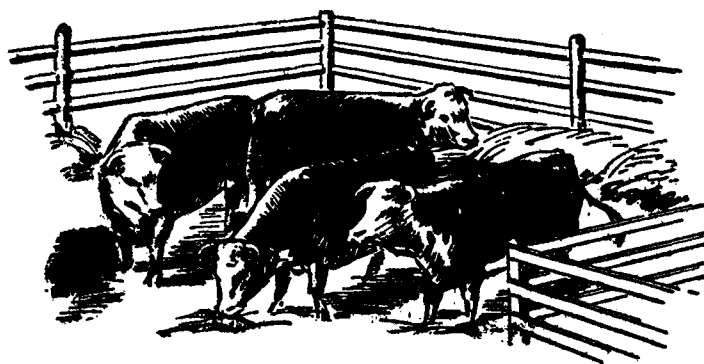


# **CATTLE FEEDING**

**and its Place in Twelfth District Agriculture**



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. . CONTENTS . .

	Page
<b>INTRODUCTION . . . . .</b>	<b>3</b>
<b>CATTLE FEEDING: WHY, WHERE, AND HOW . . . . .</b>	<b>3</b>
<b>THE FEEDLOT, THE RANCH, AND THE FARM . . . . .</b>	<b>11</b>
<b>PRICES, MARGINS, AND RETURNS . . . . .</b>	<b>17</b>

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*The western range has long been a major source of cattle for the nation. In its early years, still firmly established in story and legend, cattle moved eastward from the ranges of the Great Plains directly to slaughter. Today, cattle slaughter in the Far West has assumed significant proportions, and cattle feeding, that is, concentrated supplemental feeding after cattle leave the range, is an important part of the cattle industry.*

*This article reviews the cattle feeding industry with particular reference to the Twelfth District: the basis for the industry, its processes, its relation to and influence upon District agriculture, and some of the factors affecting prices and returns. The Corn Belt is still the nation's most important cattle feeding area, but District cattle feeding has been developing rapidly in recent years, supported by an expanding demand for beef that has resulted from an increasing population and rising income in the West.*

*Several aspects of District cattle feeding justify a regional discussion, not the least of which is its recent expansion. The feedlot may appear prosaic indeed alongside the more glamorous source of feeder cattle — the cattle ranch — but its importance to western agriculture and to the western economy is perhaps not yet fully appreciated.*

*In contrast to many other areas, cattle feeding in the Twelfth District is marked by considerable diversity of both feeding materials and feeding enterprises. Various feeding combinations, including cotton and sugar beet by-products as well as hay and grain, are utilized. Most cattle are fed on commercial feedlots, but during the past ten years or so, an increasing number of farmers are finishing stock for slaughter. Livestock feeding as a part of farm operations may bring real advantages if it means a better balanced and more diversified farm plan, but it also presents problems, particularly to the inexperienced farmer feeder. Since profit prospects for the livestock industry have been favorable over most of the postwar period, an insufficient knowledge of livestock, nutrition, and markets on the part of less experienced feeders has not been as serious as it may be under other conditions.*



## INTRODUCTION

A NATION's diet is influenced chiefly by the kind of food available to its people and by the level and distribution of its citizens' incomes. Preferences in food also influence diet habits providing there are adequate supplies and sufficient income.

Meat, when available in sufficient quantity, is one of the principal components of the human diet. Being readily digestible and nutritious, as well as pleasing to the taste, it is highly prized as food in all seasons and in nearly all climates. The per capita consumption of meat is highest in countries which possess a large grazing and cropland resource in relation to population.

While the United States ranks fifth in per capita consumption of meat, its level of consumption is much below that of the four leading countries—Uruguay, New Zealand, Argentina, and Australia. It has an extensive land area better suited to grazing than to cultivation which enables it to maintain a large livestock resource. Combined with an abundance of highly productive farm land, this resource yields a relatively high per capita meat supply. Since the ratio of meat production to population is not so great in the United States as in some of the other leading meat producing nations, the level of consumers' disposable income has a more direct bearing on per capita consumption in this country than it does in nations of an essentially pastoral economy. This has been highlighted during the past fifteen years when, with a rise in the level of disposable income, the demand for meat likewise expanded rapidly.

In addition to the rise in incomes, improved standards of diet<sup>1</sup> and an increasing population have had a significant influence on the amount, kind, and quality of meat produced. In the Twelfth District this has resulted in the

rapid expansion of a major agricultural industry—cattle feeding.

The number of beef cattle in the Twelfth District, however, has not expanded sufficiently to fill the growing requirements for both slaughter and feeder stock. During the past quarter century, the number of beef cattle<sup>2</sup> in the seven western states increased only 37 percent while the human population more than doubled. The combination of more animals, a greater beef output per animal unit, and more pounds of beef produced per acre has not been sufficient to balance the growing western demand for meat. Whereas the District was formerly a region of surplus cattle production, it now imports cattle from other sections of the country despite the fact that it is a large primary cattle breeding area. California and Washington are responsible for the District's net importation of cattle. In the other District states, the net marketings<sup>3</sup> of cattle exceed the number slaughtered. However, the combined surplus of marketings over slaughter from District states of Idaho, Utah, Nevada, and Arizona would be insufficient to equalize the deficit of California alone, if all their sales were to this one state.

<sup>1</sup> A broader acquaintance with nutritional research has revealed the importance of protein to the diet. Meat is recognized as a rich source of protein as well as of other essential nutrients including vitamins (Thiamin B<sub>1</sub>, Riboflavin B<sub>2</sub>, and Niacin); iron and copper, which are basic for the formation of hemoglobin in the red blood corpuscles; and phosphorus, the key to sound bones and teeth.

<sup>2</sup> The increase in total beef cattle numbers in the Twelfth District as a whole has lagged behind the expansion in other regions. Whereas between 1925 and 1952 the District increase amounted to 37 percent, beef cattle numbers in the Corn Belt rose 71 percent and in the southeastern states 102 percent. The number of cattle fattened by supplemental feeding has increased more rapidly in the District than in the nation, however. (See page 8.)

<sup>3</sup> Net marketings of cattle by the producers of any state are based upon the recorded numbers slaughtered under inspection in the state, less numbers brought in for immediate slaughter, to which difference is added the numbers shipped out of the state.

## CATTLE FEEDING: WHY, WHERE, AND HOW

By trail and then by rail, the nation's supply of beef originally moved from the areas of natural grass directly to the centers of slaughter. The westward extension of the rail head following the Civil War tapped the vast herds roaming the Texas breeding grounds. Herds of four- to five-year-old bullocks were trailed from this natural producing region up to the virgin pastures of Oklahoma and Kansas where they were fattened during the summer and then forwarded to slaughter centers farther east. Large herds were later trailed northward for fattening on the grass plains of Wyoming and Montana and the Dakota prairies. The profit to be made by improving Texas steers on Illinois corn was soon discovered by midwest farmers, resulting in the development of an extensive cattle traffic between the southern ranges and these northern feeding areas.

In the closing decades of the last century, however, the extensive regions of good fattening range gave way to westward farm expansion. Moreover, in the early decades of the new century an expanding urban and industrial

population brought about a growing demand for better meat. The combination of these two factors was principally responsible for the fundamental change which has occurred in the character of American beef production. A much smaller proportion of the beef served on the nation's dinner table now comes to slaughter directly off grass. The western range serves essentially as a producing area of "feeder" cattle, that is, cattle which require further conditioning in order to conform to the higher diet standards of the American consuming public.

### Why Cattle Feeding

Most of the beef cattle raised on the range go through a period of more or less concentrated feeding prior to slaughter. This supplemental feeding of livestock serves a multiplicity of purposes in the agricultural economy of the nation. The chief reasons for feeding of beef cattle are (a) to minimize the seasonal aspect of production, (b) to convert crops into a more desirable food, (c) to improve the palatability of the meat, (d) to implement the

diversification of farm production, and (e) to utilize by-product and locally grown feeds.

#### **Balancing seasonal supply with demand**

In the western range area, the yearly production of beef cattle is largely seasonal in character. Where the ranching unit is able to limit access of bulls to the breeding herd at a specific season, calving is regulated so as to have the offspring born when pastures are green and mother cows can supply a maximum flow of milk. This controlled breeding is conducive to the production of a more uniform and higher quality calf crop. Even when the physical aspects of the ranching unit are such as to require that bulls be left with the herd throughout the year, calving is largely seasonal. Cattle are more prolific when range grasses are green and animals are in vigorous health. The resulting seasonal characteristics of calf production vary within certain limits over the range area, depending upon climatic, vegetative, and topographical conditions. Nevertheless, the major portion of the western calf crop arrives during the spring and early summer.

The demand for beef at the nation's meat counter, on the other hand, is relatively constant. Part of the year-long beef demand is satisfied by cattle fattened on seasonal forage—animals which require no further finishing for slaughter. However, the ranges which grow natural grasses containing sufficient nutriment to fatten beef cattle satisfactorily are limited, highly seasonal, and extremely variable in grass production. Meat, being perishable, cannot be adequately stockpiled during times of plentiful grass, nor are storage facilities adequate for maintaining more than a few weeks' supply. Feeding operations offset the annual peaks and troughs of both cattle and forage production and make available a uniform supply of beef of acceptable quality throughout the year.

#### **From food to better food**

Livestock has long served as a means of converting crops into foods more desirable to man. In countries where land resources are severely limited in relation to population, it has been necessary to devote farming efforts almost entirely to the growing of grain for direct human consumption. Nations which are favored with extensive areas of natural forage, ample tillable land, and water resources, however, are able to divert a large portion of their crop output to the production of meat—perhaps a less efficient usage.<sup>1</sup> But where the relation of the land resource to population is conducive to the production of livestock for food, man has clearly indicated his preference for meat.

<sup>1</sup> Approximately 13 pounds of live weight gain are produced per 100 pounds of corn fed to cattle. This is equivalent to about 8.5 pounds of edible beef, which furnish approximately 6 days' supply of energy and protein. On the other hand, 100 pounds of corn consumed as corn meal would furnish enough energy and protein combined for the average person for about 55 days. The average person requires about 2600 calories of energy and 0.15 pounds of protein per day. See R. D. Jennings, *Consumption of Feed by Livestock*, United States Department of Agriculture, Bureau of Agricultural Economics, Circular 836.

#### **Improving meat quality**

For meat to be palatable and tender, a certain amount of fat over and through the tissue is required. Cattle require a source of feed beyond that necessary to maintain growth in order to produce a carcass in which the fat is adequately distributed. Fattening increases yield and, to a certain extent, the relation of more desirable cuts to the less desirable portions. It also improves the storage qualities of the carcass and decreases the moisture loss in cooking.

Many forage plants at certain stages of growth are nutritious enough to produce an acceptable degree of finish. As the nutriments supplied by natural pasture are extremely variable in the plant life cycle, however, so also is the finish achieved by animals grazing thereon. Beef animals feeding on natural forage approach their maximum conversion of feed to fat as grasses approach maturity. After plants have matured, a decline in their nutritive value occurs. It is at the optimum point of range feed value that "grass" cattle reach their best slaughter condition. They are then either sold for direct slaughter as "grass fat," if of sufficient quality, or further finished on a concentrated feed ration. Since the supply of grass-fat slaughter cattle is as seasonal as the grasses upon which they are fattened, a major portion of the animals required to produce a year-long supply of beef must be brought to slaughter condition in the feedlots, cornfields, and irrigated pastures of the nation.

#### **Toward farm diversification**

The experimentation and analyses resulting from an aroused interest in the conservation of agricultural resources have highlighted the functional position of livestock in the maintenance of farm fertility. Crop rotation and better cultural practices have also been recognized as important elements in soil conservation. The ideal plan for long-time maintenance of farm productivity, however, requires proper crop rotation coupled with intelligent cultural practices, and both of these integrated with the use of livestock. Equilibrium of crop production is based on the rotation of small grains or hay, then cultivated or tilled crops—cotton, sugar beets, corn, potatoes, beans—and finally the growing of grasses or legumes. Livestock produces the fertilizer which replaces those ingredients in the soil which the growing of crops has removed and serves as a means of converting farm crops and by-products into a consumer commodity.

#### **By-product feeds**

The fattening of livestock also serves as a practical means of marketing some major agricultural by-products. This is particularly important to Twelfth District agriculture. The meal feeds—such as residue from oils processed from cottonseed—are rich sources of protein feed. The meals are widely used as a basic part of the concentrated ration in drylot fattening as well as for supplemental

feeding on the range. The growing of sugar beets offers another valuable source of livestock feed. The by-products alone of an average acre of sugar beets are said to exceed in feeding value the entire product of an average acre of corn.

These and numerous other by-products have become more plentiful in the Twelfth District states during the last twenty years. They are among the main sources of protein and carbohydrate feeds used by the beef producing industry in the area. The feeding of cattle serves as an efficient means of marketing these bulky products "on the hoof."

### Source of Feeder Cattle

The American meat industry depends heavily upon the breeding and growing ranges of the vast area of the western states for its production of feeder cattle. Because of the diversity of the forage, climatic, and physical features of the West, various methods of production are followed. Producing ranches, however, are basically of three types: primary producers (breeding ranches, called cow and calf ranges), steer ranches (growing or fattening ranges), and operations which sell cattle of all ages and combine both other types.

All western range lands supply forage to a greater or lesser degree, though in most areas it is not of the right quality to fatten cattle to a desirable slaughter condition. Management, therefore, concentrates on the production of cattle for others to fatten. These are marketed at weaning time in the fall or are carried until the following spring and sold as yearlings. On some breeding ranges, grazing is on a year-round basis and little or no extra feed is normally required. Labor expenses and other costs of operation, as a consequence, are relatively low. In other areas where winters are more severe, hay—frequently cut from natural meadows—must be stored for winter feeding of the breeding herd. While labor requirements are higher in this type of operation, the generally larger percentage of calves raised and their normally heavier weight tends to offset the lower production costs on all-year ranges.

Good grass fattening ranges are more localized than are breeding ranges. They are found principally in the foothill areas of California and in the Flint Hills-Osage district of Kansas and Oklahoma. On the fine natural grass pastures of these two regions combined, over a million head of cattle are brought to slaughter condition each year. Due to seasonal differences, peak marketings of California grass beef occur in late spring and early summer, while cattle from the Flint Hills-Osage country are marketed in late summer or fall.

Steer ranch management is a highly speculative operation. Stocker cattle, contracted for in the breeding areas, are brought onto pastures at the start of the grass season with the objective of adding maximum gains over a relatively short season. While profits are potentially high, losses are frequently severe.

Another form of ranch operation is one in which all ages of cattle are handled. The herd is composed of breeding cows, replacement heifers, and growing cattle to be sold as stockers or feeders. In some areas where pastures and feed conditions permit, the offspring may be retained to be fattened on grass by the producer. Unless the natural features of the operating unit dictate specialization in either producing calves or grazing steers, the greater flexibility of the general purpose ranch is frequently preferred as a safer long-range pattern of operation since adjustments are more easily made to changes in feed supply and demand and price conditions.

### Source of cattle for Twelfth District feeders

The characteristics of feeder cattle production in the Twelfth District are generally representative of the patterns prevailing in the western range region. Both breeding ranches and general purpose ranches are found in all District states. The extensive areas in Federal and state lands in the intermountain states of the District are principally breeding ranges. Over three-quarters of the land comprising the states of Arizona, Utah, Nevada, Idaho, and eastern Oregon is composed of Federal land of varying degrees of livestock productivity. The climate and vegetation make these areas more suitable for producing calves than for growing or fattening beef. The production from these ranges finds a ready outlet in the grazing areas of California's foothill districts and irrigated pastures, in the alfalfa fields of the Imperial and Salt River Valleys, and in District feedlots. Breeding ranches in the southern desert areas of the District usually operate as all-year ranges. In the colder climates of northern Utah and Nevada, Idaho, and eastern Oregon and Washington, breeding herds are summer grazed but require supplemental winter feeding.

The major portion of the District steer ranches (fattening ranges) are located in California. The Sacramento-San Joaquin foothills, as well as those of the numerous smaller valleys in the state, produce a wild pasture (principally alfalfa and burr clover) relatively high in protein content during the growing season and up to maturity. To convert this grass into beef, thousands of feeder cattle are shipped into California each fall from the breeding ranges of the District and from other western states. In normal years, many of these cattle reach a finish of sufficient quality to be marketed for slaughter directly off grass the following spring and summer.

Although California's foothill pastures offer some of the finest natural grass pastures in the West, their production is variable in quality and their efficient use extremely seasonal. In relation to the expanding District demand for finished beef, these fattening ranges are also limited in extent. The major share of semi-finished cattle from the ranges of the District and from some of the adjoining states as well are therefore conditioned for slaughter in District feedlots on their way to the consumer table.

## Shipments into California

An indication of the expansion which has occurred in the western demand for beef is the trend in the number of cattle (excluding calves) slaughtered in California over the past twenty-five years. Between 1925 and 1935, an annual average of 770,000 head under all inspection services was slaughtered in the state. During the latter half of the 1930's, yearly slaughter had risen to one million head, and during the following ten years it exceeded this, on the average, by a half million. In 1951 California became the nation's leading cattle slaughtering state when, under all inspection services, 1,658,000 head were butchered.<sup>1</sup> Some of the stock supplying this increased demand are animals fattened outside of the state and shipped in for immediate slaughter. Also, appreciable amounts of dressed beef are received by rail and truck.

The inshipment of stocker and feeder cattle required to maintain feeding operations is, however, of still greater importance than shipments into California of animals for immediate slaughter. From 1930 to 1944 a yearly average of about 400,000 head was received in the state for restocking its grass ranges and its then relatively insignificant pasture and feeding operations. Beginning in 1945, however, inshipments of cattle for fattening purposes increased sharply. In 1951 over a million head of such types were imported—either directly to feed yards or to be conditioned for feeding on native or irrigated pastures.

This larger need for replacement cattle to maintain the District enterprise has rounded to the advantage of range cattle producers. Pacific Coast feeder-cattle buyers have had to reach farther and farther inland for the animals necessary to satisfy their demand. Formerly shipment to eastern farm and finishing centers was the normal pattern of movement for the major portion of the western range output. Today, in contrast, buyers from the West Coast are strong competitors in all District ranges, as well as far beyond. Not only has the resulting competition reacted to the favor of the District cattle grower, but an active market closer to home has been

<sup>1</sup> The 1951 total cattle slaughter, however, was not the largest for a single year, having been exceeded in 1945, 1946, and 1947 as a result of the large marketings incident to early postwar reductions of breeding herds.

FEEDER AND STOCKER INSHIPMENTS—CALIFORNIA  
(in thousand head)

Principal states of origin	1930-39 average	1940-49 average	1950	1951
Arizona .....	133	120	120	156
Colorado .....	14	18	18	41
Idaho .....	21	34	58	56
Kansas .....	2	8	27	42
Montana .....	8	40	117	96
Nebraska .....	2	8	5	6
Nevada .....	36	80	118	106
New Mexico .....	80	65	62	89
Oklahoma .....	1	4	13	30
Oregon .....	30	66	133	106
Texas .....	55	75	157	256
Utah .....	20	23	62	42
Washington .....	2	4	14	6
Wyoming .....	9	15	31	20
Other .....	7	12	18	23
Total .....	420	571	953	1075

Source: California Crop and Livestock Reporting Service, "California Annual Livestock Report, Summary for 1951."

created for the output of their breeding herds. In view of high freight costs and incidental shipping charges, loss in weight through shrinkage, and losses incurred through bruising or death—all factors reducing net returns—the existence of a market closer to the primary production area represents an immeasurable gain to the District cattle growers. Areas outside the District have also benefited from District cattle feeding activity. Texas and Montana, whose well-bred stock was relatively scarce on District meat counters in the past, are now a major source of the type of replacements so desired by Pacific feeders. The West Coast buyer is a familiar personage at the roundup in these breeding areas.

During the 1930's Arizona was by far the largest western exporter of stocker and feeder cattle to California. Subsequently, Arizona's importance as an exporter of replacement stock to the Pacific area was diminished by a series of drought years which generally reduced Arizona cattle numbers, and later on, by restrictions against importation of Mexican cattle. Additional contributing factors were a larger home market for slaughter cattle and the increase in the shipment of finished animals. Meanwhile, however, range cattle producers in Oregon, Nevada, Idaho, Utah, Texas, and Montana have each greatly increased their westward feeder and stocker marketings.

## Characteristics and Location of Cattle Feeding Areas

The major feeding areas of the nation depend for their economic existence primarily upon the availability of suitable fattening feeds, access to a dependable supply of feeder cattle, and a direct market outlet for the finished product—fat cattle. Adequate facilities for livestock transportation are also essential to the locale of livestock fattening areas.

Generally speaking it is cheaper and easier to transport cattle to feed than to haul the feed to cattle. It is essential not only that feeds be available, but also that the conversion of feed to beef be at least as profitable as are the alternate market outlets for the foodstuff grown in an area. Although some of the grains commonly used in fattening cattle can be used directly as human food, many of the feeds used in fattening cattle are not suitable for consumption in such fashion. Other types of livestock operations, however, offer competitive outlets for feedstuffs—the fattening of hogs and lambs and the production of poultry and dairy products.

As converters of feed into human food, beef cattle are less efficient utilizers of feed than are some other types of livestock.<sup>1</sup> The cattle feeder must therefore be able to convert the feed, through his cattle, into enough pounds of beef of such quality as to receive a price which justifies

<sup>1</sup> For example, a hundredweight of corn or its equivalent fed to beef cattle in the average fattening enterprise would produce about 17,000 calories and 0.8 pounds of protein. An equal amount of corn fed to hogs would produce 34,000 calories and 1.2 pounds of protein; to a commercial laying flock of chickens, 12,600 calories and 2.4 pounds of protein. A commercial dairy farm selling whole milk, making use of the equivalent feed, would produce 28,000 calories and 3.1 pounds of protein. See Jennings, *op. cit.*, Table 13.



its competitive usage in this manner. It is essential, then, that feeding operations be located where feed is abundant and relatively cheap and where its cost is not encumbered by excessive freight.

In order to be close to an adequate supply of feed, commercial livestock feeding enterprises are located in farming areas. The higher land values in such areas, however, preclude their usage by large scale breeding herds. The availability of replacement cattle is then of major importance to the feeding enterprise. Though some stock may be available from farm herds located in the crop-growing regions, the total output from this source is not generally enough to insure the needs of large feeding enterprises. Also farmers who raise beef cattle as part of their management program are likely to feed their own animals for more profit than can be realized by disposing of their animals as feeders. Consequently, commercial cattle feeding areas must look for their replacement supply of livestock in regions where agriculture is better suited to cattle raising than to crop growing.

The western range herds constitute the most dependable source of feeder stock for most of the major feeding areas. Feeder buyers are better able to find in the range districts the uniformity in breeding, quality, and age to fill their individual requirements than would be possible by gathering stock from a large number of smaller farm producers. The season of range sale, too, generally coincides with the season in which cattle feeders are most apt to want replacements. Many specialty producers of feeder cattle ordinarily dispose of the year's calf crop in the fall of the year prior to turning the breeding herds out on winter range or before winter feeding of hay becomes necessary.

Ordinarily, producers would not be able to carry the calf crop during the winter without cutting down on their breeding units, except in years of particularly favorable feed conditions. This is the time feeder buyers want delivery since the animals will be fattened and sold before price competition develops from marketings of grass-fat cattle, which gets under way the following summer.

The location of a feeding area in relation to the ultimate area of consumption is also an aspect of considerable importance in the commercial fattening of livestock. A fattening enterprise favorably situated between the supply area of feeder cattle and the final consumer market profits both by advantages in transportation costs and by smaller weight losses during transit. Freight rates on feeder cattle are less than those on fat cattle in transit to slaughter destination. When the finishing area is located in the general direction toward which the livestock would normally move to slaughter, the feeder (by registering the animals in transit to ultimate destination) is sometimes able to take advantage of "stop-over" privileges. Total transportation costs from origin to the final market are then less than they would be for a double movement—that is, first to the feedyard at one rate and later to slaughter at a higher rate. However, because of the relative proximity of

some fattening areas to the slaughter market, it may be more advantageous to truck the animals on the final shipment to slaughter, even though "in-transit" privileges by rail are thereby lost. This is true of most of the main fattening areas of the Twelfth District.

Since the principal District markets are close to the West Coast, the distance from the feedyard to the slaughter market is in most cases a relatively small part of the total travel involved between the cow range and the packer's hook. This operates to the advantage of the District feeding industry, in general, even where no in-transit privileges may be exercised, since the major share of the livestock travel comprises movement as feeders. Normally, the weight loss in transit by feeder cattle is of less value per hundredweight than the weight loss of fat cattle.

### The Corn Belt

The major cattle feeding area in the United States is that commonly referred to as the "Corn Belt."<sup>1</sup> Although other areas in the nation have increased in importance in the beef fattening enterprise, the Corn Belt still contributes a large share of all cattle fed in the nation. The historical background of the region, the nature of the land, and its favorable location have combined to make the fattening of livestock one of the main phases of its farm economy. Midway between the western breeding grounds and the great eastern metropolitan areas, crisscrossed by an extensive web of rail and highway facilities, this mid-continent area serves a major function in the production of the nation's beef requirements.

Livestock feeding in the Midwest first centered around the fattening of hogs. After the enactment of various Federal laws reduced the profit to be made from distilling corn into spirits and as wheat raising moved westward to the short-grass plains, pioneers in the Ohio Valley turned to the raising of hogs. Because of the slow methods of transportation existing at the time, however, meat had to be salted or "pickled" and shipped as barrelled pork. Slaughter was confined to the winter season. When transportation facilities improved and expanded, it became possible to ship livestock and poultry products to eastern markets. As the land proved particularly adapted to growing of corn, the fattening of livestock became the principal agricultural pursuit of the region.

Though hogs are still the mainstay of midwest livestock production, the fattening of beef cattle also plays an important part in the management plan on a large share of the region's farms. The average Corn Belt farm raises more corn than that ordinarily required for the hog program or for feeding to the poultry flock or work stock. The major portion of this surplus is used to fatten cattle.

It is estimated that one-fifth of the annual corn crop is fed to cattle on farms—about half of this to beef cattle and half to dairy animals. Another fifth is utilized by poultry and work stock on farms while hogs consume

<sup>1</sup> Comprising all or parts of the states of South Dakota, Nebraska, Kansas, Minnesota, Iowa, Missouri, Wisconsin, Illinois, Michigan, Indiana and Ohio.

nearly 50 percent of the total crop. About 10 percent finds an outlet in industrial and commercial and other non-farm use.

Approximately four million head of cattle are put on grain feed annually in the Corn Belt—the greatest number on Iowa farms which, on the average, fatten over one-quarter of the total. Illinois is the second ranking state, followed by Nebraska, Kansas, and Missouri as the leading producers of grain fed beef in the region.

#### Western Feeding Areas

Cattle feeding in the West, which presently accounts for about one-fifth of the nation's cattle feeding, is carried on in two general regions: the Rocky Mountain States<sup>1</sup> and the seven states of the Twelfth Federal Reserve District. This division is the result partly of natural geographic features and partly of the relation of these areas to the major market outlets. The number of cattle fattened annually in this western region increased during the past two decades at a more rapid rate than in either the Corn Belt or in the nation as a whole. Between the decades 1932-41 and 1942-51, numbers fed in the West increased 44 percent compared with a 34 percent increase for the United States.<sup>2</sup> The low point during the past twenty years occurred on January 1, 1935 when an estimated 321,000 head were on feed in the western region. With occasional fluctuations, numbers fed increased rapidly to a peak of nearly one million head at the beginning of 1952.

Between 1930 and 1935 the Rocky Mountain section of the West fattened slightly more cattle than did the Twelfth District. Although the feeding industry has developed rapidly in both these regions, it has expanded faster in the District. Between 1932-41 and 1942-51 District numbers increased 51 percent compared with a 38 percent increase in the Rocky Mountain region. Since 1947 Twelfth District operators have accounted for 54 percent of the feeding activity in the West.

#### The Rocky Mountain area

Nearly half of the western cattle feeding is done in the feedlots and farms of the area from Montana to Texas. The irrigated valleys bordering the South Platte and Arkansas Rivers in eastern Colorado are important feeding districts. Feeder cattle from that state and bordering ranges are fattened through the winter and spring months on hay, grain, and sugar beet by-products. Also adjacent to the Rockies are a number of less important feeding districts—in the environs of Billings, Montana, the Big Horn and the southeastern corner of Wyoming, and along the Pecos Valley of New Mexico. Marketings from these areas bordering the Great Plains are heaviest from January to June and shipments move principally to Chicago and the river markets.<sup>3</sup>

<sup>1</sup> Montana, Wyoming, Colorado, New Mexico, and Texas.

<sup>2</sup> Based on figures of *Cattle on Feed* as of January 1 compiled by the United States Department of Agriculture, Bureau of Agricultural Economics. These are the only statistics available covering all states for a comparable period.

<sup>3</sup> Kansas City, St. Louis, Omaha, St. Joseph, and Sioux City.

Feeding operations are carried on in various parts of Texas also. Cattle are fattened through the fall and winter months, primarily on hay, grain, and sorghums grown in the locality. The by-products from cotton growing also constitute an important feed concentrate. Although feeding operations in Texas have expanded considerably during the past decade, the rate of growth has been less than in the country as a whole.

#### Twelfth District feeding areas

Cattle feeding in the Twelfth District has not had the long historical background that identifies the more famous Corn Belt enterprise. The District industry blossomed with the regional economic activity of the war and post-war periods and has been characterized by a diversity of operational methods, in contrast to the more uniform pattern of midwest production. The District enterprise does not rely so much upon the output of a single crop, and its access to a wide variety of feedstuffs offers the feeder greater flexibility of production.

The Twelfth District as a region possesses all the essentials required of an economic beef fattening area: (1) a vast acreage of both public and private grazing land on which high quality feeder stock is produced; (2) a multitude of feeds and by-products of high nutritive value which the farming areas of the District supply; (3) expanding market outlets which are favorably situated in relation to breeding and feeding; and (4) a highly developed system of rail and highway transportation facilities that adequately serves the region from the cow range to the slaughtering pen.

#### Trends in District feeding

On January 1, 1952, 687,000 head of cattle were being fed in the Twelfth District for winter and spring markets. Of this amount 348,000 were in California drylots. An additional 8,000 head were being fattened on field feeds and irrigated pastures in the state, so that California accounted for 58 percent of the District total and 31 percent of all cattle on feed in the twelve western states.

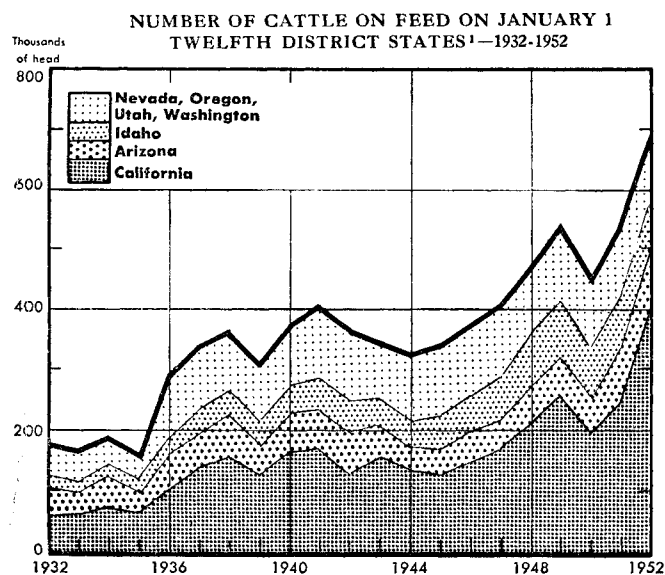
While the total number of cattle put on feed has been greater since 1942 than during the previous decade in all District states, some shifts have occurred in the relative importance of the various states. California's share of total District feeding has increased over the past twenty years. Comparing the two 10-year periods—1932-41 and 1942-51—Idaho and Washington have also become more important as cattle feeding states, contributing 16 and 7 percent, respectively, during the latter period. Arizona and Nevada, on the other hand, now account for a smaller share of total District feeding than formerly. During the latter ten-year period, Arizona's share was about 14 percent and Nevada's only 5 percent. Utah and Oregon have about maintained their relative importance in District cattle feeding but their respective contributions are less than 10 percent each.

## California

California is the leading beef fattening state in the District. The important fattening areas are the Los Angeles commercial yards, the Imperial Valley, the Great Central Valley, and adjacent coastal areas. Small scale operations are also carried on in some localities in the northern mountain counties. The large feeding plants in the vicinity of Los Angeles and up and down the Central Valley are mostly commercial drylot operations where hay, grain, and mill feeds are widely used. In the Imperial Valley large numbers of cattle are winter fattened on irrigated grains and alfalfa pastures. The hay, grain, and sorghums grown in the vicinity also form the basis for a large drylot enterprise.

In California the months of peak activity in cattle feeding are December and January. Feeding at this season is largely timed so that cattle will be ready for slaughter before the heavy run of grass-fat cattle is initiated the following summer. Approximately four-fifths of the cattle on feed at this time of the year are normally marketed before the end of March. On December 1, 1951, a total of 434,000 head was reported in the state's drylots—an increase of 480 percent over the same date two decades previous. Up to 1935 less than 85,000 head of cattle were reported on feed on December 1 in any year. For the following ten years, numbers increased steadily with only minor fluctuations and by 1947 exceeded 200,000 head. Subsequently feeding operations expanded rapidly. Although December and January are the months of heaviest feeding in California,<sup>1</sup> the new character of western demand requires that large numbers of cattle be fed throughout the year. Because of the availability of grass-fat cattle during the summer months, feeding operations are

<sup>1</sup> December 1 and January 1 are the only reporting dates for numbers on feed in California.



<sup>1</sup> Includes only cattle being fattened for market as a more or less distinct agricultural enterprise, and excludes small operations incidental to dairy and general farming.  
Source: United States Department of Agriculture, Bureau of Agricultural Economics, *Cattle on Feed—January 1*.

normally less during this time. Nevertheless, it is estimated that, including slack seasons, at least a million head of cattle a year are fattened in California drylots under the present level of activities.

## Idaho-Arizona

Idaho and Arizona are the states next in importance in District feeding. Feeding in Idaho is located principally in the Snake River Valley, between Rexburg in the east and the Payette-Weiser area to the west. Hay, grain, and sugar beet by-products are the main feeds used. The irrigated desert area of Arizona's Salt River and Yuma Valleys produces a combination of pastures, alfalfa, hay, grain, sorghums, and cotton by-products upon which relatively large feeding operations are based. Feeder stock produced on the state's ranges and Brahman cross-bred cattle from the Southwest move through the drylots and irrigated pastures of these areas on their way to Los Angeles or local markets.

## Other District areas

A number of small irrigated valleys in western Nevada and in northern and central Utah supply hay and some concentrate feeds for about 15 percent of the cattle fed through the winter season in the Twelfth District. Cattle from the Nevada sector are fattened mainly for the San Francisco market area while those from Utah are shipped principally to Los Angeles and eastern markets.

Feeding operations are less localized in the Pacific Northwest than in Nevada and Utah, although Oregon and Washington combined fatten approximately the same amount as the total of the other two states. Commercial yards in the Puget Sound area fatten beef for the Tacoma-Seattle markets. The hay and grains grown in the Spokane-Pullman-Walla Walla triangle and in the vicinity of Yakima are used to finish beef for the north coast markets. A large proportion of Oregon feeding is done in the Tule Lake-Klamath Basin district and in the sugar beet area in the eastern part of the state, though smaller numbers are also fattened in the central and northeastern sections.

## Scientific Feeding

As contrasted to the methods of fattening beef cattle in other parts of the nation, the western feeding industry is characterized by its factory line pattern of production. District cattle feeding plants vary in size from those able to feed a few hundred head to yards with a capacity of over twenty thousand. Yet operations, even in the smaller plants, are generally highly mechanized, both as to the preparation or mixing of feeds and the delivery of the ration to the feed trough. For example, most plants are so designed that from a push-button central panel one man can mix and store feed in the desired proportions. From the storage facilities rations are mechanically deposited in the trough by trucks or rail cars in such a manner that all animals are fed within the space of a few hours. The horse, the wagon, and the pitchfork have been relegated to the curio room.

Since District feeding plants are essentially beef-making factories, their inherent high capital costs have necessitated the elimination of a major part of the guesswork in feeding. It has long been a saying that the eye of the master fatteneth his cattle. Today it may perhaps more properly be said that it is the hand of the nutritionist that does so. True, the western feeder must also "know" cattle. He must know the feeding characteristics of the various types, ages, and sexes of the animals he handles. He must be able to judge how his animals are reacting to the rations fed and to tell when and what adjustments may be necessary during the course of the feeding period. He must be acquainted with the beef grade standards and also the qualities his animals must possess in order to yield those standards in carcass form. But most important, the cattle feeder must know the relative fattening value of different feeds and what combinations will produce a balanced diet. To do so requires that he be a nutritionist and, as such, possess a thorough knowledge of the organic and inorganic composition of feeds and how they are used by the animal body.

#### *Wide variety of feeds in the Twelfth District*

The great difference between District methods of feeding and those of the important midwest region originates in the dissimilarity of the agriculture of the two areas. The midwest feeding plan is based on a corn economy, and the principal feed formula used is a corn ration. Because the growing of corn is particularly adapted to the soil and climate of the area and because this cereal is so relished by cattle, it has long been the backbone of Corn Belt feeding. Corn is especially suited for fattening cattle because of its high proportion of digestible nutrients and net energy. It is high in fats and in nitrogen-free extract, being nearly all starch. Having a low fibre content, it is highly digestible. These properties, combined with its palatability, have made corn the standard to which other fattening feeds are compared. Midwest farmers have not had to search for a better feed.

The growing of corn, however, is not a basic part of agriculture in the Twelfth District, and this grain is not the basis of the region's feeding economy. The diversity of District agriculture, however, makes available a wide variety of feeds suitable for producing any of the several carcass grades that the western market demands. Both concentrate and bulk feeds are abundant. They are, nevertheless, of diverse chemical composition and consequently differ in relative fattening value. Which particular feeds are used depend upon their availability, their nutritive qualities, and their ability to bring a group of animals to the desired finish or grade most economically. The feeder's problem, then, becomes one of producing a balanced ration for the least cost. No one feed or combination of feeds is best or most economical. The price of feeds fluctuates from year to year, even from season to season. Their chemical composition is also variable. Since a suitable ration can be made up of many different combinations, an appraisal of the fattening value of the result-

ing mixture must be arrived at by weighing the various nutrient components against the costs of the feed medium supplying them.

In preparing the ration, the feeder is therefore interested in determining the quantity and the quality of the nutrient content available to satisfy the daily maintenance requirements of his stock according to their age, weight, and condition. He must also analyze the quantity and quality of those ingredients which are available to be transferred into body fat. He must, of course, determine the relative cost of each, and this is finally dependent upon his knowledge of their nutritive function and value.

The palatability of the feed mixture is also essential to the ration. Even if all the required nutrients are present and in correct proportion, unless the animals take to the feed with eagerness they will not consume sufficient quantity to make economical gains.

Owing to the great variety of feeds available in the area, a far broader acquaintance with the principles of animal nutrition is exacted of the District cattle feeder than is generally required of the farmer feeder in regions of less diversified feed resources. For this reason, the District operator finds it necessary to keep in close touch with the results of research in animal nutrition<sup>1</sup> and in the development of feed by-products.

<sup>1</sup>As shown by nutritional research, the animal body needs must be met by supplying feed in both concentrate and roughage form. The former (grains and the many high protein by-products such as cottonseed or linseed meal) are low in fibre and high in total digestible nutrients. The latter (the hays and straws, silage, cottonseed hulls, wet beet pulp, etc.) are bulk feeds essential to the proper physiological functioning of the animal body. They are high in fibre but low in total digestible nutrients.

Certain feed ingredients are essential to the maintenance of growth and continued health; others are required to furnish energy. The feeder therefore cannot be satisfied with merely filling the animal's paunch. He must be sure that he is filling it with the total amount of digestible nutrients and the required minerals to insure his stock maximum gains over the entire feeding period.

The total digestible nutrients in the ration are the sum of all the digestible organic nutrients—protein, carbohydrates, and fat. Their percentage in the feed represents the approximate heat or energy value of the feed. The net energy supplied by the animal feed intake is expended in a number of ways, but principally in body maintenance, growth and muscular activity, and in the production of offspring and of milk in breeding animals. Cattle in the feed pen exert a minimum of muscular activity. The surplus net energy above that required for body functions, maintenance, and growth is used for the formation of body fat.

The feeder supplies protein because it is essential to the maintenance and rebuilding of the tissues of the animal body. Animals build the protein of their tissues primarily from the amino acids which result from the digestion of protein in their food. Proteins are supplied chiefly by legume hay or concentrates such as seed meals. Any excess over that required to meet the maintenance needs of the body serves as a source of heat and energy. As protein feeds are normally higher priced than feeds high in carbohydrate and fat content, they are ordinarily less desirable than the cereal grains for the addition to body fat.

The feeder supplies carbohydrates as a source of heat and energy. Since carbohydrates form about three-fourths of all the dry matter in plants, they are the main source of these particular needs. The carbohydrates differ greatly in digestibility and nutritive value, however. For the purpose of feed analysis they are divided into nitrogen-free extract and fibre. The nitrogen-free extract includes the more easily digested and, therefore, more valuable carbohydrates such as the sugars and starch; the fibre, cellulose, and other carbohydrates are not easily dissolved and consequently are of lower feeding value.

The feeder supplies fats as a further source of energy and of body fat. The fats also aid in the absorption from food of vitamin A and carotene, which animals convert to vitamin A. Fats are supplied primarily by the cereal grains (corn, oats, barley), in the residue meal from certain oil seeds (cottonseed, soybeans), and to a certain extent from roughage.

Mineral nutrients are likewise of great importance to livestock feeding, and their lack causes serious diet deficiencies which retard gains or may actually cause loss of weight. Calcium and phosphorus make up three-quarters of the mineral matter in the animal body and over 90 percent of that of the skeleton. These elements are derived chiefly from the legume hays and the protein-rich concentrates of the ration. A lack of them may cause loss of appetite and general unthriftiness. Iron and copper are essential to the blood and have other vital functions. Trace minerals—magnesium, zinc, manganese—are important to the animal diet also if maximum gains are to be realized. Their lack may cause a loss of appetite or depressed appetite, emaciation, or anemia. Sodium and chlorine (in the form of common salt), of course, are vital, and in the feedlot these are usually supplied separately from the feed.

## A use for by-products

The expansion in cattle feeding has been accompanied by a corresponding increase in the output of feed by-products suitable for the finishing of livestock. In the Twelfth District, however, more pounds of beef are produced by the feeding of sugar beet<sup>1</sup> and cottonseed by-products<sup>2</sup> than by any other by-products.

The importance of livestock feeding enterprises as a market for sugar beet by-products is reflected in the number of cattle marketed each year from the sugar refining areas. As many as 50,000 to 60,000 cattle are fattened each year in some of the larger feed yards. It is estimated that in the 1950-51 season over 350,000 head of cattle were finished on rations consisting in large part of beet pulp. The most extensive operations were carried on in California and Idaho, which fed 167,000 and 95,000 head of cattle, respectively, followed by Utah, Oregon, and

<sup>1</sup>The by-products derived incident to the growing of sugar beets have long been an important source of livestock feed upon which many thousands of cattle and lambs are fattened annually in most western states. Livestock feed from sugar beets is derived both on farms where the beets are grown and from the factories where they are processed.

Beet tops, the residue of leaves, and the part of the crown left after harvest are a rich protein feed. Tops are generally utilized by allowing the cattle to glean the fields. Each year cattle feeders contribute appreciably to the income of District beet growers through rental paid for this feed. Farmers realize returns on a per acre or per head basis or in the tonnage yield of the crop harvested.

It is in the process of extracting sugar from the beet, however, that the most important by-products—pulp and molasses—are derived. Pulp is fed in wet, pressed, or dried form. Wet pulp, the principal feed derivative of sugar beet processing, is a carbohydrate feed much relished by cattle. Seventy pounds of wet pulp has the equivalent feeding value of five pounds of barley. Large cattle feeders often contract for their pulp directly with District beet sugar factories. Since wet pulp is both bulky and of high water content (85-90 percent), it is usually fed close to the extraction plant. Dried pulp finds an outlet mainly as a dairy feed. Beet molasses, up to certain quantities, is considered equal in food value to grain and is extensively used by District feeders. A valuable carbohydrate, it serves an important function in various feeding rations.

<sup>2</sup>Cottonseed cake or meal is a rich source of the protein requirements of the animal diet. It is extensively used in the western feedlots to balance rations deficient in this nutrient, as well as for supplementing feeding on the range. When filling a protein deficiency in the ration, 100 pounds of cottonseed meal is about equal in value to 250 or 300 pounds of grain. The hulls, the outer covering of the cottonseed removed in the oil extraction process, are a satisfactory source of carbohydrate roughage. They are used extensively by large feeders in the District cotton growing areas, who generally build their feeding facilities in the vicinity of the oil mills. As a feed, seed hulls supply up to 43 percent of the total digestible nutrients required in the ration, which is about equal to that furnished by the late cut hay or oat straw. Being low in protein and certain necessary minerals and vitamins, they must be fed in conjunction with feeds which will correct these deficiencies.

## THE FEEDLOT, THE RANCH, AND THE FARM

Although many cattle are fattened with supplemental feeds by range and farm operators, the bulk of the cattle feeding in the Twelfth District occurs on commercial feedlots. The typical District feedlot is operated by a specialist, known as a "custom" feeder, who contracts to fatten cattle for a packer, a cattleman, a farmer, or other type of operator. Many District packers also operate their own feedlots to provide cattle for their slaughtering plants. In addition, some food merchandising chains feed livestock so as to supply their own meat counters with the carcass grades most suited to their needs. Range producers frequently choose to enhance the value of their animals by fattening them for markets rather than by selling them to others for fattening. The District feeder, like his mid-western counterpart, may also be a farmer who uses

Washington with 40,000, 32,000, and 18,000 in that order.<sup>1</sup>

Cattle feeders also constitute the major outlet for the by-products retrieved by the extraction of edible oil from cottonseed. With Arizona and California now major cotton growing states, there has been a corresponding increase in the tonnage of livestock feed produced from this source. In 1951 approximately one million tons of raw cottonseed were produced in the District cotton growing area. From this amount about 48 percent would be realized as cake or meal and 26 percent as hulls. The main portion of both found a ready market in the cattle feed troughs of the region. An average price of \$60 per ton for meal means to the District a value of production at the mill level of over \$27 million. Cottonseed hulls, calculated at an average value of \$14 per ton, contributed nearly \$4 million more at current production levels.

The use of sugar beet and cottonseed by-products has been stressed because of their greater production, higher feeding value, and wider usage as a source of feed in District cattle finishing plants. Both of these products highlight the importance of the feeding enterprise as a marketing medium for agricultural by-products. The finishing of livestock, however, exists as a steady outlet for many other feeds which are residues of District crops. Surplus prunes, grape pumice, almond hulls, and citrus and pear pulp are a few of the feed materials derived from the fruit and nut orchards which contribute various nutrients to cattle feeding rations. To these may be added field products, such as surplus potatoes and offal from the vegetable and fruit canning industries. Each year, as a result of research and experimentation, new uses are found for the waste materials supplied by the processors of agricultural products. Cattle feeding makes possible the economic marketing of many of them. The wider use of these by-products is reflected in turn upon the price District farmers ultimately receive for the output of their crop land.

<sup>1</sup> Estimated from beet sugar refinery reports.

cattle as a mechanism for marketing his crops to better advantage or as a medium of greater farm diversification.

### The Custom Feeder

The most important District cattle feeder is the commercial or "custom" feeder, especially in California, the leading beef producing state of the Far West. Commercial feeding enterprises are not entirely new to the District. A few feedyards, controlled either by packers or independent operators, have existed for a number of years in the vicinity of the principal metropolitan centers, notably around Los Angeles and the San Francisco Bay region. The number and size of "drylot" enterprises, however, have increased rapidly during the past decade and are now more generally located in the intensely farmed valley areas.

Relationships of supply and demand prevailing since 1940 have been the motivating force in the rise of this type of operation to its present significance in District agriculture. With the supply of grass cattle far short of increasing meat consumption requirements, the opportunity was presented for extensive production-line output. Under the circumstances, the possibility of attractive profits for the competent feeder was created, while the speculative aspects inherent in beef-cattle feeding were minimized. The change in consumer preferences, which accompanied western economic expansion, has been further conducive to the development of this highly specialized type of operation. Though differences still exist between the types of beef demand in the eastern and western sections of the nation, western consumers are increasingly demanding smaller cuts and beef of more tender quality. Changes in diet habits have also reduced the usage of animal fat. Consumers, therefore, now favor meat containing a minimum of fat waste, yet of sufficient finish to insure palatability.

These shifts in consumers' wants have required the slaughter of younger animals which produce smaller carcasses. They have also created a stronger demand for cattle carrying a higher degree of finish. Younger cattle, however, make the most economical gains, as they require less feed per 100 pounds of gain. Higher finish, within limits, commands a higher price because through it the meat receives its tenderness and flavor. Obviously then, the evolution in the character of western demand has worked to the advantage of the cattle feeding industry as a whole since less time is involved from the cow range to the dinner table. More especially has it done so in the type of operation where feeding practices, and therefore quality of production, are expertly controlled. The custom feeder, as a specialist, has exploited these changes in the pattern of beef consumption. His job is to put the required finish on a beef animal for the least possible cost. He must do this within the margin of feeder and slaughter prices while allowing for his own as well as the stock owner's profit. In minimizing the speculative risk, he has, of course, narrowed his relative opportunity for profit. The custom feeder's gamble is allied with changes in the cost of the ingredients which he uses in mixing his feeding rations, rather than in fluctuations in cattle prices. For this reason he is better able to "hedge" his risks, as the cost of feed tends to be less variable than the market price of fat cattle.

#### **Contractual agreements**

When cattle are shipped into the custom yard, an agreement is entered into between the owner and the feeder relative to the conditions under which the stock is to be fed. Some contract feeders require a written contract embodying the terms and conditions of the service. More frequently, however, a verbal agreement is considered sufficient by the feeder, as possession of the cattle is a satisfactory guarantee against the liabilities which will accrue to the account of the owner.

Basically, the custom feeder sells feed and with it his ability to convert that feed into economical gains on the owner's cattle. His primary profits are realized through the markup he is able to take on the cost of the feed consumed. The value of his product—the feed formula—is the reflection of its efficiency in producing the gains required. Reputation for performance, then, must of necessity play a major part in continuing success in the type of operations identified with the larger share of the District feeding industry.

Little custom feeding is now done on a gain-in-weight basis although formerly this practice was rather common. A gain-in-weight basis is generally considered undesirable by drylot operators for a number of reasons. It is a potential source of poor owner-feeder relations. Disagreements can too easily arise when the cattle owner feels that the expected gains have not been realized. The nature of individual animals and the conditions under which they have been raised and handled may have an unmeasurable effect upon their capacity to gain weight under feedlot conditions. Wild, nervous cattle will take much longer to "get on feed" or may never put on the equivalent gains as the same breed of animals of gentler disposition. Similarly, cattle from a range of deficient feed conditions may lack the capacity essential for an adequate feed intake. That the stock owner is more apt to be acquainted with these characteristics than the feeder might well work to the advantage of the one and the disadvantage of the other. Ownership of the cattle frequently changes hands during the feeding period. As the gains in weight normally are higher in the forepart of the period, it is unlikely that the feeder can continue the same rate of increase for the second owner.

For much the same reasons, contracts which embody a gain, plus part of the price margin, are considered undesirable by the majority of commercial feeders. With the more precise interpretation of beef grades introduced by changes in the character of western demand, feeding on percent of the margin (price spread) is felt by most custom operators to involve unwarranted risks.

Quotations are, therefore, generally based on either a cost-plus formula or a stipulated fee per head per day. Both methods relate to the cost of feed. The former is a charge for the actual cost of feed consumed, to which is added an overage per ton. The feeder may include his overhead costs (milling, labor, insurance, etc.) in quoting his charges on feed ton prices. On the other hand, his rates may be based on the current market price of the essential feed ingredients, plus a stipulated spread. Most commercial yards charge a service, or "yardage," fee of 3 or 4 cents per head per day. The services normally rendered include vaccination, branding, sorting, weighing, hospitalization of sick stock, and other services incident to the care of cattle. The feeder, however, does not accept the responsibility for death loss.

Decisions as to length of the feeding period, the grade and weight to which individual groups of animals are to

be fed, and a number of other variable factors are agreed upon between the feeder and the livestock owner. Some commercial firms feed whatever ration is requested by the owner. Others insist that the feeding procedure be at the feeder's discretion. Many commercial operators feel that in order to maximize results they must have the latitude of feeding cattle according to their own prescribed procedures. Most custom yards, however, offer the livestock owner a range of feeding formulas.

Records of performance of each pen of animals are made available to the cattle owner. These indicate the amount of feed consumed and, if periodic weighing periods are requested, the average gains being made. At the completion of the feeding period a report is submitted which discloses the total feed consumed and the total gains accomplished, the average gains per day, and the average cost per pound of gain. The feeder, in daily contact with the animals in his care, usually notifies the owner when, in his opinion, the cattle have reached their maximum efficient condition. The owner then makes his own marketing arrangements.

### **The Packer Feeder**

Meat packers are essentially processors of livestock. Competition within the industry is keen, and profits per dollar of sales are small. Consequently successful operation depends upon insuring maximum sales, coupled with efficiency of operation. In the Twelfth District during the past decade, maximum sales and plant efficiency have had to be maintained in conjunction with a program of plant expansion in slaughter capacity, and this at a time when suitable cattle supplies were not expanding as rapidly as demand. It is this adverse relationship which forced the western packing industry to assume a major role in the District cattle feeding. Whereas slaughterers in other regions have access to a regular source of farm fattened animals, western packers had to create a large share of their expanding need for slaughter stock.

Statistics on the percentage of total District cattle feeding done by meat packing firms are not available. Packers, however, account for the largest share of all District commercial cattle feeding, either through their own operations or by contracting with custom feeders.

Prior to the last decade, western slaughter needs were largely filled by the marketing of heavy, grass-fat cattle from the better range forage areas or from cattle fattened on western hay crops and beet tops. The rapid growth in western population and economic activity incident to the war and postwar periods not only created a greater demand but also a changing type of demand. More people required a greater amount of beef. But more people with higher incomes also gave rise to a demand for a quality of meat not generally realized from the carcass of an aged, grass-fed steer. Unlike the midcontinent area where the production of quality beef has long been a part of the agricultural economy of the region, the West rapidly outstripped its supply of desirable slaughter cattle. Conse-

quently, District packers had the alternative either of drawing both live and dressed beef from areas far removed from western markets and competing under the disadvantages of higher costs or of feeding, directly and indirectly, sufficient numbers of cattle to guarantee their plants a minimum supply consistent with efficient operation. By and large, they have chosen the latter course.

### **Advantages of packer feeding**

It is recognized that the profits realized from their feeding operation during the past decade have been, in general, very favorable. Other less spectacular advantages have also accrued. Owing to the seasonal character of western grass production, the output of grass-fat cattle is extremely variable. Dry cycles are quickly reflected in the number and quality of animals suitable to market off grass. Through their ownership of cattle in custom yards or by operating their own feeding plants, District packers have been able to meet the requirements of the trade even during seasons of unfavorable grass conditions. Feeding a portion of their annual slaughter needs also places the packers in a position to adjust more quickly to anticipated changes in the type of supply. Packers, especially the national firms, are in close touch with regional as well as nationwide supply conditions and outlook. If it appears that a certain type of slaughter animal will in the future be scarce, they are better able to feed to that particular end, in order to avoid being forced to bid on what would likely be a tightening market. The new merchandising practices introduced by the large chain stores have served to stimulate a greater standardization of quality and cuts. Many of these firms refuse to accept beef carcasses above specified weights and also require meat of particular Government grade. By feeding a part of their slaughter requirements to these specifications, the District packing industry has been better able to guarantee the requirements of new meat merchandising methods.

One of the important contributions of District operations in which packer feeding has played a significant part has been the improvement of the general quality of beef produced in the area. It is obvious that large consumer demand must have existed and a shift in the character of that demand must have occurred. The yearly output of good and choice grade beef which has been maintained in this western region, however, may, in large measure, be attributed to the volume of feeding for which the packers have been responsible. Their direct and indirect participation has been influential in establishing feeding practices conducive to quality output.

The extent of packer feeding has also been a sustaining force to large scale commercial feeding operations. Custom feeders, of course, finish many cattle for farmers, producers, speculators, and others. The high percentage of packer cattle in custom yards, however, attests to the importance of that industry in maintaining volume production in commercial plants.

### **Problems arising from packer feeding**

Despite the advantages which have accrued both to themselves and other livestock interests, the feeding activities of District packers have introduced some problems also. It has been pointed out that packers are primarily livestock processors. Their feeding program has required of them an annual outlay of many millions of dollars of high risk capital which is not directly involved with processing operations. While cattle prices have been high and feeding margins large, profits from this venture have been favorable. A sharp drop in cattle prices during the feeding period, however, such as occurred during the 1948-49 winter season, causes serious losses. While the national packing firms are perhaps better able to sustain such losses for a time, since feeding is only a limited aspect in their nationwide operations, the independent District packer is not so favored. The unit or regional operator could conceivably be liquidated in one or two seasons of declining prices. Yet the independent, to protect his position in an economy where the primary resource has been relatively scarce, has frequently been forced to involve his plant in a heavy feeding program. The situation has long range implications for the unit slaughterer which merit serious analysis and research—more particularly since higher feeding costs and smaller margins are likely to prevail in the future.

On the other hand, large feeding plants are vulnerable to any appreciable shift in the District feeding pattern. Commercial operators are essential in the business of selling feed and “know-how.” A marked decrease in the volume of cattle fed for the account of the packers could possibly create a serious problem to many District commercial feeders unless supplemented by volume demand from other sources. Maintaining capacity output in commercial feeding plants is of paramount importance, particularly in those establishments which raise only a small part or none of their feed materials.

Large scale packer feeding may be said to present further disadvantages to other District feeders. The harvest from a livestock fattening venture is like that of many other agricultural commodities—when the “crop” is ready, it has to be marketed. Regardless of how many packer-owned cattle may be approaching slaughter condition, by and large the feeder’s animals must be offered for sale when they are ready. Without knowledge of either the amount of packer cattle on feed or the approximate time they will be ready, the independent operator is feeding against a supply situation he is unable to estimate. It is hardly to be expected that his trading position will be favorable any time that packer inventories of slaughter cattle are temporarily adequate.

In order to maintain their feeding operations, contracting by packers for both slaughter and feeder stock at country points rather than at central markets has been greatly increased. From one point of view, the producer gains thereby since he is in a better position to accept or refuse an offer, that is, he can trade before his animals leave the ranch. On the other hand, the central markets

of the District become less representative of the actual prices which prevail—yet the only comprehensive and reliable daily price information emits from these centers. Whether, in the long run, District cattlemen—both feeders and range operators—will benefit more from direct country sale or from sale in central markets is a debatable question and more properly allied to a marketing study.<sup>1</sup>

### **The Grower Feeder**

Generally speaking, the western cattle grower is not a producer of slaughter cattle. Western ranches do not generally possess the feed potential required to include the fattening phase of the beef production cycle. Because of this, most range operators are primarily interested in raising stock for others to fatten. Nevertheless, because of large capital requirements and high operating costs, many producers have attempted to improve their relative position within the industry. In most instances, this has been partially accomplished by increasing the weight and quality of animals marketed from a given ranch unit. It has been further accomplished on many District ranches by feeding stock to the final slaughter stage. Where irrigation water resources are available, owners have frequently been able to develop or acquire the facilities necessary for carrying on a feeding enterprise in conjunction with the breeding unit.

Like its effect on many other phases of the livestock industry, a demand which has given rise to high prices and generally favorable margins has furnished an added incentive for cattle growers to integrate a feedlot with the ranch structure. Where feasible, whether in the drylot or by supplemental feeding on irrigated pastures, or both, the feeding program also offers other advantages to the range livestockman. Off-age calves can be brought along to quick maturity and marketable condition rather than carrying them over another year. Cull bulls and aged cows are often profitably conditioned for market. By bringing their salable stock to a desirable slaughter grade, some cattlemen have established a dependable and premium market outlet for their product.

### **The Farmer Feeder**

Farmer feeders supply a smaller share of the total beef output of the Twelfth District than they do in many other areas of the nation. Nevertheless, the high cattle prices which have prevailed for beef relative to competing alternatives and a general confidence in the future demand of an expanding western market have induced many District farmers to encompass cattle feeding in their farm operation during the past decade. The contribution of cattle feeding to a well-balanced farm plan has also come to be more greatly appreciated. Feeding is only incidental to crop production on some District farms; on others, however, livestock is employed as a primary and sometimes the sole vehicle for marketing the crop output.

<sup>1</sup> See, for instance, A. A. Dowell and Knute Bjorka, *Livestock Marketing*, (New York, McGraw-Hill, 1941).



District farm-feeder operations are generally of the pasture feedlot system, that is, one in which varying combinations of irrigated pastures, concentrates, and occasionally owned or rented winter range are used to carry the animals until they are ready for final finishing on home-grown feeds. Sometimes the farmer buys mature animals to be placed directly on a full fattening ration. The purchase of feeders of sufficient age and weight to be placed immediately in the feedlot entails greater risk, however. Price fluctuations on the slaughter cattle market are quickly reflected on the profit margin because of the higher cost of the gains made by mature animals and their smaller total gains.

Most District farmers, therefore, prefer to grow out and fatten younger animals because of the less speculative nature of this procedure. The original investment is lower and the average cost per pound of gain is reduced because of the growth factor. Growing animals also make more satisfactory use of certain farm feeds which are not available to commercial operators. The longer time the animals are held in a farm-feeding operation also makes for more flexible operations by offering greater latitude in the weight and finish to which the animals are fattened and in the timing of the marketing period. Adjustment to a longer or shorter feeding period is facilitated. Since beef cattle on the farm become an integral part of the whole farm production plan, the farm-fattening process has less of an over-all specialty aspect than have other forms of cattle feeding.

#### **Diversification**

Fattening cattle on farms requires the raising of crops for feed rather than primarily for the cash market. This means growing a greater variety of crops, tending towards wider diversification. As crop production becomes less specialized, the plague of surpluses is also reduced. An added inheritance of crop-livestock management is the introduction of better patterns of crop rotation which makes possible the adoption of better soil conservation practices.

With the increase in feeding operations, there has been wider diversification in the crops grown on District cattle feeding farms. The growing of legumes—particularly alfalfa—becomes an integral part of the cropping plan.<sup>1</sup> In addition to the legumes, grains are grown for feed concentrates and row crops for cash income. Barley, oats, and sorghums are the chief feed grains grown on District livestock farms. The row crops—cotton, sugar beets, beans, etc.—require intensive cultivation, which conditions the soil and keeps weeds under control. Both row crops and grains likewise contribute valuable crop aftermath to the farm feed resource. The general cropping pattern followed on most feeding farms, which implements continu-

<sup>1</sup> More than any other crop, alfalfa meets the need of the feeding ration. It surpasses all other hay crops because of its high protein and mineral content, and is, as well, a good source of the essential Vitamin A. It ranks high in palatability and is a good producer of the feed roughage required. It possesses the important advantage of being a deep-rooted, nitrogen-fixing plant, which acts as a soil builder and counterbalances the depleting effects which result from intensive grain and row crop culture.

ing conservation of soil fertility, usually consists of a rotation of three to five years of alfalfa followed by the grains and row crops. Irrigated pastures, basically legumes, are also frequently worked into the cycle.

One of the most significant recent developments in the character of District agriculture has been the inclusion of irrigated pastures on many farms formerly devoted exclusively to intensified crop production. The shift from crop growing to a crop and grass economy has been largely the result of an increase in livestock farming. The feeding phase, in its various aspects, has been the main contributing cause. In California alone, in less than fifteen years, irrigated pasture acreage has increased from a nominal amount to an estimated 700,000 acres. While it would be incorrect to conclude that this development has been entirely due to beef cattle feeding or grazing activities, since dairymen and lamb feeders are also extensive users of irrigated pasture, the greatest impetus has come from the recognition of irrigated pastures as an efficient method of producing good grade beef.

Many acres not suitable to the economic production of high value crops have proved capable of yielding quality pastures where adequate water is available. Even when grown in competition with crops, irrigated pastures frequently show favorable returns when all factors are considered. Where production is high, they offer through a fairly long growing season a source of relatively cheap, nutritious, and succulent feed of high carrying capacity. Serving also as a soil binding crop when of a legume character, they form an appropriate balance for the higher cost concentrate feeds grown on most District farms and mesh into a desirable rotation plan as well.

#### **Flexibility**

Besides the greater diversification and better land use practices inherent in livestock-crop farming, a greater flexibility of operations is also introduced with cattle feeding. Since the farmland resource is ordinarily too valuable for use in a cattle breeding program, replacement stock is purchased from outside sources. The number fed can thereby be adjusted seasonally to the supply and value of feed. The length of time the cattle will be held can be geared to circumstances peculiar to each year's conditions. This can be effected in a variety of ways, more particularly by the age and type of livestock purchased and the length of the feeding period. That the sale of fat cattle contributes cash income at different times of the year from other farm marketings is an added advantage.

Feeding livestock on the farm requires proportionately less labor and a better disposition of labor time. Cattle also serve as efficient consumers of the roughage crops grown on the farm, besides converting into income crop residue that would otherwise be wasted. Feeding operations insure the production of the fertilizer necessary to maintain long-time fertility. This latter factor alone is felt by many farmers to justify feeding, even when relatively higher cash return could be realized by selling a

larger volume of crops on the cash market. An equation of one head of stock per acre farmed is considered adequate to maintain a good balance of fertility—based on the production of approximately four tons of manure per head per year. It has been aptly said that the long-range maintenance of soil fertility will be the chief inheritance of District farm feeding enterprises.

#### *The problems of the farmer feeder*

Although the integration of cattle feeding into the production plan offers many advantages to the farm economy of the District, the adjustment may likewise present numerous problems to producers making the change. The grazing and fattening of livestock necessitates a rudimentary knowledge of animal husbandry not possessed by all farmers alike. The range in type and quality of cattle, which contributes to differences in their feeding characteristics, requires a “know-how” which comes in large measure from increasing experience. Livestock requires constant surveillance, thereby robbing the specialty crop producers of slack seasons which can be devoted to other endeavors. Fencing, stockwater facilities, and winter feeding also contribute to the exactitude of livestock-crop farming as opposed to a single crop system.

A limited acquaintance with the complexities of the livestock market serves to complicate the general marketing program for many producers. Because of the peculiarities of the livestock market, the farmer who also handles cattle is required to keep in closer contact with market forces than he may ordinarily be accustomed to doing.

The matter of buying replacement stock is a further problem confronting the farmer feeder—more particularly those new in the business or those who fatten a small number of head. Few central markets in the District can be considered representative markets for feeder cattle, nor do they receive extensive shipments covering a range of classes and quality as do feeder markets farther east. Large feeding enterprises are able to care for their needs through their own experienced buyers or through the services tendered by specialized purchasing agents. Ordinarily, the District farmer has neither the time nor the experience required to buy his feeders advantageously in distant range areas. He is, therefore, largely dependent on order buyers whose natural concern is a profitable transaction.

Geared to this problem, co-operative livestock procurement agencies are attempting to reduce the difficulty. Staffed with trained buyers and shippers with wide coverage and contacts over the western range, their efforts made to service this need have facilitated, in some District areas, the purchase of replacement stock for the smaller feeder. A much broader extension of facilities is needed, however, before farmers over the District generally will be adequately cared for—particularly those desiring to buy less than carload lots.

The increase in the number of rural livestock auction yards in the West over the past ten years has also facili-

tated the exchange of feeder and stocker cattle within local areas. To a certain extent these yards offer a source of replacement cattle to the feeder requiring only a few head. In general, however, local auctions offer neither the standardization of quality nor the type of cattle which can be most advantageously fed to District requirements.

These are some of the problems presented District farmer feeders. There are also others more dependent upon the character of local agriculture and the peculiarities of each individual operation. However, with the practical aid extending through Government research and experiment agencies (both Federal and state) and with improving procurement and marketing facilities, the integration of livestock in the farm pattern is well justified, on the long term, in those locations where land and water resources are conducive to feed and forage production.

#### **Cattle Feeding and District Agriculture**

While cattle feeding over the past decade has proved a generally profitable venture for the farmer who has included livestock in his production plan, as well as to ranch and feedlot operators, its impact on the general character of Twelfth District agriculture is of greater importance. Cattle feeding has effected a change in the farming pattern in many localities, and the shifts which have occurred can be expected to expand over a larger and larger area. It has stimulated an increasing interest in the use of livestock as an efficient means for conservation of the basic agricultural resource—land. Its development has created a broader outlet for the hay, grain, and crop by-products produced in the region. It has furthered the practical exploitation of water resources and the more economic use of the water already available, while introducing new and improved irrigation techniques. As a result of expanded feeding activities, changes in some aspects of cattle marketing have occurred which have resulted in a closer relation being established between the producer and buyer of slaughter cattle. Finally, the combination of these and related factors has furthered the integration of the entire District beef production function.

Each of the different suppliers of the District's expanding slaughter cattle requirements—feedlot, ranch, and farm operators—has contributed a share toward this better balance in the agricultural composition of the region. Because of the character of the western land resource and the peculiarities of its agriculture, it is not likely, however, that any one of them will become the dominant factor in producing the future beef supplies for the District market. As ranch and farm feeding increases, meat packers will undoubtedly find it less urgent to carry large cattle inventories of their own—and in the long run will profit thereby. Large scale farming and large scale production of by-products, however, exist as a supporting element for large scale commercial feedlot enterprise. But feeding cattle for the western market meanwhile will continue to serve as an effective means of lessening the cattle growers' specialization and broadening the farmers' opportunities.

## PRICES, MARGINS, AND RETURNS

The cattle feeder is able to influence only within relatively narrow limits the price he receives for his product. Within these limits, however, there are a number of factors that affect the price he will receive. Judgment exercised in the type and quality of the feeders purchased and the grade to which they are finished influences what he will be paid for his fattened animals within the price range existing on the market at the time of sale. A choice feeder steer fattened to a choice slaughter grade will bring more per hundredweight than the same animal brought to a less desirable finish. On the other hand, the same animal fattened to a prime finish but to an excessive weight would suffer a price discount under normal market conditions.

Timing of sale is an important element also—both in calculating the most favorable marketing period and in determining when the animals are ready for market. It is important that the feeder set the feeding period so that his animals will be ready for slaughter at the most favorable time relative to seasonal demand. It is likewise imperative that he be able to judge at what point his stock have made their most efficient gain and have acquired their most desirable finish.

The cattle feeder has a certain latitude in the choice of markets. Market prices fluctuate and the closest market, after allowing for transportation differentials, is not always the highest market. The choice of the method of marketing may also affect the final price realized per hundredweight. The operator may elect to sell by direct contract to a slaughter buyer or to consign his cattle to a specialized selling agent to be sold at highest bid—or in some areas by auction.

The trading ability of the operator or of his agent is reflected to a degree in most transactions. When quality and condition of a commodity can vary over such a wide range, price appraisal may be subject to the elements of human judgment rather than based solely on measurable specifications.

The exercise of proper care in the branding, dehorning, and handling of stock can minimize or eliminate bruising or shrinkage or badly scarred hides. The animal loss incurred from bruising, crippling, and various other sources prior to final sale amounts to many millions of dollars—much of which eventually reacts upon the prices received by producers.

Apart from these various points, the feeder has little control over the price his animals command in the market place. Slaughter prices on the nation's market are primarily a reflection of the complex relation between the extent and the character of the national demand for meat on the one side, and the volume of cattle marketing and meat inventories on the other, further influenced by local supply and demand situations.

## Factors Influencing Prices

### *Consumer income and the demand for beef*

Beef is consumed in all parts of the country by persons in all income levels. The extent of its usage, however, is strongly influenced by the level of disposable income—the higher the income, the greater the consumption. Because per capita income more significantly affects beef consumption, it also more readily influences beef cattle prices than those of either pork or lamb.<sup>1</sup> In 1940 beef (excluding veal) made up 38.6 percent of the per capita consumption of red meat. As the level of incomes increased after 1940, the proportion of beef to total red meat consumed by civilians rose to 43.6 percent in 1941-42. Because of the needs of the armed forces, lend-lease, and other Governmental requirements during 1943 and 1944, only 36 percent of civilian per capita meat consumption consisted of beef during those years. Following this period, however, an increased rate of slaughter and the reduction in military requisitions made available a larger supply of beef for civilian use. The proportion of beef in total consumption of meat varies considerably from year to year, but since 1944 it has averaged over 42 percent, indicating a strong preference for beef among American consumers when their incomes are high.

The amount of income and its distribution among people also influence the quality of beef consumed. Since most consumers prefer steaks and roasts to stewing meats, they are willing to spend relatively more for the former when their incomes are high and relatively less when their incomes are reduced.

The effect of rising national income upon beef prices is indicated by the trend in cattle prices as compared with other meat animal prices over the past decade. By 1950 disposable personal income had risen 210 percent above the 1935-39 average, while average prices received by farmers for beef cattle rose 256 percent during the same period. The price of hogs rose only half as much. Although the relative rise in lamb prices was nearly as great, this is of little significance since lamb and mutton comprise less than 5 percent of all red meat consumed in the nation.

### *Slaughter cattle price trends*

Beef cattle price movements, over the long term, accompany the major trends of other commodity prices. Their fluctuations upward or downward are frequently sharper, however, since they are generally more sensitive to consumer purchasing power. Beef cattle prices rose with the all-commodity wholesale price index to record levels during and immediately following World War I;

<sup>1</sup>The consumption of pork varies geographically and by population groups. In areas where pork is habitually used, its consumption varies little at different levels of income. The consumption of lamb changes by income and also by population groups. The preference for lamb, especially in the American white group, increases as incomes increase. Lamb is more generally eaten in urban areas and in population centers with a concentration of people of Mediterranean extraction, who by custom prefer lamb. See: E. C. Voorhies and R. W. Rudd, *Sheep and Wool Situation in California, 1950*, University of California, College of Agriculture, Agricultural Experiment Station, Circular 339.

likewise, cattle prices registered a sharp postwar break but recovered more rapidly than the over-all index during the latter part of the 1920's. They both dropped disastrously to the depths of the great depression. Following 1940, both cattle prices and the index of all commodities reflected war and postwar conditions. The removal of price control and the high level of postwar economic activity are highlighted, however, by the steep ascent in the price of beef cattle after 1945.

Prices of beef cattle also exhibit the cyclical movement identified with other livestock prices. The numbers of any type of livestock increase and decrease over a period of years in recurring patterns—generally referred to as the production cycle. The increase or decrease in the volume of marketings incident to these changes in inventories is reflected in an inverse manner on prices. When greater inventories precipitate larger marketings, they exert a downward pressure on prices; and when the numbers marketed are reduced because of contracting inventories, prices are strengthened. The beef price cycle is normally of longer duration than that of either hogs or lambs since the latter reproduce more rapidly and their offspring are marketed at an earlier age.

#### Seasonal price movements

Like other meat animal prices, the market prices of slaughter cattle are subject to the seasonal variations which result from seasonal marketing trends—receipts of grass-fat animals through summer and early fall and of fed cattle through winter and early spring. The extent and duration of seasonal movements are influenced by the numbers of livestock marketed and the length of the marketing season, which in turn are influenced by range grass conditions, feed supplies, inventories of cattle, and, to a certain extent, by the profit or loss experienced by cattlemen the previous year.

The over-all length of the grass marketing period is largely dictated by rainfall and growing conditions on the better range grass areas. In seasons of abundant natural pasture, "grass" operators are likely to stock more heavily in order to utilize this resource of relatively cheap feed. Consequently, marketings are spread over a longer period. Similarly, in years of poorer grass, fewer cattle are marketed "grass fat" and these over a shorter time.

Fed cattle marketings accelerate after the decline of the "grass run." The nation's feeders, particularly in the important Corn Belt area, postpone their principal feeding enterprise until the grain harvest can be anticipated and its future price more correctly appraised. A larger number of animals are, therefore, normally placed on feed in the fall, and the increase in fed cattle marketings develops a few months later. The volume of long-fed cattle, which results from a plentiful and relatively cheap supply of corn, or of short-feds, because of a soft corn crop, likewise affects the duration of the surplus-fed cattle marketing season.

Large profits or severe losses experienced one year tend to have a psychological influence on the extent to

which cattle feeders, both range and feedlot operators, are willing to gamble the following year. In varying degrees, then, the above elements combine to determine the seasonal pattern of marketings and, therefore, of slaughter prices as well.

#### Short-run price fluctuations

Quotations on the nation's cattle markets fluctuate from week to week, and even from day to day, on the same markets as well as between markets. Many factors contribute to these short-run movements. The balance between the demand for meat (as expressed at the wholesale level) and the volume of daily and weekly marketings is primarily responsible for the frequent change in cattle prices. What the wholesaler receives for carcass beef is quickly reflected in the price of slaughter cattle.<sup>1</sup>

The volume of weekly receipts and the types of animals marketed are extremely variable. As marketings and slaughter vary, the supply of beef is also affected. Livestock slaughterers, since they are handling a perishable commodity, are able to adjust their beef inventories, upward or downward, only to a limited extent. When fattened animals reach their most desirable finish, they must be slaughtered. For feeders to hold them for more favorable prices would in most cases prove more costly than profitable. When his animals are ready he has a relatively short time to capitalize on their most efficient returns. Neither is the packer in a position to wait out a temporary period of rising prices, nor to increase appreciably his inventory of slaughter cattle on a relatively low market. The commitments to his customers have to be filled and delivery made if he is to maintain his competitive position. Since beef in carcass form is a perishable commodity and a steer on the hoof an expensive boarder, the packer can neither store a larger than normal inventory in his cooler nor carry a backlog of fat cattle beyond that required to insure continuous operation. For these reasons, the slaughter buyer is in the market each day. Through him the packing industry gears its slaughter to the level of consumer demand for beef.

Most of the fresh beef handled by packers is sold within two weeks of the time of slaughter. When marketings are

<sup>1</sup> A steer is not all beef. The spread, or lack of spread, between the dollar value of a fat bullock and what its carcass brings at wholesale has an important influence on what the slaughterer is willing to pay for an animal. Since the value of the by-products he processes or sells to others for processing also determines his margin of profit, this value often becomes the basis of packer resistance to the asking price for livestock on the day-to-day market. The following chart gives the percentage of finished product to live weight:

	Percent
Beef .....	54.3*
By-products: Hide .....	5.9
Fats .....	2.2
Head .....	2.2
Feet .....	1.1
Blood .....	.7
Casings .....	.8
Miscellaneous .....	3.2
Valueless materials .....	10.1
Shrinkage .....	6.8
Additional shrinkage through processing.....	12.7
	100.0

\*This dressing percentage is taken as the representative average yield for all grades slaughtered.

Source: Swift & Company, Agricultural Research Department, Bulletin No. 6.

large, the available supply of beef approximately 14 days forward will be relatively large. So also is the supply today a reflection of the volume of marketings at some previous time. On the analysis of the short-run supply situation, distributors become either aggressive or reluctant buyers. When supplies are large, they are only willing to buy at lower prices. The slaughterer, to sell his beef competitively, must lower his quotations, against which he must also lower the price he offers for live cattle. When live marketings are reduced, the reverse is true—distributors become more aggressive and prices are bid up. The slaughterer in turn must pay more for the stock needed to replenish his cooler.

**Price differentials between markets**

Because of a larger volume of daily receipts and greater diversity in the class of animals sold, average prices at one market will ordinarily be more significant than at other markets in the same general trading area. As a result the larger market comes to be considered the price setter and is looked to as a barometer of prices for the region. But if prices within a regional trading area were actually determined at the major center, daily price movements at the other markets could be expected to react in a like manner. Prices at these markets should reflect those at the major center, plus or minus freight and shipping differentials. However, studies of price differentials between Chicago—the nation's largest livestock center—and competing midwestern markets show that daily

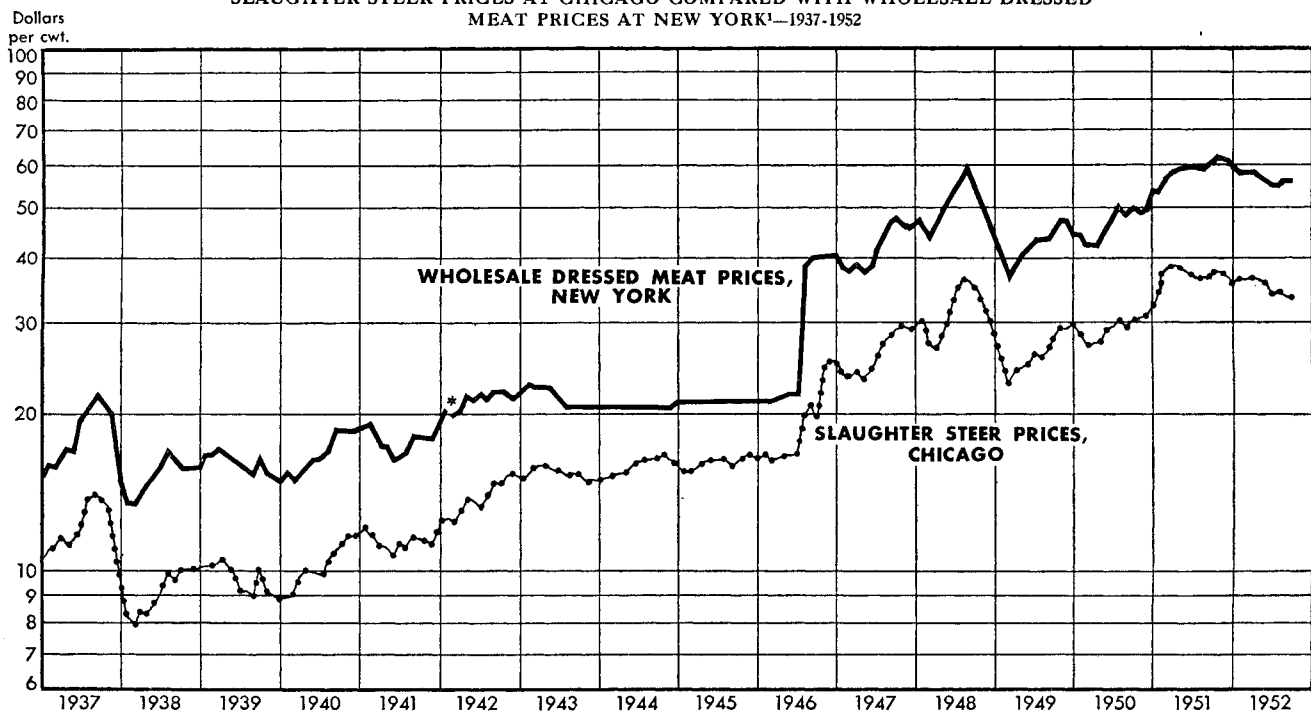
price changes occur between this market and other centers, as well as between pairs of markets, excluding Chicago.<sup>1</sup> For short intervals the changes may even be in the opposite direction. Nevertheless, because Chicago is advantageously located between the primary production ranges and the great consumption areas and contains the administrative center of the nationwide packing firms and because from it is diffused a great volume of market information, it serves as the composite expression of nationwide supply and demand conditions. Chicago quotations, therefore, are closely watched by buyers and sellers at all principal livestock centers.

For somewhat the same reasons, slaughter quotations on the Los Angeles market perform a similar function relative to livestock prices in the Far West. Serving the largest western concentration of population, it offers the greatest diversity of demand for slaughter cattle in the District, which it supplies by drawing from practically all states west of the Mississippi River. Within its boundaries are located not only the major nationwide meat packing firms but a large concentration of independent plants as well. The market reports which emanate daily from Los Angeles are regarded throughout a large portion of the District as a reflection of the strength or weakness of District slaughter cattle prices.

While the level of slaughter cattle prices at any market range within the limits established by the over-all supply

<sup>1</sup> See Dowell and Bjorka, *op. cit.*

**SLAUGHTER STEER PRICES AT CHICAGO COMPARED WITH WHOLESALE DRESSED MEAT PRICES AT NEW YORK<sup>1</sup>—1937-1952**



<sup>1</sup> The prices used are those for "good" grade steers and dressed meat. The grade designation is that used prior to December 30, 1950. From 1951 on, the previous "good" grade has been designated as "choice."  
 \*Not available. During this period the volume of sales was insufficient to establish representative prices.  
 Note: This chart is plotted on a semi-logarithmic scale on which equal vertical distances represent equal percent changes rather than equal absolute amounts.  
 Source: United States Department of Agriculture, Production and Marketing Administration, Livestock Branch.

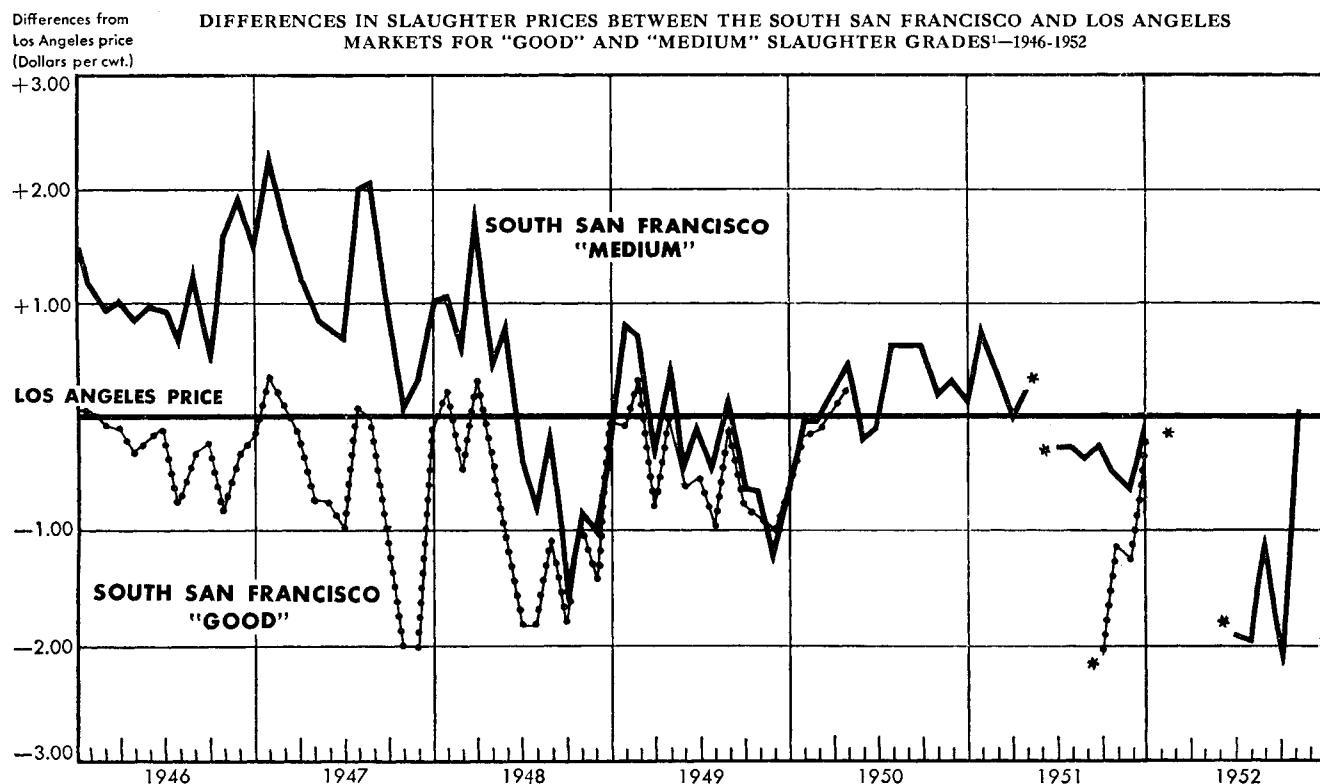
and demand situation, they also express special circumstances existing in the area served by the particular markets. Circumstances peculiar to the area influence not only the over-all movement of livestock prices on the local market but also the price level of separate classes of livestock on the same market. This is more characteristic of cattle prices than other types of livestock since cattle sales cover a wider range in age, type, weight, and grade of animals. Should receipts of long-fed, well-finished steers, for example, be larger than anticipated when the local wholesale carcass supply of this type is still relatively plentiful in the area, buyer resistance would be registered and prices would quickly reflect the situation. At the same time, reduced receipts of short-fed, medium-finished animals, coinciding with an active demand for the same, may make prices stronger for this grade. Another market within the general trading area may meanwhile be expressing a different set of local features with resulting stronger or weaker market pressures. Prices at the one market, therefore, may be lower or higher for the same class of animals on the same day. The disparity between the two markets would not long exist, however, before purchasers at one would find it no longer profitable to buy and would, therefore, shift their activity to the competing center, providing transportation differentials were equalized. Each market, it is seen, is continuously subject to its peculiar local in-

fluences, but it also reacts to occurrences outside its own immediate trading area. Influenced by these interrelated forces, the sum of the movements results in a constant shifting and readjusting of quotations as prices tend to equalize within the broad limit representing national conditions.

*Demand differs in various markets:* The character of demand peculiar to one trading area, however, may tend to make the average run of prices higher at one competing market than at another. Over a period of time, one market may also be stronger for particular classes or grades of livestock. This fact is of much practical importance to District feeders, especially to those operators so situated that they may choose one or more alternate markets for disposing of their animals. For example, to many District shippers the freight differential from their place of operation to either the Los Angeles or San Francisco area is of little consequence in determining the ultimate returns realized on the sale of livestock. It is worth any feeder's time to analyze price trends over a period of years at the centers available to him and for the separate classes of cattle he normally handles.

In the early postwar years "medium" grade steers<sup>1</sup> at South San Francisco averaged about \$1.50 per hundred-

<sup>1</sup> Grade as used prior to December 31, 1950.



<sup>1</sup> Prices of slaughter steers, 900-1100 pounds. Grade designations are those used prior to December 30, 1950. From 1951 on, the previous "good" grade has been designated as "choice," and the previous "medium" grade has been split into two grades, the top half of which is now designated as "good" and the remainder is called "commercial." Since the change in grade designations, the price used for the "medium" grade is the average of the prices for the "good" and "commercial" grades.

\*Not available. During these periods the volume of sales was insufficient to establish representative prices.

Source: United States Department of Agriculture, Production and Marketing Administration, Livestock Branch.

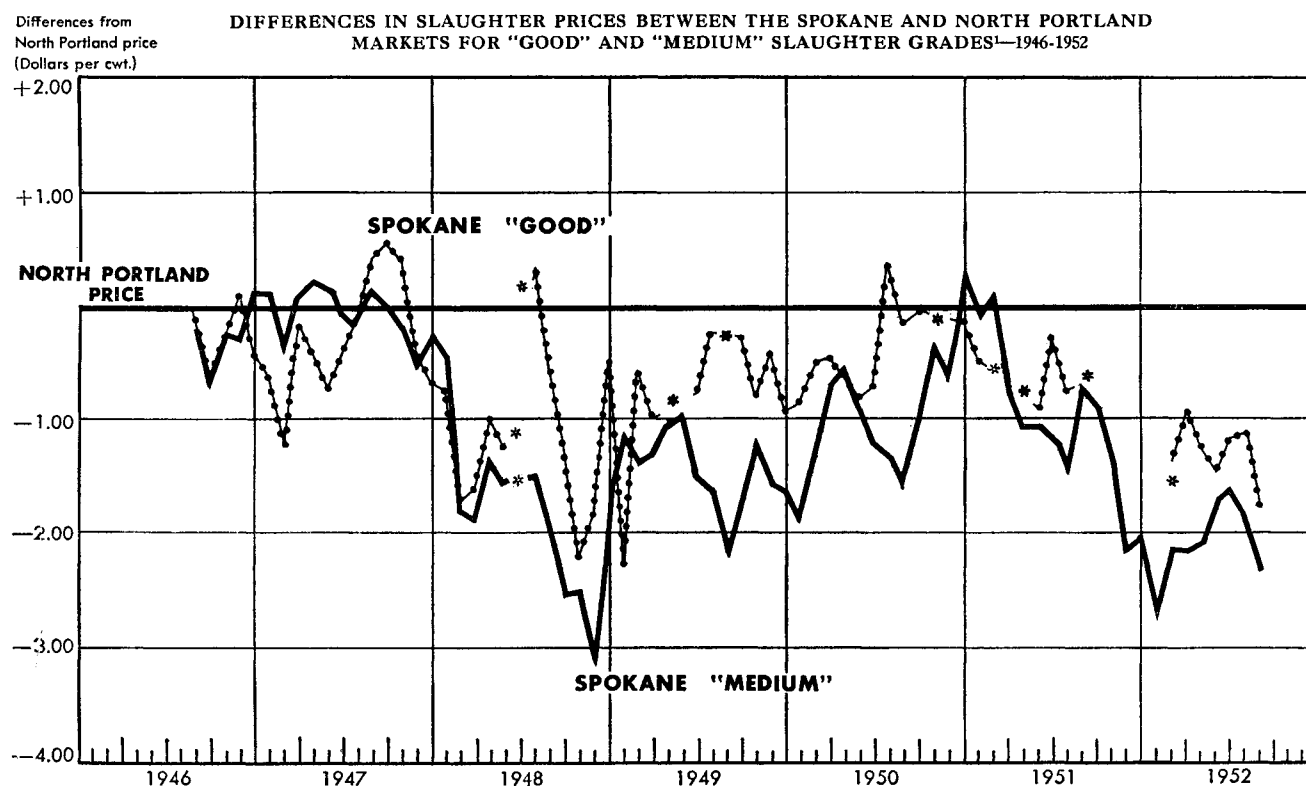
weight higher than the same class of cattle on the Los Angeles market. On the other hand, the price of the "good" grade, with but a few exceptions, was higher in the southern market for the same period. The differences between the two markets for these grades is usually explained by the character of their respective demands for meat at the retail level. In this case the more heterogeneous nature of the southern market makes for a relatively stronger demand not only for the best grades but for cheap meat as well. The existence of a large group of high-income people and a substantial restaurant outlet results in a strong demand for choice grade beef. Because Los Angeles slaughterers also serve the requirements of a large demand from the lower income groups, there is a large outlet for the cheaper stewing and roasting meats. This is why Los Angeles has long been known as a more favorable market for cows, from which much of the supply of cheaper meat is derived.

Although medium grade steers have commanded a higher price on the South San Francisco than on the Los Angeles market, the favored position of this grade appears to have diminished in the last two or three years. For various reasons, however, the South San Francisco market has become less representative of prevailing prices for the central Pacific Coast area, and consequently those producers accustomed to marketing this class of cattle

should not draw unjustified conclusions from this trend. Keen competition among slaughter buyers over the past few years has induced more and more direct buying at country points so that fewer cattle of all grades are being offered on the public market. Moreover, the increasing inaccessibility of the stockyards—the result of metropolitan traffic congestion—and increased slaughtering activity of interior plants have contributed to the diminishing position of the public market in the area.

### Factors Influencing Returns

The fattening stage is of importance to the beef making process because during this period the dressing percentage (proportion of carcass to live weight) is increased. At the beginning of the feeding period, slightly less than half of the average feeder steer is edible. During feeding, the major share of the weight increase takes place in the edible portion of the animal body. A suitable feeder steer when fattened to "choice" slaughter grade is made to yield in carcass form between 58 and 60 percent of its live weight—and as high as 63 percent when finished to "prime." The tenderness and palatability of the beef produced improves along with this increase in edible portion. To produce this increase in carcass weight and to improve its quality profitably, the feeder must carefully consider (1) the relationship that is likely to exist be-



<sup>1</sup> Prices of slaughter steers, 900-1100 pounds. Grade designations are those used prior to December 30, 1950. From 1951 on, the previous "good" grade has been designated as "choice," and the previous "medium" grade has been split into two grades, the top half of which is now designated as "good" and the remainder is called "commercial." Since the change in grade designations, the price used for the "medium" grade is the average of the prices for the "good" and "commercial" grades.

\*Not available. During these periods the volume of sales was insufficient to establish representative prices.

Source: United States Department of Agriculture, Production and Marketing Administration, Livestock Branch.

tween the per hundredweight buying and probable selling price, and (2) the type of animal best suited to exploit this relationship.

### The feeder-slaughter margin

Normally, the feeder expects to receive a higher price per hundredweight for his cattle when fat than he was required to pay for them. Since the fattening process requires a certain amount of time, however, he must buy replacement stock to be sold against a future market subject to the complex price relationships previously described.

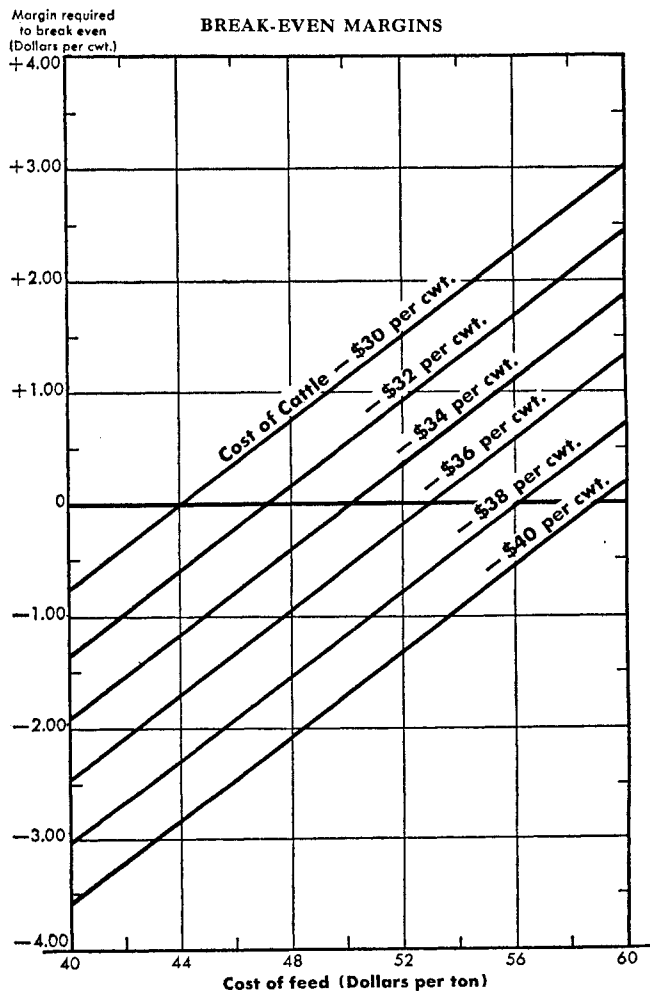
The amount of time involved between the purchase of feeder stock and their sale as fat animals is largely dependent upon the amount of additional weight the operator feels is necessary to enhance their value most, as well as the grade to which he thinks they will most economically fatten. Under conditions in which cattle are fattened in the District, the time required to bring a suitable feeder to "choice" slaughter grade ranges from 120 to 180 days. Approximately 90 to 120 days' feeding is needed to acquire a "good" slaughter finish. Heavier, well-fleshed cattle or those grass-fat animals which can be improved by a turn in the feedlot are fed for a shorter term—60 to 90 days. It is seldom profitable to attempt feeding a lower quality animal to a higher slaughter grade, however, since their relatively inferior characteristics preclude their producing a desirable carcass economically.

Price fluctuations on the market for which the animals are being fattened are often greater, as well as more frequent, than on the market where they were purchased. A large part of the feeder buying is done on a contract basis a considerable time in advance of delivery and at country points far removed from the major markets. Feeder prices, consequently, are less subject to day by day market pressures. Based on the slaughter grades most in demand on the District market, a seasonal pattern in the dollar margin between buying and selling prices usually occurs, after allowing for the time lag of the various feeding periods. The margin for all grades usually decreases between summer and fall and is relatively wider during the winter and early spring. The dollar margin is usually greater for the higher grade and less for each lower grade. When margins rise or fall the changes usually occur sooner in the lower grades. When both slaughter and feeder prices are relatively high, dollar margins are generally greater, while the reverse usually occurs when both are low.

*Required margins:* The price the feeder receives for his cattle when fat will be realized not only on the weight added but also on the original weight bought. The animal which brings the highest price per hundredweight when fat does not always furnish the operator the greatest profit. Neither does the grade which shows the widest spread insure the highest net return. The cost of the gain becomes increasingly great as the animal approaches the highest finish. Fed on the District's high-cost feedlot ra-

tions, the cost per pound of the added weight is, therefore, usually higher than the price per pound the feeder realizes from the sale of the animal. Hence, the cost of the gain becomes of basic importance to successful livestock feeding.

Feed costs represent approximately 80 percent or more of the cost of the gains in weight. Another 6 percent is usually absorbed by interest on the purchase price of the



Note: This chart indicates the relation of the cost of feed and the cost of feeder cattle to the margin between the cost and sale price of cattle that is required to break even on the feeding operation. It is based upon a 700 pound feeder steer fed to 1,000 pound slaughter condition in 150 days with an average weight of 850 pounds during the feeding period and average daily feed consumption of 3 pounds per cwt. The costs include interest at 6 percent on cost of cattle (for five months) but no other production costs.

The use of this chart may best be illustrated by citing an example. A reading of the vertical price scale at the point of intersection between a given cost line for cattle and a given cost line for feed indicates the margin between the cost and sale price of cattle that is required to break even on the feeding operation under the conditions previously indicated. Thus, if cattle cost \$30 per cwt. and feed costs \$60 per ton, the sale price would have to exceed the cost price of cattle by \$3 per cwt. in order to break even. The detailed calculations are as follows:

Cost of steer (700 lbs. @ \$30 per cwt.).....	= \$210.00
Cost of feed (1.9125 tons [see below] at \$60 per ton) .....	= 114.75
Interest (6 percent on \$210 for 150 days).....	= 5.25
<b>Total cost .....</b>	<b>\$330.00</b>
\$33 per cwt. (or \$3 per cwt. above cost price) is the required selling price for finished steer in order to break even (1,000 lbs. @ \$33 per cwt.).....	= \$330.00

The amount of feed consumed is calculated by multiplying the average weight of the steer during the feeding period (850 lbs.) by the daily feed consumption (3 lbs. per cwt.) which is then multiplied by the length of the feeding period (150 days).



cattle. Labor, taxes, purchasing and marketing charges, loss from shrinkage, and mortality loss make up most of the remaining expenses. The by-products retrieved from feeding—principally manure—serve to regain part of these.

Since the cost of feed and the cost of cattle are the major capital expenses in any feeding venture, they are the most significant variables which reflect on profit or loss. How the cost of feed and the cost of cattle influence the margin required for the feeder to break even on his operation is indicated in the accompanying chart. Such an illustration must necessarily be tied to certain constants because of the range in the price of cattle based on age, sex, and type. But the influence of both cattle and feed costs would similarly affect the necessary margin for any group of animals, although by different amounts. It is seen that the more the operator has to pay per hundred-weight for feeder cattle, the smaller the margin necessary if the feed cost remains the same because the cost of the weight gains approaches the original cost of the cattle. Discounting other expenses, if the per hundredweight cost of the gain and of the cattle are equal, the operator could obviously sell the finished animal for the same price per pound as he paid for it and still break even. As the feed price decreases, the cost per pound of weight gain is also reduced. Conversely, the more the gains cost the feeder, the wider the margin he will need.

A larger margin is required when both cattle and feed prices are relatively high than when the price of both is low. The most margin is needed and, therefore, the least desirable feeding conditions exist when the price of feed is high and the price of cattle is relatively low because the cost of gains in weight is relatively greater.

Within certain limits, the more the animals weigh the less the required margin tends to be since the increased price received when they are fattened is realized on a greater amount of initial pounds. Limits are imposed, however, by a decrease in the feeding efficiency of heavier and older cattle.

*Feeding returns:* Profits from cattle feeding are primarily influenced by the size of the margin realized at the time of sale between the per hundredweight buying and selling prices. It is this aspect which contributes to the speculative aspect of feeding operations and to the potential costliness of an error in judgment in anticipating future slaughter cattle price trends. When prices for fattened cattle move upward during the feeding period, margins rise rapidly. Short-run price declines, on the other hand, can result in heavy financial loss. Cattle feeding has been generally profitable over the past decade because of favorable price relationships between costs of feeders and prices of slaughter cattle.

#### **The choice of feeder cattle**

How the operator views the possible margin, his analysis of what it will cost to feed his cattle, and the gains he

expects they will make all influence his decision as to the age, sex, and type of animals he chooses to fatten.

*Age:* The age of an animal is important because of the effect on the efficiency with which it utilizes its feed to transmit its gains into weight. Younger animals make more economical weight gains—greater gains for the amount of feed consumed—since less net energy is required to make a pound of gain. Yearling steers make more economical gains than two-year-old cattle of the same breeding and quality, and calves, in turn, more favorable gains than yearlings. On the other hand, the higher price of the younger animals and the longer time required to bring them to slaughter condition may make the total gain less profitable when the feed is a high-cost ration. The extra time required to reach a desirable slaughter weight ordinarily is not justified in District feeding unless the animals are to be fattened to a prime degree of finish, for which there is a relatively limited market in the area.

Heavy, mature steers can be expected to consume more feed per 100 pounds of gain than do younger animals; yet in a period of strong demand for heavy cattle (such as at a time when heavy military buying occurs), they frequently prove more profitable to feed.

Whether it is more profitable to fatten yearlings, two-year-olds, or heavy cattle depends, therefore, upon the particular circumstances which influence the level of slaughter cattle prices. In the Twelfth District particularly, anticipation of the level of prices for long-fed, high quality calves, or heavy, older cattle requires a keen analysis of future demand conditions and is generally attempted only by feeders of wide experience. The demand for higher finished beef—prime grade—is largely restricted to the specialty restaurant trade. The outlet for heavier beef carcasses is principally in the demand that arises from the military, a rather unpredictable outlet.

*Sex:* The nation's annual calf crop is about equally divided between steer and heifer calves. A portion of the female calves each year is retained by breeders for herd replacement. How many are actually kept depends on the relationship of cattle inventories to feed prospects and whether, because of price outlook, breeders are desirous of expanding or contracting their herds. Over the long term, however, about two-thirds of the annual crop of heifers is slaughtered for veal or sold as feeders. These latter actively compete with steers on the feeder market.

The usual lower price of heifers frequently makes them more profitable to finish. Heifers do not make as rapid gains as steers, but they become fat sooner. However, because of the possibility of their being pregnant and their tendency toward accumulation of wasteful kidney and external fat, prejudice has long been exercised against heifers by slaughter buyers. With retail demand tending toward smaller carcasses and younger beef, however, the discrimination against them has become less extreme than formerly was the case. When young and not overly fat, their dressing percentage compares favorably with that of

steers and their carcasses show few of the undesirable characteristics which develop with age and excessive weight.

*Type:* Because of the preponderance of the British breeds—Hereford, Angus, and Shorthorn—over the nation generally, the major share of the country's cattle marketings is represented by these types. When of suitable beef conformation, little preference between them is exhibited by slaughter buyers. Personal preferences and their respective availability usually dictate the feeder's choice.

During the past two decades, however, crossbreeds of Brahman influence have gained in popularity in some of the main producing areas because of their resistance to heat, drought, and parasites and because of their early maturity. Feeder cattle of this type are now both numerous and more generally accepted. Since a much smaller proportion of the crossbreeds grade as high in carcass form as the standard breeds when fed under equal conditions, they normally bring less per hundredweight and may face further penalty for excessive weights.

Because of these crossbreed characteristics, it must be decided whether their higher dressing percentage and ability to reach market condition sooner are sufficient to offset the lower price which results from their less desir-

able beef conformation. Marketing them at weights not more than 100 to 150 pounds heavier than other cattle serves to minimize the graduated penalties for heavy carcasses. On the other hand, the weight characteristics which normally affect the demand for them adversely are turned to an asset when there is a strong market for heavy carcasses.

Whereas in periods of high prices and wide demand for meat the advantages offered by crossbreeds may offset their undesirable features, it must be appreciated that in a period of declining prices less desirable cattle are likely to be penalized first.

It is to be seen from the above discussion relative to feeding margins and choice of feeders that the profits to be made in cattle feeding, as well as the losses which can be incurred, are perhaps as diverse as the number of operators involved or the groups of animals which are fed. Since the feeder is interested in making the maximum dollar profit for his expended effort, the character of each operation represents his individual appraisal of the variables which concern the market outlook. Because of the nature of the animals and the nature of the demand for meat, cattle feeding allows for considerable flexibility of operation—more than in many other forms of agricultural endeavor—and places a premium upon the correctness of the producer's intuition regarding market forces.