle produced, as more than half of the total amount of cattle produced in Arizona come from this area.²

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1 Ibid., un-numbered map insert.

Production Practices Related to Marketing

Given a specific area of operation, each rancher should strive to produce the maximum number of saleable animals of desirable type and weight on a sustained basis. In doing this he must properly manage both his livestock and the range area they utilize. The entire ranching operation should be geared to this maximum sustained production as well as the problem of increasing efficiency and the adoption of new techniques when they seem applicable.

Arizona cattle ranches are principally of the cow and calf type. However, operations may be on a cow-calf-yearling, cow-yearling, or straight steer pasturing basis. In recent years, the trend seems to be away from the historic cow and calf set-up to a cow-calf-yearling type of operation.

In most instances ranchers maintain a herd of breeding stock and market feeder calves and/or yearlings. In general, calves are marketed in the fall, and yearlings in both the spring and fall. Short-aged calves too young for fall shipment are sometimes held over another year to be sold as yearlings. Ranches lacking desirable summer range but producing strong early spring feed may market yearlings in the spring. Occasionally ranchers purchase stocker calves or yearlings and pasture them in the summer months on the higher mountain ranges to utilize the strong seasonal feed. These cattle would then be marketed as feeders in the fall.

The production practices employed by range cattlemen for the marketing of feeder cattle may be divided into two main groups: range management, and livestock management.
Range Management

Ranges differ considerably as to the type of vegetation and available forage due to the variation in the existing environmental conditions. Each ranch however, has its optimum vegetative cover for livestock which should be utilized so as to maintain or increase the amount of better forage plants.

The primary limiting factor in the production of feeder cattle in Arizona is the lack of precipitation. Water gives the basic value to the rangeland and is the primary limiting factor for the production of both forage and livestock. Many management practices have been employed to overcome local deficiencies. Areas have been re-seeded, check dams built, wells dug, dirt tanks and catch basins made, springs developed, and under certain conditions, water has been hauled to cattle in tank trucks. The proper management and maximum utilization of available water is essential to a satisfactory type of ranching operation.

Livestock Management

Feeder cattle, as any other commodity offered for sale on the open market, must be acceptable to the buyers and ultimately to the consumers. Production and marketing practices must be aimed directly at satisfying the wants of feeders and the consuming public. The livestock management program adapted to the production of feeder cattle for market can be broken down into three general headings: breeding practices, culling practices, and handling methods.
Breeding Practices

Hereford cattle are by far the most prevalent breed of cattle raised in Arizona. Small numbers of Angus, Brahman, Santa Gertrudis, Charolaise, and various crossbreeds are found, but in minor proportions. From a marketing standpoint, there is little actual advantage of one breed over another. The breed of cattle which is raised is largely a matter of personal preference. From a production standpoint, Brahman cattle or Brahman crossbreds may be more desirable in an extremely arid region because of their rustling abilities and inherent resistance to heat.

Quality, uniformity, and type are not associated with any particular breed or crossbreed. All three of these factors are necessary for feeder cattle to compete on the open market. Cattle which are not uniform and also lack in beef type and quality will not make the gains comparable to better grades of beef cattle, and will normally not command as desirable a price. Generally, uniformity, beef type, and quality are associated with herds of purebred or "grade" cattle as opposed to most crossbreds or mixed herds. For this reason, practically all commercial cattle producers use purebred bulls of desirable type and uniformity.

The highest possible percentage calf-crop is a goal of all commercial cattle producers. The calf crop is most closely associated with the type and amount of feed available and the related condition of the breeding herd. Animals in good health will produce a larger, more thrifty calf than animals on an inferior or depleted range.

The ratio of bulls to cows varies, but on most ranches will approximate one bull to twenty cows. Obviously, more bulls are needed on a rough
type of range which is sparsely vegetated than on a productive, level type of range.

Two common systems of breeding found in Arizona are seasonal and year-long. The physical condition of the range area may necessitate year-long breeding. From a marketing standpoint the year-long system of breeding has the following disadvantages: (1) some heifers will be prematurely bred as short yearlings and calve at two years of age; (2) the associated loss of calves and first calf-heifers at parturition, the temporary stunting of the young cows, and the small type of calves produced, will more than offset the advantage of having a few extra calves to market; and (3) the weight, size, and general appearance of the cattle to be marketed will not be uniform, which will undoubtedly induce a certain amount of buyer discrimination.

Most ranches practice some form of seasonal breeding. The bulls are turned in with the cows in the spring and remain there through the summer. In the fall, they are separated and carried through the winter in a separate pasture. From a marketing standpoint, this system of breeding has several distinct advantages; namely: (1) calves are dropped in the spring and early summer which results in a uniform size, weight, and general appearance of animals marketed in the fall; (2) the calves can be given more adequate care, and odd lots are not so likely to occur; (3) calves are dropped more in accordance with the available feed supply and during somewhat more desirable weather; and (4) spring calves may be

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marketed in the fall, which eliminates the expense of carrying them through the winter.

**Culling Practices**

Culling constitutes an important phase of any livestock management program. Any animal which is not producing to the desired standard, or which is not producing to capacity, should be eliminated from the herd if the herd is to produce the maximum number of quality animals.

The most important consideration in culling is consistency. If any herd improvement is to be made, all animals below a preset standard must be culled.

Cows that produce small, off-type calves should be culled along with known shy-breeders, aged cows, and cows not possessing beef type. Undesirable cows are usually marketed in the fall with the regular sale of calves and/or yearlings. The exact age at which cattle should be culled is a subject of much debate, and will naturally vary with individual animals. As a rule, cows past 8 years of age should be culled as their calves will tend to have a lower weaning weight.\(^1\) Both cows and bulls of extreme age will likely be un-thrifty and produce fewer calves that will not be as desirable as the calves obtained from younger animals. The age at which bulls should be culled depends in part upon the type of breeding system being used. If inbreeding is not desired, bulls should not be kept longer than three years. Otherwise, if some form of inbreeding is

\(^1\) *Ibid.* p. 91.
used, the practice of selling bulls that are still productive and replacing them with young, unproven bulls, may do more harm than good.

**Handling Methods**

Several common management practices which are of specific importance from a marketing as well as a production standpoint are considered essential in the raising of feeder cattle. Branding, dehorning, castrating, and vaccinating are well known examples.

The purpose of branding is to establish ownership and identity. Every rancher owning range livestock must have a brand and earmark recorded with the Arizona Livestock Sanitary Board.¹ In order to sell cattle, one must have the right to sell as evidenced by a brand, bill of sale for the cattle, or power of attorney from the owner of the cattle authorizing their sale. Before cattle are sold, driven, or conveyed from their range, they must be inspected by an authorized brand inspector who must inspect and record every brand and mark.²

Dehorning, especially of steer calves, is becoming quite common. Many buyers offer a premium for dehorned animals since they will require less feed space, have an equal chance at the feed trough, are easier to handle, and show less damage from shipment. Fat cattle buyers also show a preference for dehorned cattle as they will produce carcasses that are usually free from bruises and require less trimming. The disadvantage of dehorning stems from the possible set-back to the calves plus the extra

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² Ibid., p. 8.
amount of labor involved.

Castration of bull calves is usually done during the spring, preferably when the calves are not more than four months old. Steer calves are quieter and easier to handle both on the range and in the feed lot. The more desirable beef qualities are developed in castrated animals. However, young bulls up to eighteen months of age may be quite acceptable from a quality standpoint.

All ranchers use some type of vaccine on their calves. Calves are normally vaccinated in the spring at the same time they are marked and branded. Blackleg vaccine, hemorrhagic septicemia vaccine, and malignant edema vaccine are commonly used.

Perhaps the most significant change in the beef cattle industry in recent years has been the use of so-called growth stimulants. Although the use of various growth stimulants has become a well-recognized procedure in the fattening of cattle for market, the use of these hormones to increase the efficiency of forage utilization by calves and yearlings under range conditions has been rather limited. Prior to the use of any growth stimulant, a rancher should determine several things, including the acceptability of implanted cattle by feeders, and the cost of the implant and its administration.

Table 3 summarizes the results of a test conducted in Arizona with the use of Stilbestrol implanted at various ages on range cattle, and on the same cattle re-implanted or fed Stilbestrol in the feed lot. These tests were conducted under range conditions in cooperation with the Arizona Agricultural Extension Service. All ranchers cooperating with the Extension Service increased the pounds of beef produced per animal by implanting.
Table 3. Summary of Results Obtained from the use of Stilbestrol on Range Cattle and on the same Cattle Carried Through the Feedlot.

<table>
<thead>
<tr>
<th></th>
<th>No Implant</th>
<th>Yearling</th>
<th>Weaning</th>
<th>Pre-weaning</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>and Pre-weaning</td>
<td>Implant Only</td>
<td>+ Yearling</td>
<td>+ Weaning + Yearling Implant</td>
</tr>
<tr>
<td>No. of Steers</td>
<td>48</td>
<td>36</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Initial Weight</td>
<td>208</td>
<td>215</td>
<td>181/4</td>
<td>202</td>
</tr>
<tr>
<td>Final Weight</td>
<td>798</td>
<td>853</td>
<td>828</td>
<td>869</td>
</tr>
<tr>
<td>Average Gain</td>
<td>590</td>
<td>638</td>
<td>641/4</td>
<td>667</td>
</tr>
</tbody>
</table>

**FEEDLOT PHASE**

<table>
<thead>
<tr>
<th></th>
<th>Control</th>
<th>None</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>None</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain in lbs. 126 days</td>
<td>307:</td>
<td>388</td>
<td>375</td>
<td>361</td>
<td>351:</td>
<td>320</td>
<td>302</td>
<td>311</td>
<td>310</td>
</tr>
<tr>
<td>Av. Daily Gain lbs.</td>
<td>2.39:</td>
<td>3.03</td>
<td>2.93</td>
<td>2.82</td>
<td>2.77:</td>
<td>2.50</td>
<td>2.36</td>
<td>2.43</td>
<td>2.42</td>
</tr>
<tr>
<td>Feed/cwt. of Gain lbs.</td>
<td>107:</td>
<td>878</td>
<td>943</td>
<td>970</td>
<td>1032:</td>
<td>1081</td>
<td>1153</td>
<td>1048</td>
<td>1098</td>
</tr>
</tbody>
</table>

1 Implanting rates were: baby calves 15 mg., weaners 18 mg., and spring yearlings 24 mg.

2 When the steers entered the feedlot they were allocated to the pens according to their previous range treatment. "None" indicates no range implant; "1" indicates a spring-yearling implant; "2" indicates a yearling and weaning implant; and "3" indicates a yearling, weaning, and two months implant.

Source: Al Lane, Unpublished Report, Department of Animal Science, University of Arizona, Tucson.
Objectives of this Thesis

This thesis deals with the problems associated with the marketing of feeder cattle in Arizona by range producers. The main objective is to assemble and analyze data and descriptive information relating to the marketing of feeder cattle in such a way that a unified economic analysis of all phases of marketing this class of cattle will result.

In the introductory chapter an attempt is made to produce a brief description of the cattle ranching industry in Arizona in relation to its economic importance to the state; the location and description of the producing areas; and the common production practices related to the marketing of feeder cattle. The following chapters will be utilized to obtain a more detailed and specific study of the supply, seasonality of movement, prices, marketing practices, and costs involved, in the marketing of feeder cattle in Arizona.

The specific objectives are:

1. To determine the supply of feeder cattle as to their origin, movement, and destination for both locally produced cattle and inshipments from out-of-state.

2. To determine the seasonality of movement of local cattle and inshipments from out-of-state. Also, to determine the seasonality of movement by class of cattle for both inshipments and outshipments.

3. To compare marketing practices and costs involved in the sale of feeder cattle through the available outlets while utilizing either truck or rail facilities.

4. To analyze feeder cattle prices by comparing trends of local
feeder cattle prices with selected markets, discussing the seasonal variation in local prices, comparing prices paid for top feeder steers and good-choice feeder calves, and to study feeder cattle through a multiple correlation analysis of prices and selected variables.

**Procedure**

Data were secured from primary and secondary sources as required to permit the desired analysis.

Information pertaining to the cattle industry of Arizona was obtained from various published and unpublished reports from the Department of Agricultural Economics, the Department of Range Management, and the Department of Animal Science, at the University of Arizona.

Major reliance for movement and supply data was placed on reports issued by the Federal Crop and Livestock Reporting Service for Arizona. This source accounted for the majority of the data found in Chapters II and III relative to inshipments and outshipments as well as the seasonality of movement of cattle and calves in Arizona.

In that available data for inshipments did not exclude cattle shipped in for immediate slaughter, an attempt was made to obtain a more accurate picture of the supply of feeder cattle by indicating the particular county of destination. Since the cattle fattening areas are well known, and centered mainly in Maricopa, Yuma, and Pinal counties, inshipments to these three counties can be considered as being almost entirely feeder cattle. Outshipment data were analyzed in a similar manner by excluding cattle shipped from the principal fattening areas, and including shipments from the predominantly range areas.
Information on marketing practices was obtained from ranchers, cattle feeders, various publications, and from research in progress in the Department of Agricultural Economics at the University of Arizona.

The marketing cost data were obtained primarily from personal interviews and correspondence with representative commission firms, auction markets, and transportation agencies.

Price data were obtained from the Livestock Market News Service, and the Weekly News Letter of the Arizona Cattle Growers Association, as well as from unpublished data from the Department of Agricultural Economics at the University of Arizona.
CHAPTER II

THE SUPPLY OF FEEDER CATTLE

Even though the entire state of Arizona may be considered a range area and annually produces over 1,000,000 head of cattle and calves for market, it is a deficit area from the standpoint of the number of feeder cattle produced. This is due primarily to two factors: the general increase in population in the western United States and the related increase in demand for beef, and the large increase in both number and capacity of local feed lots.

Local Supplies

Arizona range cattle producers have not kept pace with the large increase in demand for feeder cattle, but still play an important part in supplying feeder cattle to local markets and feed lots.

The local supply of feeder cattle is dependent upon several factors: the number of cows and heifers of breeding age; the calf crop; the weather and related forage conditions; the financial status of the rancher; the size and administration of the particular grazing permit; and the market price of cattle. All of these factors can affect the supply of feeder cattle and in specific instances, each may be the dominant factor in determining the particular time and amount of cattle a rancher may wish to sell. The most important single factor related to the rancher's willingness to sell his cattle is the weather and its related effect upon the amount and quality of forage available. Poor range conditions resulting from a
drought or over-stocked range will necessitate the sale of a larger pro-
portion of cattle than would be marketed under normal conditions. Its
principal effect would be an increased or forced sale of cows and heifers
which would normally be kept in the herd as brood cows or replacement
stock. Since the upper limit of stock that can be run on public land
ranges, which predominate in Arizona, is determined by the particular
grazing permit, the variations in the weather and related forage con-
ditions, e.g., adverse weather and lack of forage, have their principal
effect in reducing cattle numbers. Good range conditions do not place any
such restriction on cattle numbers and can lead to an eventual increase in
cow numbers through the retention of more replacement heifers or an imme-
diate increase in inventories through the purchase of cows or steers.

A decision by ranchers to accumulate cattle will cause a decline in
the number of cattle marketed. If this decline is of sufficient size, e.g.,
if sufficient numbers of cattle are held on the range or are purchased to
increase the herd size, the value of the cattle that are marketed will in-
crease. It is well accepted that cattle values are inversely correlated
with cattle numbers and that a change in the value of cattle causes a change
in cattle numbers which, in turn, affects cattle values.  

As a result of an increase in the value of cattle, two different
reactions may occur. Either an increase in marketing will take place, or a
build up of cow numbers may occur in hopes that the price will remain high.

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1 James H. Lorie, Causes of Annual Fluctuations in the Production
of Livestock and Livestock Products, University of Chicago Press, Chicago,
1946, p. 48.

2 Ibid., p. 53.
Available evidence indicates the latter condition prevails.¹

If herd numbers are increased, a related increase in production will occur. Over a period of time, this will reverse the downward trend in marketing and therefore the upward trend in prices will diminish. This process of increased marketings and decreased prices will continue as long as marketings are above normal.

Cow numbers in Arizona have generally failed to increase along with the national average. Figure 1 compares the trend in numbers of cows and heifers on farms and ranches in Arizona, California, and the United States. During the past 13 years, local cow numbers have decreased steadily from a high of 539,000 head in 1946 to a low of 451,000 head in 1959. This is a decrease of some sixteen per cent. During the same period, the national average has increased more than fifty per cent; total cow numbers increasing from 21 million head in 1946 to over 32 million head in 1959. It is obvious that Arizona has not added to the rather sizeable increase in the number of cows and heifers in the United States.

Since 1951, Arizona has annually produced an average of about 366,000 head of calves.² Relating this to the number of cows and heifers two years old and older, the average annual calf crop has been determined as being approximately 76 per cent; varying from a low of 75 per cent in 1957 to a high of 80 per cent in 1959. This is not strictly a calving rate,

¹ Ibid., p. 53.
Figure 4. Number of Cows and Heifers in Arizona, California, and the United States, January 1, 1946-1959.

however, but does represent the number of calves born, expressed as a percentage of cows and heifers two years old and older on farms and ranches as of January 1, of the particular year in question.

Out-of-State Supplies

Inshipments of cattle and calves into Arizona during the 1946-1958 period varied from a low of approximately 97,000 head in 1949 to a high of approximately 410,000 head in 1958 (Table 4).

Table 4. Total Annual Inshipments of Cattle into Arizona by Class, 1946-1958.

<table>
<thead>
<tr>
<th>Year</th>
<th>Steers</th>
<th>Calves</th>
<th>Cows &amp; Heifers</th>
<th>Bulls</th>
<th>Mixed</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>43,110</td>
<td>25,819</td>
<td>13,407</td>
<td>2,203</td>
<td>116,490</td>
<td>201,029</td>
</tr>
<tr>
<td>1947</td>
<td>31,659</td>
<td>47,114</td>
<td>13,535</td>
<td>1,878</td>
<td>59,057</td>
<td>153,343</td>
</tr>
<tr>
<td>1948</td>
<td>18,781</td>
<td>29,676</td>
<td>13,557</td>
<td>1,361</td>
<td>70,887</td>
<td>133,272</td>
</tr>
<tr>
<td>1949</td>
<td>10,635</td>
<td>18,736</td>
<td>3,309</td>
<td>1,423</td>
<td>63,207</td>
<td>97,310</td>
</tr>
<tr>
<td>1950</td>
<td>8,639</td>
<td>40,479</td>
<td>7,413</td>
<td>1,586</td>
<td>138,011</td>
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<td>246,939</td>
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<td>1956</td>
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<tr>
<td>1957</td>
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<tr>
<td>1958</td>
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<td>8,815</td>
<td>1,234</td>
<td>307,485</td>
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</tbody>
</table>

The average annual increase of inshipments since 1946 has been greater than 18,000 head (Figure 5).

Origin

Texas annually ships a greater number of cattle into Arizona than any other state (Figure 6). Since 1946, Texas has shipped on the average approximately 135,000 head of cattle and calves, or approximately 54 per cent of the total annual inshipments into Arizona.¹

The other more important states supplying cattle to Arizona are: New Mexico, Oklahoma, Louisiana, and Colorado. These five states, plus Mexico, have shipped an average of 90 per cent or more of all the cattle moved into Arizona during the 1946-1958 period. However, the various percentages shipped in by each state have not been constant. The variation in importance of Mexico is due to the hoof and mouth disease quarantine, and the related closing of the border during the period from 1946-1952 and again in 1954. Normally, Mexico ships in substantial numbers of cattle. In 1946, Mexico was the major source of cattle shipped into Arizona, with 46 per cent of our inshipments coming from that area. In 1958, Mexico was the second largest exporter of cattle to Arizona, shipping some 84,000 head or approximately 21 per cent of all cattle shipped into the state.

The southeast area (Louisiana, Florida, and Mississippi) has become more and more important from a standpoint of inshipments of cattle to Arizona. In 1958, Louisiana, Florida, and Mississippi combined to ship about 56,000

Figure 5. Shipments of Cattle and Calves into Arizona, 1946-1958.
Figure 6. State of Origin of Shipments of Cattle and Calves into Arizona, 1946-1958.
Source: Livestock and Poultry on Farms and Ranches, January 1, Crop Reporting Board, Agricultural Marketing Service, Washington, D.C.
head of cattle into Arizona.

The majority of the cattle shipped into Arizona are fed out in local feed lots. During 1958, mixed cattle accounted for 74 per cent of the total inshipments; steers 11 per cent; calves 11 per cent; heifers and cows one per cent; and bulls less than one per cent. From the above figures it can be seen that the mixed cattle, steers, and calves accounted for approximately 96 per cent of the total inshipments of cattle during 1958. Table 4 shows the annual inshipments of cattle into Arizona by class from 1946 to 1958.

Destination

Feeding operations in Arizona are found mainly in the irrigated valleys; principally the Salt River Valley and the Yuma area. Substantial numbers of cattle are also fed out in Pinal county, although the eastern part of this county is utilized strictly as grazing land. From the data in Table 5 it can be seen that Maricopa and Yuma counties are by far the largest counties from the standpoint of total inshipments. Figure 7 shows inshipments of cattle and calves to Maricopa, Yuma, and Pinal counties on a trend basis with an index of 1946 equalling 100. The strong increase of inshipments to Yuma and Maricopa counties since 1949 has been the direct result of the increase in feeding operations of those areas. In 1958, Maricopa, Yuma, and Pinal counties accounted for more than 75 per cent of the total number of inshipments. Pima and Cochise counties rank next in

---

1 Ibid., Feb. 4, 1959.
Figure 7. Inshipments of Cattle and Calves from Out-of-State to Maricopa, Yuma, and Pinal Counties, 1946-1958.

importance with the remainder of the inshipments distributed as stockers or feeders throughout the rest of the state. Table 5 lists the number of cattle and calves shipped into Arizona by county of destination from 1946 to 1958.
Table 5. Inshpements of Cattle and Calves by County of Destination, 1946-1958.

<table>
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<td>1,561</td>
<td>1,557</td>
<td>790</td>
<td>1,485</td>
<td>909</td>
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<td>1,367</td>
<td>387</td>
<td>1,223</td>
<td>583</td>
<td>2,810</td>
<td>1,332</td>
<td>731</td>
<td>1,311</td>
<td>623</td>
<td>1,171</td>
<td>1,670</td>
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<td>3,697</td>
<td>4,967</td>
<td>4,190</td>
<td>4,21</td>
<td>3,274</td>
<td>6,552</td>
<td>2,511</td>
<td>2,195</td>
<td>3,363</td>
<td>378</td>
<td>3,046</td>
<td>5,136</td>
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<td>6,788</td>
<td>3,751</td>
<td>1,514</td>
<td>1,065</td>
<td>7,760</td>
<td>2,559</td>
<td>730</td>
<td>1,569</td>
<td>2,514</td>
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<td>1,990</td>
<td>3,326</td>
</tr>
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<td>5,115</td>
<td>5,552</td>
<td>5,290</td>
<td>3,566</td>
<td>1,103</td>
<td>1,874</td>
<td>1,774</td>
<td>455</td>
<td>1,695</td>
<td>4,538</td>
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<tr>
<td>Maricopa</td>
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<td>83,681</td>
<td>72,133</td>
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<td>212,183</td>
<td>153,421</td>
<td>125,521</td>
<td>211,290</td>
<td>213,210</td>
<td>221,590</td>
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<td>20,210</td>
<td>17,857</td>
<td>6,438</td>
<td>20,116</td>
<td>30,619</td>
<td>12,307</td>
<td>9,171</td>
<td>21,820</td>
<td>22,640</td>
<td>23,937</td>
<td>26,390</td>
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<tr>
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<td>9,222</td>
<td>8,097</td>
<td>8,620</td>
<td>13,872</td>
<td>16,070</td>
<td>18,764</td>
<td>19,491</td>
<td>26,705</td>
<td>19,299</td>
<td>21,814</td>
<td>28,583</td>
<td>47,805</td>
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<td>Cochise</td>
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<td>6,309</td>
<td>1,522</td>
<td>10,051</td>
<td>7,765</td>
<td>8,961</td>
<td>7,854</td>
<td>10,217</td>
<td>8,627</td>
<td>11,241</td>
<td>21,042</td>
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<td>Gila</td>
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<td>85</td>
<td>108</td>
<td>180</td>
<td>288</td>
<td>216</td>
<td>255</td>
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<td>22</td>
<td>249</td>
<td>75</td>
<td>135</td>
<td>362</td>
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<td>Graham</td>
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<td>3,179</td>
<td>1,851</td>
<td>3,021</td>
<td>1,339</td>
<td>2,283</td>
<td>1,602</td>
<td>2,605</td>
<td>2,375</td>
<td>5,398</td>
<td>7,706</td>
<td>7,898</td>
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<td>375</td>
<td>378</td>
<td>298</td>
<td>819</td>
<td>526</td>
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<td>453</td>
<td>469</td>
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<td>5,402</td>
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<td>10,892</td>
<td>13,150</td>
<td>9,110</td>
<td>8,365</td>
<td>10,898</td>
<td>8,639</td>
<td>10,911</td>
<td>11,924</td>
<td>23,475</td>
</tr>
<tr>
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<td>2,919</td>
<td>3,391</td>
<td>269</td>
<td>1,491</td>
<td>601</td>
<td>1,483</td>
<td>6,680</td>
<td>1,926</td>
<td>7,279</td>
<td>3,083</td>
<td>6,408</td>
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<td>Total</td>
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<td>153,343</td>
<td>133,272</td>
<td>97,310</td>
<td>195,728</td>
<td>309,991</td>
<td>226,326</td>
<td>183,860</td>
<td>294,496</td>
<td>293,366</td>
<td>304,001</td>
<td>312,528</td>
<td>410,488</td>
</tr>
</tbody>
</table>

CHAPTER III

SEASONALITY OF MOVEMENT

Range cattle are normally marketed at the end of the season of best range feed, when they are in the best possible condition. Historically, by far the greatest number of Arizona cattle and calves have been marketed in the fall.

The actual time of movement is dependent upon several conditions; the more important of which are: the weather and the related amount and quality of forage present, and the market price of cattle.

The range condition will normally be the dominant factor influencing the seasonality of movement of cattle. Ranchers do not have much latitude in the time in which they can market their cattle. Depending upon the available feed, each rancher has one or possibly two different periods each year during which he can market his cattle and still utilize his range area and the available feed to the maximum extent. A drought, and a subsequent shortage of feed, may require a forced liquidation of cattle inventories at a relatively early market date. Conversely, a "good" year, with satisfactory amounts of moisture and feed, may enable the rancher to keep his stock on the range for a longer period of time. Normally, however, the individual rancher may be considered

flexible only to a rather limited degree relative to the time at which he may market his cattle.

**Outshipments**

Data on outshipments of cattle and calves as reported by the Federal Crop and Livestock Reporting Service for Arizona, do not differentiate between fat cattle moving to immediate slaughter, "two-way" cattle, and cattle shipped as stockers or feeders. Unless otherwise specified, the term "outshipments" will refer to all cattle and include both cattle shipped for immediate slaughter and those that are shipped as stockers or feeders.

**All Cattle**

Total outshipments of cattle and calves have increased considerably in the past several years, showing an annual increase of approximately 17,000 head since 1946 (Figure 8). Since 1946, total outshipments have varied from a low of 291,000 head in 1949, to a high of 569,000 head in 1959. The 13-year average number of outshipments has been approximately 429,000 head.

The seasonal variation in the outshipment of all cattle and calves from Arizona during the past thirteen years exhibits two rather definite high points (Figure 9). The first of these comes in May, and is caused primarily by the relatively large number of outshipments of cattle from Maricopa, Yuma, Pinal, and Gila Counties.¹ The second and

Figure 8. Outshipments of Cattle and Calves from Arizona, 1946-1958.

Figure 9. Seasonal Variation of Outshipments of Cattle and Calves from Arizona, 1946-1958.

larger peak occurs during the fall months of October and November. More than 25 per cent of the total annual out shipments are marketed during these two months. Maricopa, Cochise, Apache, and Coconino counties, have accounted for more than 52 per cent of the total out shipments during this fall peak since 1948. The seasonal low occurs during the summer months of July, August, and September, and is approximately 50 per cent below the yearly average.

Range Cattle

In that "outshipments" implies both fat cattle and feeder cattle, an attempt was made to exclude fat cattle to obtain a more accurate picture of the seasonality of movement of feeder cattle from Arizona ranges. This was done by limiting the total outshipment figures to include cattle from predominantly range counties, and exclude cattle shipped from the primary fattening areas. The following data were obtained by deleting Maricopa, Yuma, and Pinal counties, and considering the other counties as a group. It must be realized that the eastern portion of Pinal county is utilized almost exclusively by range cattle and that there are several fairly large feed lots in counties other than the three listed. However, Maricopa, Yuma, and Pinal counties, have more than 90 per cent of the entire feed lot capacity of the state.¹

From the data in Figure 10, one can see that the outshipments of cattle and calves from the range counties exhibit two rather distinct

Figure 10. Seasonal Outshipments of Cattle and Calves from Arizona excluding shipments from Maricopa, Yuma, and Pinal Counties, 1948-1958.

seasonal peaks, the first occurring in May, and the second in October and November. The spring peak is caused primarily by the relatively large number of outshipments from Mohave, Gila, and Graham counties (Table 6). During the past eleven years, these three counties have accounted for more than half of the entire outshipments from range areas for the month of May.

The seasonal low occurs during July, August, and September. These three months have accounted for less than nine per cent of the total outshipments of range cattle during the past eleven years.

The second or fall peak is by far the greater of the two. Since 1948, more than 50 per cent of the annual outshipments of cattle from Arizona have taken place during this two-month period.

By Class of Cattle

All classes of cattle shipped out of Arizona tend to follow a rather similar pattern. Generally, two distinct peaks are noted; the first occurring in the spring, and the other in the fall. The early peak is caused primarily by the movement of yearlings and the sale of some cows and bulls. The fall peak is caused by the normal movement of cattle from most Arizona ranges, and is composed mainly of calves and yearlings.

The following data were obtained from the Federal Crop and Livestock Reporting Service for Arizona, for the years 1946 to 1958 inclusive.

Steers

The term "steers" is used here to include both yearling steers and

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<td>4</td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>82</td>
<td>32</td>
<td>4</td>
<td>144</td>
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<tr>
<td>Cochise</td>
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<td>14</td>
<td>17</td>
<td>26</td>
<td>10</td>
<td>4</td>
<td>4</td>
<td>15</td>
<td>108</td>
<td>78</td>
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<td>324</td>
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<td>3</td>
<td>10</td>
<td>17</td>
<td>2</td>
<td>2</td>
<td>6</td>
<td>71</td>
<td>45</td>
<td>14</td>
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<td>103</td>
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<td>9</td>
<td>32</td>
<td>6</td>
<td>2</td>
<td>1</td>
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<td>5</td>
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<td>1</td>
<td>0</td>
<td>1</td>
<td>6</td>
<td>12</td>
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<td>7</td>
<td>11</td>
<td>4</td>
<td>8</td>
<td>29</td>
<td>41</td>
<td>10</td>
<td>213</td>
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<td>2</td>
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<td>3</td>
<td>3</td>
<td>10</td>
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<td>5</td>
<td>12</td>
<td>67</td>
<td>67</td>
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<td>61</td>
<td>91</td>
<td>242</td>
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<td>31</td>
<td>75</td>
<td>493</td>
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<td>Percent of Total</td>
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<td>3</td>
<td>5</td>
<td>14</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>28</td>
<td>24</td>
<td>5</td>
<td>100</td>
</tr>
</tbody>
</table>

steers two years old and older. The older steers are annually greater in number than the yearling steers, and contain a far greater percentage of animals going for immediate slaughter.

In general, steers tend to be shipped more heavily in the spring than in the fall, with the seasonal high in May, and a somewhat lesser high in October and November (Figure 11). Steers two years old and older show a greater variation than yearling steers and tend to reach their spring peak in March, April, and May, and their fall peak during November.¹

Heifers

The bulk of heifer shipments occurs during the spring, reaching an annual high in May (Figure 11). Only 12 per cent of the shipments occur during the summer months of July, August, and September.

The fall peak occurs in October and November, with more than 20 per cent of the annual out shipments occurring during this period.

Calves

Calves tend to have a more regular pattern of seasonal movement than any other class of stock.² During the 1946-1958 period, approximately 50 per cent of the total out shipments of calves occurred during the months of October and November (Figure 11). The seasonal low occurred earlier than for other classes of cattle, taking place in June, July, and August.

¹ Ibid., pp. 11-13.
² Ibid., pg. 13.
Figure 11. Seasonal Variation of Outshipments of Cattle from Arizona by Class, 1946-1958.

Cows

Seasonal variation in outshipments of cows is shown in Figure 11. Most cows are culled during the fall months with an earlier and less- pronounced peak occurring in May. The period from July to September normally includes the seasonal low.

Bulls

The marketing of bulls is mainly a fall practice, as indicated by the distinct peak occurring in November (Figure 11). There is a spring peak found in April which is followed by the seasonal low during the months of July through September.

Inshipments

Data on inshipments of cattle and calves published by the Federal Crop and Livestock Reporting Service does not include cattle shipped in for immediate slaughter, nor does it distinguish between "two-way cattle" or stocker and feeder cattle.

All Cattle

The seasonal variation of inshipments for all cattle and calves shipped into Arizona for the period 1946 to 1958 is shown in Figure 12. A distinct seasonal high is found during the month of October, with the fall months of September through November accounting for an average of more than 35 per cent of the total yearly inshipments.
Figure 12. Seasonal Variation of Shipments of Cattle and Calves into Arizona, 1946-1958.

The seasonal low occurs in February, and is approximately 50 percent below the average yearly number of inshipments.

**Feeder Cattle**

To obtain a more accurate picture of the seasonality of movement of inshipments of feeder cattle, data were obtained for inshipments to Maricopa, Yuma, and Pinal counties, for the period 1948 to 1958 (Figure 13 and Table 7).

It was assumed that these data would more accurately reflect the number of inshipments of feeder cattle, since Maricopa, Yuma, and Pinal counties are utilized almost exclusively for the fattening of cattle for market.

From these data, it can be seen that the inshipments of feeder cattle follow the usual pattern of all inshipments. The seasonal high occurs in the fall, with a distinct peak in October. The seasonal low occurs during the spring months, with the least number of inshipments during February.

**By Class of Cattle**

Table 4 lists the average annual number of inshipments of cattle into Arizona during the 1946 to 1958 period by class.

**Steers**

The bulk of the inshipments of steers occurs during the fall, reaching a seasonal high in October (Figure 14). Inshipments during the
Figure 13. Seasonal Variation of Inshipments of Cattle and Calves into Maricopa, Yuma, and Pinal Counties, average 1948-1958.

Table 7. Seasonal Inshipments of Cattle and Calves to Maricopa, Yuma, and Pinal Counties, 1948-1958.

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<tbody>
<tr>
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<td>118</td>
<td>85</td>
<td>104</td>
<td>97</td>
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<td>145</td>
<td>19</td>
<td>216</td>
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<td>218</td>
<td>154</td>
<td>1,807</td>
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<td>Pinal</td>
<td>20</td>
<td>12</td>
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<td>11</td>
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<td>32</td>
<td>32</td>
<td>20</td>
<td>234</td>
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<td>Yuma</td>
<td>7</td>
<td>8</td>
<td>7</td>
<td>9</td>
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<td>13</td>
<td>14</td>
<td>17</td>
<td>23</td>
<td>56</td>
<td>45</td>
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<td>235</td>
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<tr>
<td>Sub Total</td>
<td>145</td>
<td>105</td>
<td>125</td>
<td>117</td>
<td>123</td>
<td>163</td>
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<td>259</td>
<td>341</td>
<td>295</td>
<td>198</td>
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<td>Percent of Total</td>
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<td>5</td>
<td>6</td>
<td>5</td>
<td>5</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>11</td>
<td>15</td>
<td>13</td>
<td>9</td>
<td>100</td>
</tr>
</tbody>
</table>

Figure 14. Seasonal Variation of Shipments of Cattle into Arizona by Class, 1946-1958.

spring are fairly uniform, varying between four to six per cent of the yearly total with a moderate peak occurring in June. The seasonal low occurs in January, with an average amounting to four per cent of the total inshipments of steers received during this month.

Heifers

The pattern of inshipments of heifers is shown in Figure 14. The bulk of the total inshipments of heifers occurs in October with more than 20 per cent of the total inshipments taking place at this time. Two minor peaks are found in March and June, which account for 16 per cent of the yearly total. The seasonal low occurs in July and August, with only seven per cent of the inshipments of heifers coming at this time.

Calves

Calves are shipped into Arizona most abundantly during the fall, with a major seasonal peak occurring in September. Another more moderate peak occurs in November (Figure 15). More than 70 per cent of the total inshipments of calves occurs between September and January. Very few calves are shipped into Arizona during the spring of the year.

Cows

The seasonal variation of inshipments of cows is shown in Figure 14. A distinct spring peak is found in March, which is followed by the seasonal low during the months of April through August. The majority of the inshipments occur during the fall, with the months of September through
Figure 15. Inshipments of Cattle into Arizona by Class by Month, 1946-1958.

December accounting for approximately 50 per cent of the yearly total.

**Bulls**

Since 1946, bulls have been shipped into Arizona most heavily during the month of November (Figure 15). Fairly large numbers have also been shipped in during the spring months of March and April, followed by a seasonal low of less than three per cent of the yearly average during June.

**Mixed**

Mixed cattle are by far the most prevalent "class" of cattle shipped into Arizona. Between 1946 and 1958, they have accounted for approximately 75 per cent of the total number of inshipments. Any group of cattle that are shipped into Arizona in odd lots or that are mixed in relation to class, are termed "mixed cattle," and are recorded as such.

The pattern of inshipments of mixed cattle is shown in Figure 15. Inshipments are generally weak in the spring, with a seasonal low in February. From May on, numbers of mixed inshipments increase steadily to a seasonal high in October. A slight drop occurs in November, followed by a rapid decline to the seasonal low in February.
CHAPTER IV

MARKETING PRACTICES AND COSTS

The marketing of beef cattle in Arizona is governed by certain statutory regulations which must be complied with when cattle are sold, transported, or driven off their range for any purpose whatsoever.

The Arizona Livestock Sanitary Board has supervision of an important part of the livestock interests of the state. It is the duty of the board to protect the livestock industry of the state against theft and disease, and the public against unwholesome meats. To carry out this purpose, livestock inspectors are appointed by the board. The principal duties of an inspector regarding the sale of feeder cattle are: authenticate bills of sale of livestock, brands and marks; give certificates of acknowledgement of the same; and have the powers of a peace officer. ¹

**Market Classification of Feeder Cattle**

The following table lists the common descriptive terms used in connection with the marketing of feeder cattle.

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Table 8. Market Classes and Grades of Feeder Cattle

<table>
<thead>
<tr>
<th>Sex Classes</th>
<th>Age</th>
<th>Use</th>
<th>Weight Division</th>
<th>Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steers</td>
<td>Calves</td>
<td>Feeder</td>
<td>Heavy</td>
<td>Fancy or</td>
</tr>
<tr>
<td>Heifers</td>
<td>Yearlings</td>
<td>Stocker</td>
<td>Medium</td>
<td>Select</td>
</tr>
<tr>
<td>Cows</td>
<td>Two-year-olds</td>
<td></td>
<td>Light</td>
<td>Choice</td>
</tr>
<tr>
<td>Bulls</td>
<td>and up</td>
<td></td>
<td>Mixed</td>
<td>Good</td>
</tr>
<tr>
<td>Stags</td>
<td></td>
<td></td>
<td></td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Common</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Inferior</td>
</tr>
</tbody>
</table>


The sex classes are the primary market classification used for feeder cattle. Feeder cattle are generally considered as being steers, but a considerable proportion of heifers and some cows, bulls, and stags may also be offered as feeders.

Grading is the final sortment in the preparation of feeders for market. A grade includes all animals that sell or are expected to sell for about the same price per pound, and is determined largely by quality, conformation, and finish. Other factors which have some significance in the determination of grade are: the health and apparent temperament of the animal, the breeding of the animal, and the opinion of the buyer as to whether or not the animal will make a desirable feeder.

To facilitate handling, marketing, and feeding, feeder cattle are often grouped according to age and weight.

Generally speaking, the well-bred steer in thin flesh is classed as a choice feeder since he gives every outward indication of developing
into a desirable type of fat animal. The type of animal that can be
classified as a "desirable feeder" can vary with market conditions as
well as with the available feed supply, the particular demand, other
stock that are available, and numerous other factors.

Since quality favors economical production of fat cattle, it
can be concluded that, other factors being equal, it pays to produce and
market a high grade of feeder cattle.

Marketing Practices

The major problem and concern of the feeder cattle producer from
a marketing standpoint is in the selection of the particular market
outlet that will insure him the highest possible net return for his
cattle. In accomplishing this, the rancher must obtain accurate market
comparisons relative to the following points: (1) current market news
indicating prices by class and grade of cattle; (2) the grade of his own
cattle; (3) exact transportation costs to the available markets; and
(h) specific marketing costs at these outlets.¹

To prove advantageous to the prospective seller a market should
have several qualities. The necessity for the following conditions
will vary among specific markets, but they are points to consider care­
fully when selecting or comparing a particular market.

1. The market must be sufficiently competitive to accurately

¹ Frederick L. Thomsen, More Efficient Marketing of Arizona
Cattle, Arizona Agricultural Experiment Station Bul. 291, Tucson,
1954, p. 27.
reflect the current demand for feeder cattle.

2. The market should be equally acceptable to the different classes of stock to be sold, and should be relatively impartial for either large or small numbers of cattle.

3. The market should be conveniently located and possess the necessary equipment for handling the livestock to be sold. The proximity to market may be an important factor, as the more direct the shipment from producer to feeder, the more satisfactory it should be to both of them, as the cattle will have less shrinkage and bruise loss, and adjust to their new environment sooner if handling and movement are minimized. Facilities for loading, unloading, yarding, weighing, handling, and in some cases feeding, may be necessary.

4. Cost to the producer for selling his cattle through a specific market should be competitive with costs for other markets.

5. The outlet should have a favorable business reputation. Bonding, federal inspection, and suitable sanitary conditions, and periodic checking of the scales are essential to a desirable type of market.

Methods of Sale

Feeder cattle may be marketed through various channels. Direct sale from the ranch, use of terminal markets, and sale through auction markets are the principal outlets utilized and available for feeder cattle producers.
In Arizona, more feeder cattle are marketed directly to feeders or order buyers without passing through any organized market, than are marketed any other way. It has been estimated that approximately 85 per cent of the feeder cattle are marketed directly to buyers or feeders; 10 per cent or less through the terminal market in Los Angeles; and approximately 5 per cent through local auction markets.

It is a common practice for a given rancher to utilize more than one form of market during a year. For example, calves could be sold at the ranch to an order buyer, and cows could possibly be consigned to an auction or terminal market.

Terminal Markets

The principal terminal market utilized by Arizona producers for the marketing of feeder cattle is the Los Angeles Union Stock Yards. Roughly ten per cent of the feeder cattle produced in Arizona are sold through this terminal market. Terminal markets at Denver, Fort Worth, and Kansas City are occasionally utilized, but only to a very negligible degree.

Although the Los Angeles market is not of much importance from the standpoint of a feeder cattle market, it does affect feeder cattle transactions in that it is considered to be the principal price-registering mechanism for fat cattle in the southwestern United States.

The principal agencies operating at the stockyards are: commission firms, livestock buyers, transportation agencies, federal-state market

1 Ibid., p. 26.
news, and federal meat grading and regulatory services. The stockyards company which owns and operates the stockyards provides for receiving, yarding, feeding, weighing, and the loading and unloading of livestock.

Cattle to be sold through the stockyards are normally consigned to a commission firm which acts as an agent for the producer. The commission firm takes complete charge of the cattle: unloading, yarding, feeding, sorting when practicable, and selling. The cattle are shown to all interested buyers and through bargaining, the highest possible price is obtained for the cattle. The commission company then delivers the cattle to the buyer and receives payment. Transportation costs, yardage, feed bills, insurance, and other miscellaneous costs are paid by the commission firm and, with the commission, are deducted from the payment. The balance is remitted to the producer.

Although cattle are not sold on a percentage basis, the commission agencies represented at the stockyards are reputable and do a highly competent job of marketing the cattle consigned to them.

Ordinarily, the commission firm is better qualified to bargain and can compete on more favorable terms with prospective buyers than the range producer. Experience and current market knowledge are the two most important attributes of a seller, and they are much more likely to rest with the salesman than with the rancher.

The principal objection to marketing feeder cattle through the Los Angeles Union Stockyards is that it is not considered to be a represen-

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tative feeder or stocker market. Also, the distance to the market is relatively great, and the resulting shrinkage will be higher than if the cattle were marketed locally. Most producers feel they can market their own cattle to a greater advantage and will take more personal interest in their sale than does a commission firm.

Auction Markets

An auction may be defined as a market where cattle are offered for sale simultaneously to several prospective buyers and are sold to the one making the highest bid.\(^1\)

There are seven major livestock auctions in the state: three in the Phoenix area, and one each in Casa Grande, Tucson, Willcox, and Yuma. Historically, auction markets have played a relatively unimportant role as an outlet for feeder cattle in Arizona. It has been estimated that approximately five per cent of the total number of cattle marketed in Arizona have been sold through auction markets.\(^2\) However, during the past few years, auctions have become considerably more important. For example, during 1958, Cornelius Livestock Company reportedly sold over 167,000 head of cattle and calves.\(^3\)

In contrast with terminal markets, auction markets receive most of their livestock from local areas. In turn, most of the animals purchased at auctions are fed-out or slaughtered in the near vicinity.

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3 Letter from Mr. S. P. Cornelius, January 21, 1959.
On the basis of volume of cattle sold, the Cornelius Livestock Company in Phoenix is by far the most important auction in the state. During the first full year of operation, this auction sold 75,220 head; 113,191 head were sold in 1956; 158,646 head in 1957; and over 167,000 head in 1958.¹

The Cornelius Livestock Company is equipped to handle large numbers of cattle. On May 12, 1959, approximately 5,000 head of cattle and calves were sold through their ring for an estimated total price of over $750,000.²

Auctions are considered to be useful for the marketing of small or odd lots of cattle. Producers with a few head of feeder cattle are provided with market facilities comparable to those available to large operators. Also, cattle feeders are given an opportunity to purchase feeders of a particular quality and in fairly large amounts without the time and cost normally associated with locating and purchasing such animals. Most auctions provide the service of sorting according to grade, weight, and general appearance, to help facilitate the sale of cattle for the highest possible price.

The principal disadvantage associated with the use of auctions is the variability of prices and the possibility of insufficient numbers of buyers. Without an adequate number of active buyers the cattle cannot be expected to move at as high a price as could be obtained from other markets.

¹ Ibid. ² Ibid.
Ranch Sales

Ranch sales, or the practice of selling cattle directly to buyers or feeders at the ranch, is by far the most common system of marketing feeder cattle in Arizona. It has been estimated that of all stocker and feeder cattle produced in the state, at least 45 per cent are sold directly to feeders; 25 per cent to order buyers; and about 15 per cent to dealers.1 This percentage sold directly is appreciably higher than in most other western states.2

Approximately two-thirds of the ranchers in the state contract the sale of their cattle from 1½ to 100 days prior to delivery.3 The use of various forms of forward contracts has become quite a common practice. The purpose of such forward sales is to hedge against the possibility of a lack of buyers or the possibility of a low price at the expected time of sale. In some cases, the rancher has an established relationship with a specific buyer, and annually markets his cattle to the same individual. Sometimes this is accomplished without the buyer seeing the cattle until they are delivered.

The main bargaining factors between the rancher and the prospective buyer are the actual price per hundredweight, the per cent cut-back to

1 Frederick Thomsen, loc. cit.
2 I. M. Stevens and others, Marketing Western Feeder Cattle, Wyoming Agricultural Experiment Station Bul. 317, Laramie, June, 1952, p.23.
3 Thomas M. Stubblefield, Market News and Related Information Received and Used By Arizona Beef Cattle Producers, Arizona Agricultural Experiment Station Report No. 141, Tucson, 1956, p. 4.
be allowed and the conditions for not accepting an animal, and the conditions relative to shrinkage. Approximately 10 per cent is the normal allowable cut-back although the conditions for discrimination vary. Shrinkage is normally handled by a 12-hour stand prior to weighing plus a 3 per cent pencil shrink.

Direct sale of feeder cattle is especially well adapted to the rancher who has at least a carload or two of uniform, good quality cattle. Costs of marketing are usually less, especially if the cattle are going to stay in the same general area.

Direct sale does not lend itself to the movement of small groups of cattle which are not uniform. Cattle that are not uniform can often be marketed to greater advantage through an auction or terminal market than by direct sale.

Transportation

Feeder cattle are transported to the market or feed lot by truck or rail agencies. The type of transportation used is dependent upon the comparative rates and availability of truck and rail concerns, and the individual preference of the shipper. Since a greater proportion of stocker and feeder cattle are being marketed directly to buyers without passing through an organized market, the method of transportation from the ranch to the feed lot is usually determined by the buyer.

As a general rule, hauls under 500 miles in length or for less than a twenty-four hour period are made by truck, and greater distance
requiring more than twenty-four hours are made by rail.¹

Trucks have been hauling an increasing percentage of the cattle moved in the United States, as can be seen by the following figures:
1916 - 1.4 per cent; 1941 - 4.9 per cent; 1948 - 68.7 per cent; 1954 - 70.3 per cent.² This trend can be attributed to several factors: superior trucks, improved roads, reduced trucking rates in comparison with less favorable rail rates, and most of all, the flexibility and convenience associated with trucking as compared to the use of railroad cars for the movement of cattle.

The increase in importance and number of local feed lots and the decentralization of marketing have also increased the percentage of cattle using trucking facilities for movement to market.

Shrinkage

Shrinkage is an important consideration in the marketing of feeder cattle. Producers, buyers, transportation companies, processors, and marketing agencies have long recognized shrinkage of beef cattle as a problem and an important marketing cost.

Shrinkage is of two general types, namely, tissue shrink and excretory shrink. Excretory shrink may be defined as the loss in weight

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² Neff Tippets and others, In-Transit Shrinkages of Cattle, Wyoming Agricultural Experiment Station Mimeograph Circular No. 78, Laramie, 1957, p. 40.
resulting from the elimination of excreta. Tissue shrink refers to the actual breaking down of body tissues and the ensuing loss of body weight.¹

Shrinkage, or the loss in weight during movement of cattle to the market, may be expressed in several ways but is usually stated as a percentage of the weight prior to shipment.

In this study, shrinkage relates to the loss of weight of feeder cattle during the marketing process between the point of origin and the terminal market or feed lot. Although the effects of shrinkage do not terminate at the destination of the cattle, the predisposing factors cease as soon as the animals are unloaded and become relatively accustomed to their new environment. At this stage, shrinkage is more of a production problem than a marketing cost.

Importance to the Producer

Shrinkage is of special interest to the producer. The substantial increase in direct marketing has placed the producer in a bargaining position with either buyers or feeders. One of the principal conditions of sale to be determined relates to shrinkage. Only if the producer is experienced in the expected shrinkage of his cattle, and has current knowledge of prices and transportation costs, can he be in a competitive bargaining position.

If shrinkage could be minimized, a substantial savings would result to the producer, feeder, processor, and consumer. For example, if shrink-

age losses in the eleven western states could have been reduced by one-half of one per cent on all the pounds of cattle and calves marketed during 1955, assuming all this shrinkage to be valuable, and using average prices, it would have amounted to ten million five hundred thousand dollars.\(^1\) There is no reason to believe that a comparable savings could not be realized today if desirable shipping practices were more widely known and followed.

Factors Affecting Shrinkage

Physical Factors

Several physical factors such as class, sex, breed, weight, condition, and individuality affect shrinkage. It is generally accepted that heifers shrink somewhat more than steers; that cattle with a higher degree of finish shrink less than thinner cattle; that some variation in shrinkage exists between breeds of cattle; and that there may be a marked difference in shrinkage between individuals subjected to similar shipping stresses.\(^2\) All source material reviewed found the above considerations to be correct, but of a negligible importance or magnitude. In the marketing of feeder cattle, the above factors cannot be controlled or influenced by either the buyer or the seller.

Environmental Factors

The environmental factors commonly assumed to have some affect

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\(^1\) Neff Tippets, *op. cit.*, p. 11.

\(^2\) Ibid., p. 19.
upon cattle shrinkage include: time in transit, distance to market, and seasons of the year.

Time in transit and distance to market, are the most important factors influencing the amount of shrinkage. Almost three-fourths of the variation in shrinkage rates can be accounted for by the time factor, under conditions where transit time varies and other important variables are known.\(^1\) As shown in Figure 16, the loss in weight of feeder cattle does not vary proportionately to the distance traveled since the greatest loss occurs during the first few hours. Under average conditions, cattle shrink about one per cent per hour for the first three to four hours, then about one-fourth of one per cent per hour for the next eight to ten hours, and then six hundredths of one per cent per hour for the remainder of the journey.\(^2\)

According to a federal law, cattle to be shipped by rail for a period longer than 28 hours must be unloaded, fed, watered, and rested for at least five hours. A release may be signed by the shipper to increase this period to 36 hours. After the first feed and rest stop the shrinkage rates increase very slowly for stocker and feeder cattle—about one per cent for each additional day en route.\(^3\) A large proportion of this weight loss is caused by tissue shrink.

Seasons of the year and the corresponding temperature changes

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\(^1\) N. E. Ensminger, *op. cit.*, p. 60.

\(^2\) Neff Tippets, *op. cit.*, p. 28.

Figure 16. Relationship of Time In-transit to Shrinkage of Feeder Cattle.

Source: Tippets, Neff, and others, In-transit Shrinkages of Cattle, Wyoming Agricultural Experiment Station Mimeograph Circular No. 78, Laramie, 1957, p. 28.
can also affect shrinkage. Extremes in weather, especially exceptionally hot weather, can predispose to greater than normal shrinkage. Generally, any significant change from what the cattle have been used to is likely to bring about an increase in shrinkage.

Handling Methods

Handling methods affecting shrinkage include all practices used during the marketing process by people who come into direct contact with the cattle. These factors combined can have an important effect upon the shrinkage of feeder cattle. Prior planning and co-ordination of the entire marketing process cannot be overemphasized if a negligible shrink is to be secured.

It is recognized by cattlemen that sound pre-shipping practices are important in minimizing shrinkage during the marketing of feeder cattle. Pre-shipment shrinkage is due primarily to the change in feed, change in location and related environmental conditions, and the methods of handling or management employed by the ranch personnel.

Beef cattle are normally sorted and in some cases graded prior to being shipped. This entails considerable handling which can be greatly reduced by an adequate and well planned set of corrals. Unnecessary handling in sorting, grading, and loading, plus the effect of feed and environmental changes can, to an extent, weaken the cattle. This is especially true if the cattle have been on weak feed. Cattle in a weakened condition will shrink more than healthy cattle and are more
susceptible to disease.¹

Lack of feed and water, over-crowding, inadequate protection from the weather, and the handling of cattle are a few of the more common stresses imposed upon cattle in relation to marketing and can all predispose to increased shrinkage.

In the past few years, various tranquilizers and antibiotics have been used in combating these so-called "stress factors." Trilafon, the trade name of a tranquilizer manufactured by the Schering Corporation, and Terramycin, a broad spectrum antibiotic manufactured by the Chas. Pfizer Company, are well known examples of these. Results obtained from tests involving Trilafon and Terramycin are given in Tables 9 and 10.

Since the loss in tissue weight is presumably caused by the disturbed condition of the animal while in transit, tranquilizers, having a quieting affect upon cattle, seem to have a great potential in reducing stress and the associated tissue shrinkage. Most experimental results have indicated an economical reduction in both shrinkage and shipping fever with the use of tranquilizers and antibiotics.

The conditions under which feeder cattle are transported to market can have an appreciable effect upon shrinkage. In comparing truck and rail facilities for the transportation of feeder cattle, it can be concluded that cattle moved by rail the same number of hours in transit shrink slightly more than other cattle moved by truck.² However, since


² Neff Tippets and others, op. cit., p. 113.
Table 9. Reduction in Shrinkage of Feeder Steers with the use of Trilafen.

<table>
<thead>
<tr>
<th>No. in Herd</th>
<th>Treated (head)</th>
<th>Travel Time (hours)</th>
<th>Average Shrink (pounds)</th>
<th>Average Savings (pounds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treated</td>
<td>25</td>
<td>24</td>
<td>52</td>
<td>41</td>
</tr>
<tr>
<td>Untreated</td>
<td>15</td>
<td>2</td>
<td>16</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>33</td>
<td>13</td>
<td>44</td>
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</tr>
<tr>
<td></td>
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<tr>
<td></td>
<td>54</td>
<td>96</td>
<td>31</td>
<td>28</td>
</tr>
</tbody>
</table>


Table 10. Terramycin in Feed for Control of the Shipping Fever Complex.

<table>
<thead>
<tr>
<th>Data</th>
<th>Control</th>
<th>Terramycin Fed¹</th>
</tr>
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<tbody>
<tr>
<td>Aggregate Number of Animals</td>
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<td>13,162</td>
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<tr>
<td>Additional Medication Required:</td>
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<td></td>
</tr>
<tr>
<td>Number of Animals</td>
<td>936</td>
<td>169</td>
</tr>
<tr>
<td>Number per 1,000 head</td>
<td>55</td>
<td>12.8</td>
</tr>
<tr>
<td>Deaths</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Animals</td>
<td>87</td>
<td>21</td>
</tr>
<tr>
<td>Number per 1,000 head</td>
<td>5.1</td>
<td>1.6</td>
</tr>
</tbody>
</table>

¹ One-quarter to two grams per head per day for three to eight days prior to shipment.

the federal law requiring feed, water, and rest for cattle in transit for 28 hours or more does not apply to trucking concerns, longer hauls would probably favor the railroad in regard to shrinkage.  

Although the method of transportation used is of great importance to the shipper in an economic sense, it has little effect upon shrinkage. The number of animals per car or truck and the treatment during the journey are the more important factors affecting shrinkage during the transportation of feeder cattle to market.

Overloading and underloading of stock cars and trucks can cause an increase in shrinkage. If trucks or cars are underloaded, excess movement of the cattle will cause excitement, bruising, and increased shrinkage. In cold weather, underloading will cause greater shrinkage, as the effects of the cold will be more pronounced. Conversely in hot weather, overloading will increase the effect of heat and a higher shrinkage will result.

Improper driving practices may lead to an increased loss of weight. Sudden stops and starts, and a general disregard by the driver for the cattle will cause injury, increased shrinkage, and subsequent buyer discrimination.

Marketing Costs

Marketing costs are an important part of the total cost incurred

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1 N. E. Ensminger, op. cit., p. 60
by a rancher in producing feeder cattle. Improper use of market facilities or the selection of an undesirable outlet may eliminate the rancher's chances for a profit.

Even though there is no central market or organized feeder cattle market in Arizona, the producer has several outlets available for his consideration. The selection of a means of transportation and a particular market by a rancher is based primarily upon a comparison of various transportation and marketing agencies relative to the services offered and the costs involved.

Whether feeder cattle are sold directly at the ranch, through a terminal market, or through an auction sale, certain costs are incurred during the process of moving the cattle from the range to the feed lot. These costs include: shrinkage loss, transportation charges, and marketing costs. The rancher will pay all or a proportion of these costs whether he sells his cattle to a buyer at the ranch or ships them 500 miles to a terminal market. In the latter case the charges will be direct costs to him from the particular agencies involved. In the former case these costs will be figured by the buyer and included in the actual price per hundredweight paid to the rancher. Shrinkage is usually accounted for by requiring a 12 hour stand prior to weighing and then adding a certain "pencil shrink," approximating three per cent.

Transportation Costs

Feeder cattle are shipped to market by either rail or trucking agencies. The actual transportation cost comprises a sizeable percentage
of the entire cost of marketing. Therefore, it is to the definite advan-
cantage of the producer to be familiar with procedures and exact current
costs for shipping cattle via the available means to their expected
destination.

**Trucking Costs**

Trucks are the most important means of hauling cattle and calves
to market. It is estimated that over three-fourths of all livestock
hauled to terminal public markets in the United States during 1955 were
moved by motortruck.\(^1\) Data for other markets is not available, but it is
acknowledged that trucks haul by far the greatest number of cattle and
calves to auction markets.

The average distance for cattle and calves to be hauled to market
in the United States is shown by region in Table 11, for 1955.

Trucks used for the transportation of cattle to market are
approximately 7'9" wide, and vary in length from 16' to 55' over-all
(truck and trailers). No specific loading numbers are recommended by the
trucking firms — common sense and experience dictate. Table 12 indicates
a recommended loading rate by weight for feeder cattle for both trucks
and railroad cars.

Truck transportation rates are determined on the same general
basis as rail rates, being compiled from both mileage and hundredweight
figures. The minimum weight for cattle is 28,000 pounds with a charge

---

\(^1\) Victor B. Phillips, *Hired Truck Transportation in Marketing
Livestock*, U. S. Department of Agriculture, Agricultural Marketing
Table 11. Average Distance Cattle and Calves were Hauled by Hired Truck to Various Types of Markets in the United States by Region, 1955.

<table>
<thead>
<tr>
<th>Kind of livestock and region</th>
<th>Terminal</th>
<th>Auction</th>
<th>Direct to:</th>
<th>Local</th>
<th>Country Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(miles)</td>
<td>(miles)</td>
<td>(miles)</td>
<td>(miles)</td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>20</td>
<td>20</td>
<td>19</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>North Central</td>
<td>119</td>
<td>27</td>
<td>73</td>
<td>12</td>
<td>28</td>
</tr>
<tr>
<td>South</td>
<td>73</td>
<td>27</td>
<td>117</td>
<td>3</td>
<td>28</td>
</tr>
<tr>
<td>West</td>
<td>192</td>
<td>96</td>
<td>154</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>United States</td>
<td>120</td>
<td>29</td>
<td>80</td>
<td>10</td>
<td>27</td>
</tr>
<tr>
<td>Calves</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>20</td>
<td>16</td>
<td>19</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>North Central</td>
<td>110</td>
<td>20</td>
<td>33</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>South</td>
<td>53</td>
<td>21</td>
<td>21</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>West</td>
<td>155</td>
<td>40</td>
<td>33</td>
<td>33</td>
<td>162</td>
</tr>
<tr>
<td>United States</td>
<td>92</td>
<td>21</td>
<td>27</td>
<td>15</td>
<td>82</td>
</tr>
</tbody>
</table>


Table 12. Average Capacity of Rail Cars and Stock Trucks for Cattle and Calves.

<table>
<thead>
<tr>
<th>Class and Weight</th>
<th>Rail Cars</th>
<th>Stock Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>35'</td>
<td>40'</td>
</tr>
<tr>
<td>Calves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>55</td>
<td>62</td>
</tr>
<tr>
<td>450</td>
<td>46</td>
<td>51</td>
</tr>
<tr>
<td>Cattle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600</td>
<td>36</td>
<td>40</td>
</tr>
<tr>
<td>700</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>800</td>
<td>30</td>
<td>33</td>
</tr>
<tr>
<td>900</td>
<td>27</td>
<td>30</td>
</tr>
<tr>
<td>1,000</td>
<td>26</td>
<td>28</td>
</tr>
</tbody>
</table>

of 65¢ per hundredweight from Tucson to Los Angeles, and 55¢ per hundred weight from Phoenix to Los Angeles. Calves or cattle weighing less than 450 pounds can be shipped with a minimum weight of 26,000 pounds at 65¢ per hundredweight. An additional truck with a 15,000 pound minimum can be used if necessary at the same charge.

Washed sand is applied as bedding for the truck and trailer with an assessed charge of $2.50. This is considered essential to preclude undue damage to the stock while in transit.

The trucking rates for ranch or country sales are made on a somewhat different basis. The total cost depends upon the distance traveled and the particular type of truck used. For example, with a total one-way distance of 50-55 miles from a country point to a feed lot or market in the Phoenix area, the charge would be $43.00 for a "bob-tail" truck, with 16' - 18' of loading space; $46.00 for a "semi" truck and trailer, with 35' - 40' of loading space; and $61.00 for a truck and trailer with approximately 46' of loading space. For a total one-way distance of 100-105 miles, the charge would be $75.00, $78.00, or $103.00, again depending upon the type of truck used. A "residual" charge may be made by the trucking concern if access to the shipping point is restricted due to poor roads, etc. Otherwise, these costs indicated represent the total price for hauling cattle, and include all bedding and insurance costs.

If cattle are not weighed prior to shipment, and the trucker is required to take them to a scale for weighing, an additional charge of $5.00 is made per truck.

Trucks are insured for the actual value of the cattle being transported. In the event of an accident, the shipper may file claim against
the trucking concern for the actual cash value of the loss.

Table 13 lists the average trucking expense per head of cattle and calves hauled to various market outlets in the United States by region, during 1955.

Table 13. Average Trucking Expenses per Head of Cattle and Calves Hauled to Various Market Outlets, by Region, 1955.

<table>
<thead>
<tr>
<th>Kind of livestock and region</th>
<th>Terminal markets</th>
<th>Auction markets</th>
<th>Country sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>2.20</td>
<td>3.56</td>
<td>*</td>
</tr>
<tr>
<td>North Central</td>
<td>3.29</td>
<td>1.56</td>
<td>1.70</td>
</tr>
<tr>
<td>South</td>
<td>1.95</td>
<td>1.20</td>
<td>*</td>
</tr>
<tr>
<td>West</td>
<td>5.56</td>
<td>2.15</td>
<td>*</td>
</tr>
<tr>
<td>United States</td>
<td>3.38</td>
<td>1.51</td>
<td>1.54</td>
</tr>
<tr>
<td>Calves:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>.98</td>
<td>.74</td>
<td>*</td>
</tr>
<tr>
<td>North Central</td>
<td>1.54</td>
<td>.72</td>
<td>*</td>
</tr>
<tr>
<td>South</td>
<td>1.28</td>
<td>.85</td>
<td>*</td>
</tr>
<tr>
<td>West</td>
<td>1.44</td>
<td>.95</td>
<td>*</td>
</tr>
<tr>
<td>United States</td>
<td>1.43</td>
<td>.87</td>
<td>.54</td>
</tr>
</tbody>
</table>


Railroad Costs

The standard stock car is 8'6" wide and 36'7" long. This car is billed with a minimum weight of 20,000 pounds for feeder or stocker cattle. The shipper is required to pay freight on this weight regardless of the
weight of his cattle. Any weight in excess of this amount will be charged at the going rate. There is no minimum or maximum number of cattle that can be loaded into a stock car, it being up to the shipper to load the way he desires. The average capacity of rail cars and stock trucks for cattle and calves is shown in Table 12.

A federal law requires that cattle are to be unloaded after a 28 hour period for feed, water, and rest for at least a five hour period. This may be lengthened to 36 hours at the request of the shipper by signing a release.

The rates charged shippers are on a mileage and hundredweight basis. The costs increase approximately one cent per hundredweight per ten miles. The approximate cost of shipping feeder or stocker cattle from Tucson to Los Angeles is 85¢ per hundredweight, and from Phoenix to Los Angeles about 75¢ per hundredweight.

Animals are insured for their actual value. In the case of loss, it is usually unprofitable and quite difficult to prove the liability of the railroad.

Cattle classified as calves must weigh under 450 pounds. If so, they can be shipped in double decker cars or in single decker cars at approximately 80 per cent of the regular fare.

If the shipper signs a certificate saying that the cattle to be shipped are feeder or stocker cattle and will not be slaughtered within a thirty day period, he will be charged about fifteen per cent less than if the cattle were billed as "regular cattle" and were going for immediate slaughter.
Terminal Market Costs

When feeder cattle are sent to a terminal market, they are consigned to a commission company which acts as an agent for the producer in selling the cattle. Since the majority of Arizona feeder cattle marketed through a terminal market utilize the Los Angeles Union Stock Yards, data was obtained from this company as well as from an active commission firm at these yards.

An estimated cost of marketing 125 head of 600 pound yearling steers through a commission firm at the Los Angeles Union Stock Yards is shown in Table 14. It is assumed that the animals were trucked from Phoenix to the yards, and were held for a 24 hour period prior to their sale.

The selling fees collected by the commission companies for yardage charges are established by tariffs filed with the United States Department of Agriculture. The present commission charged by commission firms is: $1.40 per head for a consignment of more than one head of cattle; $0.80 per head for a consignment of more than one calf; and $2.00 per head for each bull, springer, tuberculosis reactor, suspect, or condemned head of cattle. At the stockyards, the term "cattle" is used to represent all cattle weighed in drafts, and averaging over 400 pounds in weight. Cattle weighing an average of 400 pounds or less are termed "calves," and charges are made accordingly.

A charge equal to two-thirds of the regular selling commission will be made on any dead animal handled by a market agency.
Table 14. Estimated Cost of Marketing 125 Head of 600 Pound Yearling Steers Through a Commission Firm at the Los Angeles Union Stock Yards.

| COMMISSION FIRM |
| Union Stock Yards. |
| Los Angeles 58, Calif. | July 15, 1959 |

Sold for:  
Account of: JOHN DOE  
Shipped:  
From: PHOENIX, ARIZONA

<table>
<thead>
<tr>
<th>Purchaser</th>
<th>Cattle</th>
<th>Calves</th>
<th>Weight</th>
<th>Average Weight</th>
<th>Price</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOUBLE A CATTLE CO.</td>
<td>45 STEERS</td>
<td>27090</td>
<td>600#</td>
<td>23.00</td>
<td>6230.70</td>
<td></td>
</tr>
</tbody>
</table>

| 125 | 17378.80 |

<table>
<thead>
<tr>
<th>Car Number</th>
<th>Weight</th>
<th>Rate</th>
<th>Amount</th>
<th>Deductions</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>AJAX TRUCKING COMPANY</td>
<td>28,000</td>
<td>.55cwt.</td>
<td>15h.00</td>
<td>National Live Stock and Meat Board Fund to increase meat consumption.</td>
<td>2.50</td>
</tr>
<tr>
<td>28,000</td>
<td>.55cwt.</td>
<td>15h.00</td>
<td>Freight Charges</td>
<td>469.50</td>
<td></td>
</tr>
<tr>
<td>28,000</td>
<td>.55cwt.</td>
<td>15h.00</td>
<td>Yardage 125/1.00</td>
<td>125.00</td>
<td></td>
</tr>
<tr>
<td>28,000</td>
<td>.55cwt.</td>
<td>15h.00</td>
<td>Insurance 15¢/load</td>
<td>.45</td>
<td></td>
</tr>
</tbody>
</table>

* Feed charges would depend upon length of stay before sale. Average is 4 bales per load of 30 head per day. Present price is $2.25 per cwt. Price indicated assumes a one day lay-over prior to sale.  

May 2.25 cwt. Lbs. 1,600 36.00  
Commission 125/1.00 175.00  
Total Deductions 808.45  
Net Proceeds $16,570.35
If livestock consigned to be sold are offered in the regular manner and are subsequently removed from the yards by the consignor, a service charge equal to one-half of the regular commission will be charged.

The Los Angeles Livestock Exchange carries an insurance policy for the purpose of protecting owners of livestock while the animals are at the Los Angeles Union Stock Yards. All market agencies deduct charges for this as follows: 15¢ per car on each carload; double deck shipments arriving in single deck cars will be charged at the rate of 15¢ per car; truck-ins will be charged 5¢ for one to six head, 10¢ for 7 to 11 head, and the regular car rate of 15¢ for 12 head or more.

Deductions are made by request of the National Livestock and Meat Board for the purpose of increasing meat consumption at the rate of 2¢ per head for cattle and 2/3¢ per head for calves.

Many specialised services are provided at terminal markets, including loading and unloading, dipping, weighing, spraying, testing, vaccinating, re-weighing, and brand inspection. Typical charges for some specialised services for cattle and calves are listed below in Table 15.
Table 15. Typical Charges Assessed for Specialized Services at 1h
Posted Terminal Markets for Cattle and Calves (Based on
1957 data).

<table>
<thead>
<tr>
<th>Class</th>
<th>Service Charges</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Loading or</td>
<td>Reweigh-</td>
</tr>
<tr>
<td></td>
<td>unloading</td>
<td>Brand</td>
</tr>
<tr>
<td></td>
<td>Spraying</td>
<td>ing</td>
</tr>
<tr>
<td></td>
<td>Inspection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dollars per head</td>
<td></td>
</tr>
<tr>
<td>Cattle</td>
<td>.08</td>
<td>.20</td>
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<td></td>
<td>.10</td>
<td>.15</td>
</tr>
<tr>
<td>Calves</td>
<td>.02</td>
<td>.20</td>
</tr>
<tr>
<td></td>
<td>.05</td>
<td>.15</td>
</tr>
</tbody>
</table>


Ranch Sales

Direct marketing or "ranch sales" are the most common type of sale made of feeder cattle in Arizona. Sale is made at the ranch directly to either feeders or order buyers.

In the case of selling to buyers, the only direct cost is for brand inspection. Each animal sold must be inspected for brands and marks by a duly authorized brand inspector at a charge of 15¢ per head.\(^1\)

It must be remembered that although the rancher or seller does not directly pay the indirect cost of shrinkage, or the transportation or normal marketing costs, these costs will definitely be included by the buyer in determining the price per hundredweight he can afford to pay the rancher.

\(^1\) Arizona Livestock Sanitary Board, op. cit., p. 8.
Auction Sales

Data on auction sales were obtained by letter and direct interview with representatives of the Cornelius Livestock Company. These charges are thought to be representative of the costs for marketing feeder cattle through any auction market in Arizona.

Selling and yardage charges are covered under one fee of three per cent of the total sale price or a maximum charge of $2.75 per animal. No reduced rates are given on large numbers of cattle.

Feed charges are for the amount of feed consumed by each shipment of cattle and are figured at the current market price. The total feed costs are based on four per cent of the gross weight of each animal. At the present time, a charge of \( \frac{23}{4} \) cents per pound is made for feed consumed.

All animals are brand inspected at a charge of 15¢ per head.

If the animals are consigned to be sold, and if for any reason are bid back in by the consignor or his representative, a charge of one-half of the seller's commission will be made if the cattle are removed from the yard. If these cattle are not removed from the yard, and are sold at a later date, only the regular commission charge would be made.

Animals coming from an area that is not certified free from Brucellosis are sold either for slaughter or subject to a veterinarian test before being removed from the yards. The veterinary charges 50¢ per head, with a minimum charge of $5.00 (The first animal to be tested costs $5.00 and the remaining animals 50¢ each).
CHAPTER V

FEEDER CATTLE PRICES

The price received by a rancher for his cattle is the result of the action of numerous buyers and sellers acting independently on the open market to determine the particular price for a given grade of cattle.

Price is meaningful to a rancher only when it is related to a specific grade of cattle, at a particular market, during a given period of time. It is obvious though none-the-less important that conditions of sale which modify the price paid to the rancher in terms of his net returns, are as important as the price itself. The use of efficient production methods and the selection and proper use of the most desirable market are equally necessary to insure the highest possible net return.

Ranchers, as well as other people engaged in various phases of the cattle business, operate on a relatively narrow margin. One or two cents per pound may be their margin of profit or loss. Therefore, it is natural that ranchers pay particularly close attention to the prices paid for the different grades and classes of cattle at various markets.

Prices are important in another respect, in that they can greatly affect the marketing decisions and, in some instances, the production decisions of a producer. Such questions as where to sell, when to sell, and how much to sell, may all be answered at least in part by the reaction of the rancher to the prices offered at different markets. Both current and future decisions may be influenced, and in some cases determined, by the current market price of cattle.
It is the purpose of this chapter to analyze feeder cattle prices relative to trends, seasonal variation, class comparison, the cattle cycle, and, in relation to selected variables, through a multiple correlation analysis.

Trends

Since 1937, the price received for the "best" yearling feeder steers at Phoenix, Arizona, has shown a considerable amount of variation. (Figure 17.) From 1937 until 1948, with the one exception of 1949, prices showed a continuous increase from a low of approximately $7.00 per hundredweight to a high of more than $26.00 per hundredweight. Prices dropped in 1949 to an average of less than $23.00; increased back to approximately $26.00 in 1950, and then rose sharply to an all-time high of over $35.00 per hundredweight in 1951.

Prices dropped during 1952 and 1953 to a low of about $17.00. Between 1953 and 1956, prices were relatively constant, with an average price close to $18.00. In 1957, prices took a sharp upswing to a little over $20.00, and increased still further to more than $26.00 per hundredweight in 1958.

A straight line trend plotted from the data in Figure 17 shows a yearly increase of practically one dollar per hundredweight since 1937. However, a similar trend from 1947 to 1958 shows an annual decrease of approximately $.35 per hundredweight (Figure 18).

A comparison of various markets for the price of feeder cattle during the period from 1947 to 1958 shows a fairly close similarity. Figures 18, 19, and 20 show the trend in prices of best feeder steers at
Figure 17. Average Price of Best Yearling Feeder Steers at Phoenix, 1937-1958.

Source: Calculated from Weekly Newsletter, Arizona Cattle Growers Association, Phoenix.
Figure 18. Average Price of Best Yearling Feeder Steers at Phoenix, 1947-1958.

Source: Calculated from Weekly Newsletter, Arizona Cattle Growers Association, Phoenix.
Figure 19. Average Price of 500-700 Pound Choice Feeder Steers at Kansas City, 1947-1958.

Figure 20. Average Price of 500-700 Pound Choice Feeder Steers at Omaha, 1947-1958.

Phoenix, and choice 500-700 pound feeder steers at Kansas City and Omaha respectively. Phoenix shows an annual decrease of $0.35 per hundredweight as compared with a decrease of $0.17 for Kansas City and $0.20 for Omaha during the same period.

The average price received for choice feeder steers during the 12 year period was $23.26 at Phoenix, $23.17 at Kansas City, and $23.42 at Omaha.

**Seasonal Variation**

The seasonal variation in prices paid for the "best" yearling feeder steers at Phoenix is presented as a series of index number for the period 1937-1958 inclusive, with the average of the period equalling 100 (Figure 21).

An average of the past 22 years evidences a seasonal high in the spring during the months of March, April, and May, with a fairly distinct peak occurring in April of more than 60 per cent above the yearly average. From June to December, the price dropped off gradually but consistently to a low during November and December of approximately 60 per cent below the yearly average. January shows a sizeable increase in prices which continues to the seasonal high in April.

Figure 21 compares the seasonal variation in prices for "best" feeder steers at Phoenix for two periods: 1937-1958, and 1947-1958. This data is also presented as an index with the average of each period equalling 100. It can be seen that there has been little change during the more recent period relative to the past 22 years. The seasonal high
Figure 21. Seasonal Variation in the Price of Best Yearling Feeder Steers at Phoenix, for the Periods 1937-1958 and 1946-1958.

Source: Calculated from Weekly Newsletter, Arizona Cattle Growers Association, Phoenix.
and low occur at exactly the same time, with a generally close relationship exhibited during the entire period.

**Calf vs. Yearling Prices**

Data was tabulated pertaining to "top" feeder steers and "good-choice" steer calves at Phoenix from the Weekly Newsletter of the Arizona Cattle Growers Association for the period from 1937 to 1958. The comparison between calves and yearlings was further broken down to the spring and fall months (January to June, and July to December).

It can be seen from Table 16 that normally steer prices are somewhat less than calf prices during both the spring and fall periods. For the past 22 years, calf prices during the spring of the year averaged $17.92 per hundredweight as compared with steer prices of $17.66 per hundredweight; an average difference of $0.26 per hundredweight.

During the fall for the same period, calf prices had an average of $0.74 per hundredweight higher than steer prices. The yearly average price for calves was $17.69 per hundredweight compared with an average price of $16.96 per hundredweight for steers.

**Cyclical Variation**

Another way of looking at feeder cattle prices consists of comparing them with cattle numbers. For the purpose of this study, "best" feeder cattle prices at Phoenix, Arizona were deflated by the index of prices of wholesale commodities and then compared with the number of beef cattle maintained on farms and ranches in Arizona for the period from

<table>
<thead>
<tr>
<th>Year</th>
<th>Top Feeder Steers</th>
<th></th>
<th></th>
<th>Good-Choice Steer Calves</th>
<th></th>
<th></th>
<th>Steer Price Minus Calf Price</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td>Spring</td>
<td>Fall</td>
<td></td>
</tr>
<tr>
<td>1937</td>
<td>7.63</td>
<td>7.30</td>
<td>7.00</td>
<td>7.50</td>
<td>.13</td>
<td>-.20</td>
<td></td>
</tr>
<tr>
<td>1938</td>
<td>6.74</td>
<td>7.16</td>
<td>7.25</td>
<td>7.25</td>
<td>.51</td>
<td>-.09</td>
<td></td>
</tr>
<tr>
<td>1939</td>
<td>7.94</td>
<td>7.80</td>
<td>8.00</td>
<td>8.25</td>
<td>.06</td>
<td>-.45</td>
<td></td>
</tr>
<tr>
<td>1940</td>
<td>8.55</td>
<td>8.20</td>
<td>9.50</td>
<td>9.00</td>
<td>-.95</td>
<td>-.80</td>
<td></td>
</tr>
<tr>
<td>1941</td>
<td>9.96</td>
<td>9.89</td>
<td>10.00</td>
<td>10.75</td>
<td>-.04</td>
<td>-.86</td>
<td></td>
</tr>
<tr>
<td>1942</td>
<td>11.59</td>
<td>10.96</td>
<td>12.00</td>
<td>11.75</td>
<td>.01</td>
<td>-.54</td>
<td></td>
</tr>
<tr>
<td>1943</td>
<td>13.92</td>
<td>11.47</td>
<td>14.25</td>
<td>11.75</td>
<td>-.33</td>
<td>-.28</td>
<td></td>
</tr>
<tr>
<td>1944</td>
<td>12.39</td>
<td>10.67</td>
<td>11.00</td>
<td>10.75</td>
<td>-.61</td>
<td>-.08</td>
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<tr>
<td>1945</td>
<td>12.63</td>
<td>12.68</td>
<td>12.00</td>
<td>12.50</td>
<td>.63</td>
<td>+.13</td>
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<tr>
<td>1946</td>
<td>13.96</td>
<td>11.75</td>
<td>13.25</td>
<td>15.33</td>
<td>.71</td>
<td>-.58</td>
<td></td>
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<tr>
<td>1947</td>
<td>17.63</td>
<td>20.36</td>
<td>16.50</td>
<td>19.25</td>
<td>+1.13</td>
<td>+1.11</td>
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</tr>
<tr>
<td>1948</td>
<td>25.55</td>
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Av. 17.66 16.96 17.92 17.69

from 1937 to 1958 (Figure 22). The data is presented in index form with
the average of the period 1937 to 1958 equalling 100.

It is known that both the prices paid for "best" feeder steers
and the number of beef cattle maintained on farms and ranches within the
state as well as in the United States, have shown a general increase since
1937. This can be attributed to the large increase in human population,
the improved standard of living, a relatively high level of business
activity and employment, and the increased demand for beef. However, it
can be seen from the data plotted in Figure 22 that these increases have
not been consistent, and at times have exhibited quite violent fluctua­
tions. It is well remembered that the most of this period could be
considered "war years," with the related inflationary and deflationary
conditions, and with price control and rationing being important during
World War II and the Korean action.

From 1937 through the early years of World War II, both cattle
numbers and feeder cattle prices increased rather evenly. There was an
increased demand for beef caused by the war, and the price of meat was
supported by subsidies from the federal government. A fairly sharp drop
in prices occurred in 1943, followed by a slower increase and eventual
decline in cattle numbers. The remainder of the war period showed a
fairly stable level of prices and numbers of cattle maintained on farms
and ranches. The post-war period saw an immediate increase in price
through the removal of the ceiling placed on beef cattle prices by the
federal government. The index of prices rose to a high of over 130 by
1948, as cattle numbers were still on the decline. Following this high
price, cattle numbers started to increase as ranchers anticipated a
Figure 22. A Comparison of Cattle Numbers in Arizona with the Average Yearly Price of Best Yearling Feeder Steers at Phoenix, 1937-1958.


Prices—Weekly Newsletter, Arizona Cattle Growers Association, Phoenix.
continuing favorable market for their cattle. Numerous investors and speculators were attracted to the industry and, coupled with the general optimism and inflationary conditions of the period, prices rose to an all-time high during 1951, with an index of over 160.

The recession during the early 1950's following the Korean War caused the price of feeder cattle to drop quite drastically to an index low of slightly over 80 during 1953. This figure is comparable to the adjusted index of prices paid for feeder steers during the late 1930's. A fairly severe drought during 1953 was the major factor influencing the sale of large numbers of cattle in Arizona and the Southwest, and caused a further reduction in the price paid for feeder cattle. This severe drop in prices resulted in a slowing of the increase in cattle numbers, but the total number of cattle continued to rise until 1956. People who had invested in the cattle business during the early 1950's because of the high prices, now found the value of their cattle cut in half, and as a result, large numbers of cattle were sold.

After a slight price increase in 1955, cattle prices again dropped to an index of approximately 80. At this time, cattle numbers started to decline in Arizona. As cattle numbers decreased, the price paid for top feeder steers gradually began to increase, and showed a substantial increase in both 1957 and 1958. This increased price has caused the decline in cattle numbers to proceed at a slower rate. Although as of January 1, 1959, the number of cattle on Arizona ranges was still declining, the United States total was at a new high. With rising prices and an all-time high in cattle numbers for the United States, it is likely that prices will fall unless ranchers can liquidate
part of their inventories of cattle and calves in an orderly fashion. Through the summer of 1959, there was no indication of any break in prices paid for top feeder steers, although drought was becoming important as a factor influencing ranchers' ability to maintain their herds.

**Multiple Correlation Analysis**

To further analyze feeder cattle prices, the average price paid for best feeder steers at Phoenix, Arizona, was compared with selected variables for the period 1956 to 1958. The analysis was undertaken to estimate the relative importance of the selected variables on the price of feeder cattle in Arizona. These variables were: (1) choice, 900 to 1,100 pound fat steers at Phoenix, Arizona; (2) an index of supply of feeder cattle determined by aggregating the total shipments of cattle and calves into Arizona with the number of cows two years old and older maintained on ranches in the state; (3) an average cost of feed obtained by adding the local cost of ten pounds of barley, ten pounds of alfalfa, and one pound of cottonseed meal; and (4) an index of range condition in Arizona as reported by the Arizona Crop and Livestock Reporting Service.

The economic model used was $x_{1C} = b_0 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5$, where $x_{1C}$ = the estimated price of best feeder cattle per hundredweight, $x_2$ = the price of choice, 900 to 1,100 pound fat steers, $x_3$ = an index of supply, $x_4$ = the average cost of feed, and $x_5$ = an index of range condition.

The inverse matrix method was used in this analysis to facilitate the addition or reduction of the number of independent variables without the necessity of re-working the entire problem.
The coefficient of multiple determination ($R^2$), was calculated as $0.94$, which means that 94 per cent of the change in feeder cattle price was mathematically associated with changes in the independent variables used in this study over the period considered.

In determining whether or not a significant relationship existed between the variables, the "t" test was used. The significant "t" value at the five per cent level with eight degrees of freedom is 2.306. The values calculated were: $t_{x_1 x_2} = 9.8225$, $t_{x_1 x_3} = 1.4209$, $t_{x_1 x_4} = 1.5488$, and $t_{x_1 x_5} = 1.0459$. Therefore, with a required "t" value of 2.306, it can be concluded that the only significant relationship exists between $tx_1 x_2$, or the price of feeder cattle and the price of fat cattle. The hypothesis that a significant relationship exists between the price of feeder cattle and the other selected variables was rejected at the five per cent level. This is not to say these variables do not affect the price of feeder cattle, but that their effect was not statistically significant during the period 1946 to 1958.

The estimating equation derived from the analysis was: $x_{10} = -28.6628 + 1.4696x_{21} + 0.0592x_{31} - 0.5754x_{41} + 0.1523x_{51}$. This equation indicates that a one dollar increase in the price of fat cattle acts positively on the price of feeder cattle and increases that price by $1.47$ (Figure 23). Also, that a one unit increase in the index of supply will act positively but to a negligible extent and increase the price of feeder cattle by $0.06$. A dollar increase in the price of feed would act negatively and cause a decrease of $0.58$ in the price of feeder cattle. An increase of one unit in the index of range condition would cause an increase of $0.15$ in the price of feeder cattle.
Figure 23. Net Relationship Between Price of Best Feeder Steers and Top Fat Cattle at Phoenix, 1946-1958.

Source: Calculated from economic model specified on page 104.
In Figure 24, the actual price of best yearling feeder cattle at Phoenix, Arizona, is compared with the price obtained from the estimating equation. As expected with an $R^2$ value of .94, the two lines are highly correlated.
Figure 24. Estimated and Actual Prices of Best Feeder Steers in Arizona by Years, 1946-1958.

Source: Calculated from economic model specified on page 104. Data from Federal Crop and Livestock Reporting Service for Arizona, Phoenix.
CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

Arizona is primarily a range state, with over 80 per cent of the state's total acreage being classified as grazing land. Beef cattle are the predominant type of livestock utilizing this range area, and they have accounted for an average of over twenty-two per cent of the total agricultural income received in Arizona during the period 1933 to 1958.

Several changes have occurred in the cattle industry in recent years which have necessitated related changes in the production and marketing practices employed by range cattle producers. Shifts and increases in human population, changes in consumer preference, decentralization of marketing, and the increase in number of local feed lots, have all affected the marketing of feeder cattle in the state.

Between 1951 and 1959, an average of approximately 366,000 head of calves have been produced yearly. These animals are either held over to be sold as yearlings, or are sold as stockers or feeders while still calves.

Arizona range cattle producers have not kept pace with the increased demand for feeder cattle by local feed lots. As a result, Arizona is a deficit area from the standpoint of numbers of feeder cattle, and annually receives inshipments of approximately 400,000 head of cattle and calves. Since 1946, total inshipments have increased by an average of close to
Texas is the major out-of-state source of feeder cattle for Arizona, and since 1946 has annually accounted for over 50 per cent of all cattle and calves shipped into Arizona. New Mexico, Colorado, Louisiana, and Florida are also relatively important sources of feeder cattle. Mexico varies in importance, depending upon the hoof and mouth disease situation. As long as this disease is controlled, Mexico is a major supply area of feeder cattle for Arizona.

By far the greatest number of cattle and calves shipped into Arizona from out-of-state are feeder cattle, and are fed out in one of the major cattle fattening areas of the state. Approximately 90 per cent of the total feedlot capacity in Arizona is located in Maricopa, Yuma, and Pinal counties.

Since 1946, total out shipments of cattle and calves from Arizona have increased by over 17,000 head per year, with a 13 year average of over 125,000 head. In 1959, approximately 569,000 head of cattle were shipped out of Arizona.

Range cattle are normally marketed in the fall, or after the season of strongest range feed. Range condition is considered to be the dominant factor influencing the seasonality of movement of cattle. Out shipments of cattle and calves from Arizona have shown two seasonal peaks: the larger one occurring in the months of October and November, and a lesser peak in May. The majority of shipments of cattle and calves into Arizona occurs from September through November with a distinct high in October, and a seasonal low in February.
Most range producers have several different types of markets available for their consideration, including terminal markets, auction markets, and direct ranch sale to order buyers or feeders.

During the past four years, the importance of auction markets as an outlet for feeder cattle has increased appreciably. However, it has been estimated that over eighty-five per cent of all Arizona feeder cattle are marketed directly through sale at the ranch, without passing through an organized market.

Since the conditions of shrinkage are one of the major bargaining factors in determining the price paid at country sales, it is imperative that the rancher understand the causes and probable extent of the shrinkage of his cattle under the prevailing conditions. The various stresses imposed upon cattle when they are marketed induce shrinkage. Physical factors as well as environmental factors, such as time in transit and distance to market, are the more important causes of shrinkage. A certain amount of shrinkage is inevitable, but with the proper use of recommended handling practices, the effects of shrinkage can be minimized.

Marketing costs constitute a large portion of the total costs incurred by a feeder cattle producer. The largest single marketing expense is for transportation to market via either truck or rail agencies. The particular means of transportation to use can be determined only after a careful comparison of available transportation agencies, and the net cost to the producer for the particular services offered by each agency.

Other costs will be incurred if cattle are marketed through a terminal market or auction market, and should be known in detail by the
rancher to facilitate an accurate market comparison. The commission constitutes only part of the total cost of sale at any organized market. A specific charge may be made for any service performed at the market. It is important that the rancher be aware of these specific charges and conditions of sale to enable him to make a more reliable market comparison.

The actual price received by a rancher for his cattle is naturally of considerable importance, although it must be recognized that the highest price per hundredweight does not necessarily result in the highest possible net return. Since ranchers operate on a relatively narrow margin, a variation of a few dollars in the price obtained per hundredweight can mean the difference between a profit or loss.

Prices paid for feeder cattle show rather substantial seasonal fluctuations and minor day to day changes. The seasonal high of "best" yearling feeder cattle prices at Phoenix normally occurs during the spring months of March, April, and May, with a fairly prominent peak in April. The price drops off gradually from June through December, with the seasonal low occurring in November and December.

In comparing the prices paid for "best" yearling feeder steers at Phoenix with the prices paid for choice 500-700 pound feeder steers at Kansas City and Omaha, little difference was noted during the period 1947 to 1958. The general trend at all three markets during that time has been slightly downward.

In relating prices of "best" yearling feeder steers at Phoenix with the number of beef cattle maintained on farms and ranches within the
state, a large degree of variation was found during the period 1937 to 1958. It is accepted that cattle numbers are inversely correlated with their value or market price. This is evidenced by the relationship exhibited by these two factors during the period studied. Deviations from this general pattern can be explained in part by various factors including: the effects of World War II and the Korean War; variations in business activity and employment; federal subsidies on the price of meat; and climatic changes and their related effect upon range conditions.

Since 1946, the number of beef cattle on Arizona ranges have decreased slightly from approximately 871,000 head on January 1, 1946, to approximately 850,000 head on January 1, 1958. Prices of "best" feeder steers reached a record high in 1951, took a sharp drop in 1952 and 1953, remained fairly steady until 1957, and have increased substantially from 1957 through the summer of 1959.

In comparing the prices of good-choice steer calves with "best" yearling feeder steer prices at Phoenix, it was found that prices paid for calves have been somewhat higher than the prices paid for steers during the period 1937 to 1958. A yearly average of the past 22 years indicates a price for calves of 50 cents per hundredweight higher than the average price paid for steers during the same period.

The only significant relationship found in a correlation between feeder cattle prices and selected variables for the period 1946 to 1958 was with the price of fat cattle. The hypothesis of there being a significant relationship between feeder cattle prices and an index of supply, feed costs, and an index of range conditions, was rejected at the five per cent level. However, the four independent variables can be mathe-
matically associated with ninety-four per cent of the change in feeder cattle prices during the period 1946 to 1958.

Conclusions

The range cattle industry helps to maintain the balance and general stability of agriculture as well as the economy of Arizona. As long as production and marketing practices used by feeder cattle producers can advance with other sectors of the agricultural economy, the beef cattle industry should retain its relative position of economic importance to the state.

From a marketing standpoint, the most important economic consideration to the producer is which of the available market outlets and facilities he should utilize in order to obtain the highest possible net return from his cattle.

Shipments of cattle and calves into Arizona are expected to continue to rise, due to the increase of population in California and the southwestern United States, and the associated importance of this area as a market for beef.

Although auction markets in Arizona have handled increasing numbers of cattle and calves during the past five years, it is felt that the distinct advantages associated with a more direct method of marketing will preclude the possibility of this type of outlet from growing to major importance for the sale of stocker or feeder cattle.

With rising cattle prices and the record number of cattle and calves maintained on farms and ranches within the United States, it is likely
that the price of feeder cattle will fall unless ranchers can liquidate part of their herds in an orderly manner.

Need for Further Research

Several areas worthy of consideration for further research were observed while attempting this study. Although the expense and general practicability associated with the following suggestions will vary, it is felt that each of these problems should warrant consideration in any research relating to the marketing of feeder cattle.

Studies needed are:

1. A detailed economic analysis of the various marketing outlets available to feeder cattle producers in Arizona. Due to the importance of the range cattle industry, the increase in direct marketing, and the necessity of knowledge by ranchers of the advantages and disadvantages associated with the use of particular types of market outlets, it is felt that a study of this nature would be desirable.

2. A detailed comparison of the factors affecting the price of feeder cattle. Although feeder cattle prices were analyzed by means of a multiple correlation analysis in this study, several changes could be incorporated in further analysis. The use of other dependent variables, the inclusion of total beef cattle numbers in the United States, and a lag correlation between feeder cattle prices and fat cattle prices, could all possibly be utilized in further research relating to feeder cattle prices in Arizona. If the only statistically acceptable hypothesis were the associated relationship between feeder cattle prices and
fat cattle prices, research could be attempted relative to the correlation of selected dependent variables with the price of fat cattle.

3. An analysis of shrinkage of feeder cattle from range to feedlot with emphasis upon the cost of regain after movement. This research should include studies in the use of tranquilizers and associated products for the reduction of stresses imposed upon cattle prior to, during, and after shipment. It should determine the approximate percentage of shrinkage that could be expected under various conditions for different grades and classes of feeder cattle shipped from prominent local shipping points to various feeding or market areas, and the estimated cost of regain after the cattle were placed in the feedlot.

4. The possibility of integration in the marketing of feeder cattle. The expenses of marketing are one of the major expenses associated with the production of feeder cattle. A study related to the economic desirability and potential of integration in the marketing process between producers as well as between the stages of processing, might prove beneficial.

5. A detailed analysis of the prices paid for various grades of feeder cattle at various markets. Specific prices could be obtained for all important grades and classes of feeder cattle and analyzed in relation to various markets. The purpose of such a study would be to determine the desirability of a particular market during a specific time of year, for the various grades and classes of feeder cattle.
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