Characteristics of the Pacific Northwest Beef Feedlots

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*Authors: J. B. Johnson is Agricultural Economist, Farm Production Economics Division, Economic Research Service, U. S. Department of Agriculture, stationed at Oregon State University; R. E. Vaile is Assistant in Agricultural Economics, and J. G. Youde is Assistant Professor in Agricultural Economics, Oregon State University.

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CHARACTERISTICS OF THE PACIFIC NORTHWEST BEEF FEEDLOTS

J. B. Johnson, R. E. Vaile, and J. G. Youde

INTRODUCTION

This report describes selected characteristics of Pacific Northwest feedlots engaged in feeding cattle to slaughter weights and grades. In addition, the study provides a basis for comparison of the Pacific Northwest beef-feeding industry with those of other regions.

The beef-feeding industry of Oregon, Washington, and Idaho, like that of other regions of the United States, is expanding. As a beef-feeding region of the United States, however, the Pacific Northwest is relatively insignificant. Less than 4 percent of the Nation's fed cattle marketings in 1967 were fed in Pacific Northwest feedlots. Nonetheless, as an expanding sector of the regional economy, the Pacific Northwest beef-feeding industry is making a major contribution to the region's agricultural economy.

In spite of the recent growth in beef feeding, the Pacific Northwest must ship in fed beef to fill the growing demands of its beef consumers. 1/ Historically, the Pacific Northwest has exported large numbers of feeder cattle each year to feedlot firms in other regions. 2/ Production of feed grains in the Pacific Northwest has been insufficient in quantity to fulfill the feeding needs of this region in most years since 1960. 3/ Therefore, the Pacific Northwest is currently deficit in the production of fed beef, has a surplus of feeder cattle, and a deficit supply of feed grains, which have been the primary feedstuff in most beef-feeding rations. 4/ These circumstances may help determine the future development of the Pacific Northwest beef industry.

To accommodate differences in summarization of sample data, the survey results will be presented in three parts. Part I describes the general operating characteristics of Pacific Northwest feedlots. Part II describes

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1/ J. B. Johnson and R. E. Vaile. Characteristics of the Pacific Northwest Beef Industry, Special Report No. 256, Oregon Agricultural Experiment Station, May 1968, p. 29.

2/ Ibid., p. 47.

3/ Ibid., p. 14.

4/ When soft white wheat becomes competitive as a feed grain (a condition that occurred during the first half of 1969), the Pacific Northwest becomes a surplus feed-grain producing area.

the average costs of production of selected firms operating at different volume levels. Part III compares the operating characteristics of Pacific Northwest feedlots with those of feedlots within other selected regions of the United States.

Sample Design

Stratification of the Pacific Northwest feedlot population was made prior to sampling to recognize (1) the relative importance of different capacity feedlots; and (2) the uneven distribution of feedlots among states, and areas within states of the region.

A sample of 75 feedlots was allocated as shown in Table 1.

Table 1. Allocation of Sample Respondents by State, Area Within State, and Large and Small Capacity Category

State	Washington		Idaho		Oregon	
	Capacity					
Area a/	Small b/	Large c/	Small	Large	Small	Large
Area I	1	1	1	0 d/	1	1
Area II	5	12	4	8	2	5
Area III	3	6	4	8	2	5
Area IV	1	1	1	2	1	1
Area V	NA e/	NA	NA	NA	1	2

a/ Areas correspond to Statistical Reporting Service, crop and livestock reporting districts.
b/ Less than 500 head capacity.
c/ Capacity of 500 head or more
d/ No large firms were in operation.
e/ No Area V in Washington and Idaho.

Within the stratification presented in Table 1, each respondent was selected at random. That is, the chance of any feedlot within a given stratum being selected was the same as that of any other feedlot in that stratum.

Sampling Procedures

Each of the 75 sample respondents was interviewed to obtain data on the operating and cost characteristics of their feedlot. Some respondents were unable to provide data in sufficient detail for a cost analysis of their feedlots. Consequently, an unstructured questionnaire was used in a second interview with 21 of the original respondents to develop the cost analyses presented in this report.

No attempt was made to select the subsample randomly. Three firms in each of seven volume categories were selected on three criteria:

(1) An indication that the feedlot fed cattle to slaughter weights and grades.

(2) An indication that the feedlot had historical records of sufficient detail from which cost of production data could be derived.

(3) An indication of the total hundredweight of gain produced during the fiscal year October 1, 1966, to October 1, 1967.

Interpretation of Survey Findings

Results of the initial survey suggest that sample observations on operating characteristics could be more appropriately related to the Pacific Northwest feedlot industry by segmenting sample results into the five capacity categories used in Table 2.

Approximately 90 percent of the 1,583 feedlots during 1967 had capacities of less than 1,000 head. However, the larger capacity feedlots marketed 78 percent of the fed beef. The sample was distributed so that a larger percent of firms were included from those categories representing larger capacity firms.

Inferences to the population of Pacific Northwest feedlots from sample observations of operating characteristics of feedlot firms will be confined to the population of firms within each capacity category. Because of the limited number of sample observations, sample results on operating characteristics of feedlot firms are presented by capacity category for the entire region.

The cost analysis based on data collected from 21 firms should not be generalized to the population of Pacific Northwest feedlots, but should be considered as cost patterns existing within certain firms during the 1966-1967 feeding year. Costs presented for each of the seven volume categories are a weighted average of the three firms in each category, the weighting factor being the proportion of total gain per firm over total gain by all three firms in the category. Cost data were expressed on per hundredweight of gain to provide a basis for comparison.

Table 2. Distribution of Pacific Northwest Feedlots by Capacity Categories Within State, January 1, 1967

State	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
Washington	321	11	14	6	5
Idaho	653	30	30	18	5
Oregon	445	27	8	7	3

Source: Number of Cattle Feedlots By Size Groups and Number of Cattle Marketed, 1962-1967, SRS-14, July 1968, p. 12-13.

Table 3. Distribution of Pacific Northwest Feedlots by Capacity Categories, January 1, 1967; Distribution of Sample and Percent of Sample by Capacity Categories

	Capacity categories				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
Population	1,419	68	52	31	13
Sample	37	18	11	7	2
Sample/population	2.6%	26%	21%	23%	15%

Source: Number of Cattle Feedlots By Size Groups and Number of Cattle Marketed, 1962-1967, SRS-14, July 1968, p. 12-13.

SURVEY RESULTS

PART I. OPERATING CHARACTERISTICS

The operating characteristics of the sample feedlots summarized below are those variables generally thought to influence the structure of an industry. Variation among the five capacity categories are discussed to illustrate the dissimilarities of firms operating within different capacity categories.

Type of Business Organization

Type of ownership of feedlots tends to vary with feedlot size (Table 4). Smaller capacity feedlots tend to be sole proprietorships, and most of these smaller feedlots are operated in conjunction with individually owned and operated farms or ranches. Many of the partnerships and corporations in the smaller lot category consist of members of a farm family. The larger capacity feedlots have a greater tendency to be incorporated.

Integration with Other Business Activities

A substantial number of feedlots are integrated with various related activities (Table 5). Many of the smaller feedlots were developed as associated enterprises on farms and ranches where feedstuffs and/or cattle are produced. Feedlots on such farms and ranches provide an alternative marketing outlet for feed or cattle. Under-utilized facilities (machinery and buildings) are converted to a more productive use, and fuller utilization is made of off-season labor. Approximately 94 percent of the feedlots of under 1,000 head capacity were operational in conjunction with farms or ranches.

Approximately one half of the sampled feedlots in the first four capacity categories had feed-producing counterparts. Feedlots of 8,000 head capacity or larger were found to operate independently of feed-producing or feeder cattle enterprises.

Growth of Feedlot Firms

Cattle on feed in the Pacific Northwest have increased more rapidly in recent years than the total beef cattle population. 5/ In general, annual feeder cattle supply presently is not a limiting factor for cattle

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5/ Op. cit., Johnson, p. 11.

Table 4. Type of Feedlot Ownership by Capacity Category, Pacific Northwest Feedlot Survey, 1966-1967

Type of ownership	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
Sole proprietorship	49	39	27	14	0
Partnership	40	17	27	14	0
Corporation	11	44	46	72	100
Total sample	100	100	100	100	100

Table 5. Type of Feedlot Operation by Capacity Category, 1966-1967

	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
Feedlot only	6	11	45	29	50
Feedlot and feed-growing enterprise	43	61	45	57	0
Feedlot, feeder cattle enterprise, and feed-growing enterprise	51	22	10	0	0
Feedlot, slaughter plant	0	6	0	14	0
Feedlot processing of nonmeat commodities	0	0	0	0	50
Total sample	100	100	100	100	100

feeding expansion, since the region produces a surplus of feeders. However, seasonal supply variations make it necessary for large feedlots to procure cattle from other regions during certain periods of the year. The number of cattle on feed in the region has expanded at an annual rate of approximately 4 percent, with an increasing amount being produced in the larger feedlots. These feedlots are generally increasing their capacity, while smaller feedlots tend to either grow larger or go out of business (Table 6).

Table 6. Average Annual Growth in Volume Fed by Capacity Category, 1960-1967 a/

Percent growth	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
26 or more	6	23	20	33	50
16 to 25	3	6	40	17	50
11 to 15	12	0	10	0	0
6 to 10	9	18	10	33	0
1 to 5	12	18	0	0	0
0	49	12	20	0	0
Negative	9	23	0	17	0
Total sample	100	100	100	100	100

a/ Average annual percent growth is defined as follows:

$$APG = \frac{1}{6} \sum_{k=1}^{6} \frac{z_k}{V_i} \cdot 100; \text{ where } z_k = \text{Volume } j - \text{Volume } i,\ i = 1960, \ldots, 1967;\ j = i+1.$$

Some differences can be noted between the sample of 75 feedlots and the population from which it was taken. For example, the sample firms are expanding faster than the average of all Pacific Northwest feedlots. This difference is due to a greater sample proportion in the larger feedlot categories (Table 3). The 75 sample feedlots fed 120 percent more cattle in 1967 than in 1960 as compared to the regional increase of only 50 percent.

Of the 20 feedlots in the sample showing the highest percentage rate of growth, only three had capacities of less than 1,000 head. This indicates that increased production is being generated primarily in the larger feedlots.

Firms in the three largest capacity categories demonstrated the greatest average annual percentage growth rates, with over 30 percent of the firms

in the 4,000-7,999 head category realizing an average annual percentage growth of over 26 percent. Sample firms in the 8,000 head and over category realized an average annual growth rate of over 16 percent during the seven-year period.

Length of Operation

The 20 fastest growing feedlots had been in operation an average of 15 years, indicating that feedlots which are expanding their feeding operations are those that have survived several beef cycles.

The largest percentage of feedlots in each capacity category have been in operation 6 to 20 years (Table 7). The relatively small percentage of feedlots that have operated less than five years indicates a modest entry rate of firms into cattle feeding at all capacity levels during recent years. Most of the increased feeding has resulted from an expansion of existing feedlots, rather than from the entry of new firms into the industry.

Table 7. Years Feedlot in Operation, by Capacity Category, 1966-1967

Years in operation	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
0 to 5	5	5	9	0	0
6 to 10	14	18	37	43	50
11 to 20	44	40	27	43	50
21 to 30	24	24	27	14	0
31 to 40	8	12	0	0	0
41 +	5	0	0	0	0
Total sample	100	100	100	100	100

Finance

Increasing capital requirements, coupled with higher interest rates, have made interest one of the major nonfeed costs of feedlot firms. Interest rates for short-term capital used to purchase feeder cattle, feedstuffs, labor, and direct overhead items varied among the sampled feedlots, ranging

from 5.75 percent to 7.75 percent during the 1966-1967 production period.

Fourteen operators of the 75 sample respondents used their own funds for operating capital. Of the 61 other operators who were borrowing some or all of their operating capital, 79 percent were borrowing from commercial banks.

Production Credit Associations(PCA) were another common source of short-term capital for feedlots. Over 15 percent of the smaller feedlots utilized PCA funds, whereas 23 percent of the larger firms utilized PCA funds.

Interest rates for long-term capital used primarily to acquire fixed assets differed slightly from short-term capital interest rates. The range of interest rates for long-term capital was 5.0 percent to 7.5 percent, compared with a range of 5.75 percent to 7.75 percent for short-term capital.

Twelve of the 37 firms under 1,000 head capacity were not borrowing long-term capital. Most of these 12 feedlots had been feeding cattle for more than 20 years. The fixed assets of these feedlot operators were apparently owner-financed. Fifty-two percent of the remaining 25 feedlots under 1,000 head capacity borrowed their long-term capital from commercial banks. The Federal Land Bank and insurance companies were each sources of long-term capital for 20 percent of these 25 feedlot operators.

Fourteen of the 38 firms with feedlots of over 1,000 head capacity were not borrowing long-term capital. The average age of these 14 feedlots was considerably greater than that of the other large feedlots, suggesting that the fixed assets of these feedlots were owner-financed. Of the 24 larger feedlots who borrowed long-term capital, 43 percent acquired their funds from insurance companies, with an additional 26 percent borrowing from commercial banks.

Procurement of Feeders

Auctions are an important source of feeder cattle, particularly for the small feedlots. Approximately one half of the feedlots under 1,000 head purchase some or all of their feeder cattle from auction markets. Large feedlots tend to buy directly from the producer through their own buyers or through order buyers.

The Pacific Northwest is a surplus feeder cattle area, but the seasonality of production of calves and yearlings contributes to some buying problems for the feedlots. In the fall there are more feeder cattle available than local feedlots are able to place on feed. Many feeder cattle are shipped to other regions for wintering or feeding, creating a spring procurement problem for Pacific Northwest lots. Feeder cattle are usually relatively scarce in the region in May and June.

Many of the larger feedlots prefer to feed 700-750 pound yearlings. Due to the nonavailability of this size feeder at spring placement time, however, these feedlots buy and feed lighter calves in the fall in order to have spring placements. Some feedlot operators avoid feeding fall calves for their spring replacements by contracting with producers or other smaller feedlots for stocker programs.

Two interregional forces that may have an impact on spring feeder cattle replacements include the availability of grass in the Plains States and the need for a "backhaul" to the Midwest. During years when the weather is favorable and grass is plentiful in Colorado, Nebraska, and other Plains States, there is considerable price competition in the spring for the calves wintered in Oregon, Washington, and Idaho. Another force that may contribute to price competition for spring placements is the buying practices of Midwest truckers delivering live hogs to the Pacific Northwest. These truckers seek a suitable backhaul to cover some portion of the costs of their return trip. Although backhauling is a year-round operation, the price competition has more impact on spring placements when feeder cattle supplies are limited in this region.

Although feedlot operators prefer locally produced cattle, during periods of short supply cattle are shipped in from northern Nevada, California, and other nearby states, and in some cases from British Columbia. Reasons given by Pacific Northwest feedlot operators regarding their preferences for local feeder cattle include better quality and conformation, the relatively better performance of local cattle over those shipped in from other regions, and more favorable weighing conditions at the time of purchase.

Feeding Programs

Most feedlots in the under 1,000 head capacity and 1,000-1,999 head categories feed their cattle a growing ration before placing them on a finishing ration. Growing rations are used by a smaller percentage of feedlot operators in the three larger capacity categories, indicating the tendency for larger feedlots to purchase heavier feeders.

Approximately one fourth of the feedlots with less than 1,000 head did not feed animals to finish. Rather, they carried feeders through a growing phase and sold to other feedlots, as did 11 percent of the feedlots in the 1,000-1,999 head category.

Growing Ration: The predominant growing ration ingredients for all feedlots of less than 8,000 head were corn silage, alfalfa hay, barley (or barley-wheat), and protein supplement (Table 8).

The feedlot in the sample above 8,000 head capacity feeding a growing ration used a by-product as the basic ingredient.

Table 8. Proportion of Feedlots Feeding Selected Growing Ration Ingredients, By Capacity Category, 1966-1967

Ration ingredients	Capacity				
	Under 1,000 (%)	1,000-1,999 (%)	2,000-3,999 (%)	4,000-7,999 (%)	8,000 and over (%)
Corn silage, hay, grain, and supplement	19	33	55	44	0
Corn silage, grain, supplement	3	17	0	0	0
Hay, grain, supplement	42	22	0	0	0
Roughage only	25	11	9	0	0
By-products (primary)	3	11	18	0	50
By-products (minor)	0	6	0	28	0
No growing ration	8	0	18	28	50
Sample total	100	100	100	100	100

Finishing Ration: The predominant finishing ration ingredients are the same as those in the growing ration, although the proportions used within individual rations vary considerably. Most of the firms with less than 8,000 head tend to feed corn silage, alfalfa hay, and grain in their rations (Table 9).

By-products are the primary ration ingredients in the two sample feedlots of over 8,000 head. The primary by-product used is potato waste, ranging from the whole cull potato to a potato sludge which is a mixture of potato peels, discarded french fries, and cooking oils from potato processing plants. Although there are variations in methods of feeding, potato waste is usually combined with chopped alfalfa hay, grain, and protein supplements to form the finishing ration.

Availability of Feedstuffs: The availability of by-product feedstuffs is related to the processing activity in the area and the changing technology of growing, harvesting, and processing various crops. For example, increases

in processing potatoes, peas, carrots, beets, mint, and sweet corn generate additional wastes and by-products suitable for feedlots. Technological changes in the field harvesting of green peas and sugarbeets have reduced the amounts of peavine and beet top silage available to local feedlots. Pesticide and herbicide residues in the meat of animals consuming these by-products may also be a factor in the amounts permitted to be fed to slaughter animals.

In recent years the Pacific Northwest has fed more barley to livestock than it produced. Feedlot operators usually find local barley available from harvesttime until the end of the calendar year. After that time barley must be shipped in from Montana and other surplus grain areas.

Montana is the primary source of barley inshipments. Rail rate reductions on such barley were made recently from central Montana to the Pendleton-Milton Freewater area of Oregon, with some adjustments to nearby points in Washington. Even with this reduction, freight rates from central Montana to this feeding area are approximately $9.00 per ton. 6/

Historically, corn for silage has not been a competitive crop alternative in most parts of the Pacific Northwest; rather, it has been grown in rotation with other crops.

In most cases, Oregon corn silage is not contracted in advance. In view of the marginal climate for growing corn for grain, farmers normally wait until late in the growing season to decide whether to harvest their corn as silage or grain. If the weather is suitable for ear corn, the amount of corn cut for silage is reduced. Many feedlot operators have no method of estimating silage availability, so they announce the price they will pay and open their silage pits for delivery. The amount of silage delivered determines what action the feedlot operators take to complete their roughage requirements. In Washington and Idaho there is some advance contracting for corn silage, and some farmers produce silage corn each year for feedlot use.

Hay prices are a function of local supply and demand conditions. Hay prices in interior regions of the Pacific Northwest respond to the demand generated early in the hay production season by coastal dairy areas. Later in the hay production season, feedlot operators release bids for hay and accept delivery at the feedlots.

6/ Personal interview with Public Utilities Commissioner, Transportation Division, State of Oregon.

Table 9. Proportion of Feedlots Feeding Selected Finishing Ration Ingredients By Capacity Category, 1966-1967

Ration ingredients	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
Corn silage, hay, grain, and supplement	24	39	55	58	0
Corn silage, grain, supplement	11	17	9	0	0
Hay, grain, supplement	30	22	18	0	0
By-products (primary)	8	11	18	14	100
By-products (minor)	0	0	0	28	0
No finishing ration	27	11	0	0	0
Sample total	100	100	100	100	100

Problem Areas of Feedlot Operators

Feedlot operators were asked to rank their two most pressing problems. Their responses were placed in one of nine different categories; depending on the particular interpretation given these categories, they may or may not be considered overlapping in content (Table 10). For a large percentage of those feedlot operators with less than 8,000 head, the primary problem was either what they identified as "marketing and pricing" or the "price-cost squeeze." "Animal health" was the primary problem identified by the two sample feedlot operators with greater than 8,000 head feedlots.

Secondary problems varied considerably among the different capacity categories of firms (Table 11).

"Feeder availability," "animal health," "finance," and "labor problems" were the problems most often identified by feedlot operators with feedlots over 4,000 head, with "feeder availability" a very pressing problem for lots over 8,000 head.

Table 10. Primary Problems Reported by Feedlot Operators, By Capacity Category, 1966-1967

Problem	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
None	5	0	20	0	0
Marketing and pricing	22	22	26	28	0
Finance	0	12	0	0	0
Labor	8	6	0	14	0
Weather	8	0	0	14	0
Competition	0	6	27	0	0
Feeder availability	5	6	9	0	0
Animal health	16	24	9	0	100
Price-cost squeeze	26	18	9	44	0
Cost of operation	10	6	0	0	0
Sample total	100	100	100	100	100

Consignment Feeding

Custom feeding of cattle owned by others is an accepted practice among most commercial feedlots. Those lots that custom feed report that most of the consignment contracts are offered in the fall and often exceed the facilities available. Some of the reasons given for engaging in custom feeding include spreading the risk, providing better utilization of facilities, and reducing capital requirements. The smaller lots tend to own all the cattle they feed. As the feedlot size increases there is a tendency to feed a larger proportion of all cattle fed on a custom basis (Table 12).

Table 11. Secondary Problems Reported by Feedlot Operators, By Capacity Category, 1966-1967

Problems	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
None	23	22	28	0	0
Marketing and pricing	19	22	18	14	0
Finance	0	17	0	14	0
Labor	8	11	0	15	0
Weather	5	0	9	0	0
Competition	8	11	0	0	0
Feeder availability	16	0	0	15	50
Animal health	5	6	27	14	0
Price-cost squeeze	8	0	0	14	0
Cost of operation	8	11	18	14	50
Sample total	100	100	100	100	100

Table 12. Percent of Cattle Owned by Operator, 1966-1967

Percent owned	Capacity				
	Under 1,000	1,000-1,999	2,000-3,999	4,000-7,999	8,000 and over
	(%)	(%)	(%)	(%)	(%)
1-25	0	0	0	0	50
26-50	3	12	27	58	0
51-75	0	0	0	14	0
76-99	0	6	27	0	0
100	97	82	46	28	50

Among the consignors of cattle for custom feeding are packers, speculators, ranchers and other feedlot operators. Most ranchers have their consigned cattle fed to slaughter weights and grades. Some feedlot operators consign cattle to other lots for "backgrounding," while others consign their excess feeder cattle to other lots. Some consignors actively participate in the marketing of the cattle they place for custom feeding; others delegate the entire process of feeding and marketing to feedlot management.

PART II. COST CHARACTERISTICS

Average costs per hundredweight of gain are of interest to individual feedlot operators and policymakers. Feedlot operators can compare their costs of production with cost estimates of other firms of similar size. They also can gain some insight into what costs might be operating at different volume levels. Policymakers can use cost estimates to assess profitability and rate of return to capital invested in feeding enterprises of different levels of production, and to assess the forthcoming industry supplies of fed beef that might be expected under different price levels.

Average costs of gain per hundredweight are presented for firms in each of seven volume categories (Table 13). 7/ Estimates presented are weighted average costs of the three firms observed in each volume category. 8/ Cost estimates presented for firms operating at the seven volume levels are separated into two general classifications. "Average variable cost" is the sum of the average costs of feed, hired labor, direct overhead, animal health, death loss, and interest on operating capital. "Average fixed cost" is the sum of the average costs of depreciation on fixed assets, interest on long-term capital, and real estate taxes.

Total variable costs are incurred only if cattle are being fed; in the absence of cattle feeding, total variable feedlot costs would be zero. Average variable costs are total variable costs divided by total hundredweight of gain. With an increase in the total hundredweight of gain produced, a firm's average variable costs may either increase or decrease, depending

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7/ See Appendix A for calculation methods used in making cost estimates presented in Part II. The estimated weighted average costs presented for each of the seven volume levels are calculated as follows: Per hundredweight average cost of gain estimates were made for each of three firms in each volume category. Each partial budget entry for the seven partial budgets in Table 3 is a weighted average of the corresponding entries of the three firms in that volume category. The weighting factor is the total hundredweight of gain of the individual firm as a percent of total hundredweight of gain produced by all three firms in that volume category.

8/ "Average costs" as discussed throughout Part II refer to average costs per hundredweight of gain. For brevity, "average cost" is the term used in subsequent discussion.

Table 13. Average Cost of Production per Hundredweight of Gain, by Volume Category

	Total hundredweight of gain, October 1, 1966-September 30, 1967						
	(I) 1-999	(II) 1,000-2,749	(III) 2,750-5,999	(IV) 6,000-11,499	(V) 11,500-19,999	(VI) 20,000-39,999	(VII) 40,000 +
Number of head fed[a/]	152	547	913	2,730	5,866	5,884	33,548
Pounds per gain per animal	403	417	446	336	299	393	330
Total hundredweight of gain	612	2,284	4,071	9,169	17,555	23,155	110,660
Average cost per hundredweight of gain:							
Feed cost:							
Roughage	$7.27	$7.54	$8.04	$5.77	$4.06	$3.69	$5.32
Grain	10.51	9.91	8.34	7.47	9.92	11.49	7.28
Supplements	4.40	2.49	.97	3.15	5.42	4.45	1.75
Total feed costs	$22.18	$19.94	$17.35	$16.39	$19.40	$19.63	$14.35
Hired labor costs	.44	.46	1.26	.95	.78	.59	.71
Direct overhead costs:							
Miscellaneous	.06	.00	.00	.09	.09	.09	.03
Repair on feedlot equip.	.21	.08	.18	.07	.06	.10	.21
Repair on feedlot facil.	.27	.04	.09	.13	.09	.12	.11
Repair on milling & stor.	.03	.09	.00	.08	.04	.10	.11
Personal property taxes	.36	.10	.13	.06	.10	.06	.17
Electricity	.06	.06	.04	.03	.17	.03	.04
Telephone	.06	.03	.04	.03	.04	.03	.04
Insurance	.04	.03	.16	.15	.06	.16	.08
Licenses	.07	.04	.05	.03	.02	.02	.02
Accounting and legal fees	.04	.03	.03	.06	.05	.08	.07
Bedding	.08	.01	.04	.02	.04	.25	.08
Fuel, oil, etc.	.17	.08	.25	.14	.25	.16	.22
Total direct overhead costs	1.45	.59	1.01	.89	1.01	1.20	1.18
Animal health costs	.44	.17	.30	.20	.22	.31	.25
Death loss	.00	.29	.34	.38	.37	.20	.44
Interest costs on operating capital:							
Interest on cattle	1.32	1.92	1.15	1.43	1.43	1.13	1.20
Interest on feed	.61	.65	.67	.60	.65	.66	.49
Interest on other operating capital	.07	.07	.07	.07	.05	.06	.05
Total interest charges on operating capital	2.00	2.64	1.89	2.10	2.13	1.85	1.74
AVERAGE TOTAL VARIABLE COSTS	26.51	24.09	22.15	20.91	23.91	23.78	18.67
Depreciation charges on fixed assets:							
Depreciation on feedlot facil.	.27	.22	.36	.27	.25	.14	.13
Depreciation on mill & storage	.08	.23	.06	.32	.14	.12	.10
Depreciation on feeding equip.	.74	.40	.18	.19	.61	.17	.12
Total depr. charges	1.09	.85	.60	.78	1.00	.43	.35
Interest on fixed resources:							
Interest on feedlot facil.	.07	.23	.33	.21	.19	.08	.12
Interest on mill & stor.	.04	.10	.05	.17	.07	.08	.04
Interest on feeding equip.	.16	.13	.05	.04	.15	.06	.03
Total interest on fixed resources	.27	.46	.43	.42	.41	.22	.19
Real estate taxes	.02	.06	.04	.07	.05	.04	.03
AVERAGE TOTAL FIXED COSTS	1.38	1.37	1.07	1.27	1.46	.69	.57
AVERAGE TOTAL COST (ATVC + ATFC)	$27.89	$25.46	$23.22	$22.18	$25.37	$24.47	$19.24

a/ All volume, gain, and cost data are weighted averages of three sample feedlot firms for each volume category, the weighting factor being total hundredweight of gain per feedlot as a percent of total gain by all firms in that volume category.

upon the relative efficiencies in feeding, procurement, and management at increasingly greater production levels.

Fixed costs are incurred whether there are cattle on feed or not. Average fixed costs are total fixed costs divided by total hundredweight of gain. For any given feedlot, as volume of gain increases, average fixed costs decrease. Average fixed costs will vary among firms in the same size categories, depending on the total fixed cost levels of each firm.

Total Depreciated Value of Fixed Assets

The total depreciated value of fixed assets for the firms in the seven volume categories provides an indication of the technologies being employed by the firms producing different volumes of total feedlot gain.

Feedlots producing 1-999 hundredweight of gain in 1966-1967 had been in operation an average of 18 years. Total depreciated value of these firms' feedlot facilities, feed storage facilities, and feeding equipment averaged approximately $2,600 (Table 14). Feedlots in this category usually feed cattle in corrals or similar facilities which are or previously have been used for other purposes, such as dairy or beef breeding herd enterprises. Most concentrates are custom mixed and stored at the feedlot. Feed delivery from storage to the feed bunks is done either by hand scooping from a farm wagon or by using a tractor-mounted scoop for direct delivery to the bunks.

The total depreciated value of fixed assets averages approximately $16,000 for firms producing from 1,000-2,749 hundredweight of gain. The average length of operation for these feedlots is 23 years. Most grains and supplements are custom mixed. Feed stored at the feedlot is delivered either by a trailer or truck-mounted delivery box. (See Appendix B, Illustration I, for various feed delivery systems used in Pacific Northwest feedlots). Most other feedlot equipment is jointly used with other farm enterprises.

Feedlots feeding at annual volumes between 2,750 and 6,000 total hundredweight of gain tended to have more specialized feedlot facilities. Permanent fence-line bunks of wood or concrete construction were used by all feedlots, with feedlot fences primarily of "tie"-and-plank construction. (See Appendix B, Illustration II, for various forms of feed bunk construction used in Pacific Northwest feedlots.) Concentrates were mixed primarily by custom operators and stored at the feedlot. (See Appendix B, Illustration III, for storage facilities used by Pacific Northwest feedlots.) Feed was delivered from storage to fence-line bunks by truck boxes.

All feedlots operating at volumes greater than 6,000 total annual hundredweight of gain used fence-line bunks for feeding. Feed bunks were constructed of wood or concrete. Feedlot fences were constructed of "tie" or post and

Table 14. Total Depreciated Value of Fixed Assets, By Volume Category, 1966-1967 a/

Asset classification	Total hundredweight of gain						
	1-999	1,000-2,749	2,750-5,999	6,000-11,499	11,500-19,999	20,000-39,999	40,000 and greater
Feedlot facilities	$1,419	$8,566	$20,746	$15,683	$43,930	$22,628	$203,456
Feed mill and/or feed storage	520	3,557	2,910	24,766	27,089	27,160	74,429 b/
Feeding equipment	657	3,596	2,613	4,479	40,065	17,577	41,509
Total of all fixed assets	$2,595	$15,719	$26,269	$44,928	$111,084	$67,365	$319,394

a/ The total depreciated values presented in each volume category are the weighted average totals of the three firms interviewed in each category.
b/ Due to a recent relocation of one firm in this volume category, no milling facilities existed at the relocated feedlot. A more appropriate estimate for feed mill value (depreciated) is $90,000.

planks or of steel pipe and cable. Partial or complete milling of concentrates was done in the feedlots' milling facilities. (See Appendix B, Illustration IV, for feed milling facilities used by Pacific Northwest feedlots.) Total investment in feedlot facilities, feed mill facilities, and feed handling equipment tended to increase directly with the increased volumes of gain produced in the feedlots. (See Appendix B, Illustration V, for feed handling equipment used by Pacific Northwest feedlots.)

Among the feedlots producing more than 11,500 annual hundredweight of gain, those in the 20,000-39,999 hundredweight category had the lowest total depreciated value of fixed assets. However, the three feedlots in this volume category have been operating an average of 24 years, as compared to an average of 9 years for firms in the 11,500-19,999 category and 11 years for the feedlots producing more than 40,000 hundredweight of gain annually.

Feed Costs

Variations in feed costs per hundredweight of gain can be attributed to several variables. Even if two feedlots were feeding identical rations,

feed costs per hundredweight could vary due to differences in beginning weights of feeder animals, total pounds of gain put on each feeder, prices of the same feedstuffs, feed conversion efficiency, and weather conditions.

In the Pacific Northwest there is considerable variation in the feedlot rations fed (Tables 9 and 10). Feedlots in volume category VII (Table 13) used by-products, primarily various forms of potato waste, as their main ration ingredient. The average feed cost of $14.35 per hundredweight of gain realized by these firms was substantially lower than the average feed costs realized by firms in other volume categories.

Feed cost is the major component of average variable and average total cost per unit of gain. Therefore, variations in feed costs account for a large percentage of the variation in average variable and average total costs of gain among volume categories.

Hired Labor Costs

Average costs of hired labor vary from a low of $0.44 per hundredweight of gain to a high of $1.25 per hundredweight of gain. Those firms which produce 2,750 hundredweight of gain hire only seasonal labor. Most labor in these feedlots is operator labor, and no charge for operator labor was included in the partial budgets. The proportion of operator labor used for feeding activities decreased as volume levels increased.

Most of the feeding activities in those feedlots producing 2,750 hundredweight of gain or more was performed by hired labor. Most of these firms maintained year-round feedlot employees.

For those feedlots relying primarily on hired labor for their work force, average costs of hired labor varied from $0.59 to $1.26 per hundredweight of gain. Several of the smaller firms employing year-round hired labor evidently charged all wages paid their labor force to the feedlot. More accurate accounting might show the average cost of feedlot labor to be lower in those cases where the labor force worked in other farm enterprises part of the year.

Direct Overhead Costs

Average costs of direct overhead (repairs, utilities, insurance) varied considerably among firms of different levels of production. However, no discernible trends are evident. This finding might be expected, because few economies of large-scale procurement seem to exist for most of the direct overhead items.

Animal Health Costs

Average costs per hundredweight of gain for animal health expenditures varied from $0.17 to $0.44. Variation apparently was not associated with the volume level of the feedlot, but more with the husbandry practices of individual feedlot operators.

Death Loss

Death loss costs tended to increase with increased levels of feedlot gain. Although no verification is possible from sample data, this death loss increase could be due in part to larger volume firms using a greater proportion of hired labor, operators of larger feedlots not participating in the actual feeding activities through which they could more easily anticipate or detect health problems in their feedlots, and problems stemming from a large inventory of cattle fed under close confinement conditions.

Interest Costs on Operating Capital

Interest costs on capital invested in feeder cattle varied from a low of $1.13 per hundredweight of gain to a high of $1.92 per hundredweight of gain. Interest cost variations for feeder cattle can largely be attributed to three factors: (1) differences in interest rates charged by lenders, (2) length of time feeder animals are on feed, and (3) rates of gain of feeder animals.

Average interest costs on capital invested in feed inventories are nearly uniform for those feedlots producing less than 40,000 hundredweight of gain. Interest costs on capital invested in feed inventories are approximately $0.15 less per hundredweight of gain for firms with greater than 40,000 hundredweight of gain than those with lower volumes. Several factors influence this difference, including the use of lower valued feedstuffs (by-products) and lower interest rates on capital borrowed by the larger firms. Interest costs on other operating capital averaged only slightly lower for the larger volume firms than for firms producing less than 11,500 total hundredweight of feedlot gain.

Depreciation Charges on Fixed Assets

Average total depreciation costs tended to decrease as total hundredweight of gain increased. Average depreciation costs on feedlot facilities range from $0.36 to $0.13 per hundredweight of gain. Although total depreciation costs for feedlot facilities were larger for larger volume lots, those lots were able to spread their costs over larger total hundredweights of gain. Consequently, average depreciation costs on feedlot facilities tended to decrease as volume of production increased.

Average costs of depreciation on feeding equipment followed a cost pattern similar to the average cost pattern for depreciation on feedlot facilities. Average costs of depreciation on milling and storage facilities were less for some firms in the lower volume categories. However, as previously noted, many of these smaller volume firms had only nominal investments in feed milling facilities.

Interest on Fixed Assets

Average total interest costs on fixed assets did not indicate a discernible downward trend with increased production volumes. Such costs are more closely related to the number of years a feedlot has been in operation than to the firm's size. Since interest was charged on the depreciated value of all fixed assets, total interest charges decrease as the age of the asset increases.

Real Estate Taxes

Average cost of real estate taxes tended to vary without relation to volume of production. Since assessment methods for real property and rates of taxation vary considerably among different localities, no volume-related average cost pattern could be expected.

Average Variable Costs

An inverse relation apparently exists between feedlot volume and the level of average variable cost (Table 13). Feedlots producing less than 1,000 hundredweight of gain annually during the 1966-1967 feeding year incurred the highest average variable cost per hundredweight of gain, whereas feedlots producing over 40,000 hundredweight of gain realized the lowest costs. However, among those firms in the five intermediate volume categories, considerable variation was found in the average variable costs. Volume of production and average variable costs of gain vary greatly among Pacific Northwest feedlots, but volume of production does not account for nearly all of the variation in average variable costs.

Average Fixed Costs

If an individual firm with a given set of fixed resources increases volume, total fixed costs can be distributed among more units of output. Therefore, for an individual firm increased output would reduce average fixed costs.

Total fixed costs in this study comprise the total costs of depreciation, interest on investment, and real estate taxes (Table 13). Total costs tend to vary considerably among firms in different volume categories because of differences in the depreciated value of fixed resources.

Average Total Costs

Average total cost for an individual firm is the sum of average variable and average fixed costs. As both average variable and average fixed costs tend to vary inversely with volume of product, average total costs also decline as volume levels increase (Table 13). However, as with each of its components, volume of production does not account for all of the variation in average total costs.

Although the dollar amounts of average total costs tend to decrease with increased volume levels, the proportion of average total costs attributable to fixed assets and variable resources remain fairly constant for all size categories (Table 15). The proportion of average total costs attributed to charges on fixed resources ranged from a low of 3.0 percent to a high of 5.9 percent, whereas the proportion attributable to expenditures on variable resources varied from 94.1 to 97.0 percent.

Table 15. Percent of Average Total Cost Attributable to Average Variable Cost and Average Fixed Cost, by Volume Category

Cost category	Total hundredweight of gain						
	1-999	1,000-2,749	2,750-5,999	6,000-11,499	11,500-19,999	20,000-39,999	40,000 and over
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Average variable cost	95.1	94.6	95.4	94.1	94.2	97.0	97.0
Average fixed cost	4.9	5.4	4.6	5.9	5.8	3.0	3.0
Average total cost	100.0	100.0	100.0	100.0	100.0	100.0	100.0

The very small proportion of average total costs per hundredweight of gain attributable to charges on fixed resources make average fixed costs seem inconsequential to the firm's production decisions. However, average fixed costs must be covered over time if the feedlot is to remain in business. More importantly, the initial capital outlays to enter cattle feeding with a plant capable of producing large volumes of feedlot gain may restrict firm entry into the feeding business. Although average fixed costs may not be considered in making short-run production decisions, capital requirements for fixed resources required to feed cattle may be of such magnitude to limit entry.

Proportions of Average Total Cost Attributable to Major Factors of Production

The proportions of average total cost attributable to major factors of production are relatively stable for firms at all levels of production (Table 16). However, the dollar amounts of average total costs vary substantially among feedlots of different sizes. Several possible explanations of the uniform proportion of average total cost attributable to the major factors of production are advanced. Feed costs varied from 73.9 to 80.1 percent of average total cost. This slight variation might be explained as follows: If all feedlots were feeding cattle of the same

Table 16. Proportion of Average Total Cost Attributed to Major Factors of Production, By Volume Categories

Cost category	Total hundredweight of gain						
	1-999	1,000-2,749	2,750-5,999	6,000-11,499	11,500-19,999	20,000-39,999	40,000- and over
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Feed	79.6	78.0	74.8	73.9	76.5	80.1	74.5
Hired labor	1.6	1.9	5.4	4.3	3.1	2.4	3.8
Direct overhead	5.2	2.3	4.3	4.3	4.0	5.1	6.3
Animal health	1.6	.9	1.3	.9	.9	1.3	1.3
Death loss	--	1.4	1.3	1.8	1.5	.9	2.3
Interest on operating capital	7.1	10.3	8.5	9.5	8.4	7.5	9.0
Depreciation	3.9	3.4	2.5	3.5	3.9	1.8	1.8
Interest on fixed assets	1.0	1.8	1.9	1.8	1.7	.9	1.0
Real estate taxes	a/	a/	a/	a/	a/	a/	a/
Average total costs	100.0	100.0	100.0	100.0	100.0	100.0	100.0

a/ Less than 0.1 percent.

beginning weight for a given number of days at some predetermined daily level of gain, then pounds of feed necessary to produce a pound of gain should be nearly constant for all feedlots, regardless of volume level. If feed requirements per pound of gain were uniform and the dollars for feedstuffs per hundredweight of gain decreased with increases in feedlot volumes, this would suggest that larger feedlots were able to purchase their feedstuffs at prices lower than the purchase price of feedstuffs for smaller feedlots, or that larger volume feedlots were able to purchase different feedstuffs of equivalent nutritive value at lower costs than the traditional feedstuffs.

Interest on operating capital varies from 7.1 to 10.3 percent of average total cost of production. The relative stability of this proportion, along with the relative stability of the proportion of average variable cost attributable to other production factors, may be due to accounting procedures and other factors not identified in this analysis.

PART III. COMPARISONS OF OPERATING CHARACTERISTICS OF BEEF FEEDLOTS IN SELECTED REGIONS OF THE UNITED STATES

The recent completion of two publications describing the characteristics of beef cattle feeding in other regions of the United States facilitates comparisons between Pacific Northwest beef feedlot operations and those in five major cattle-feeding regions. One publication describes characteristics of beef cattle feedlots in California, Colorado, and the Western Corn Belt. 9/ The other bulletin deals with the Texas-Oklahoma cattle-feeding industry. 10/ In this section comparisons are made of selected feedlot operating characteristics in these six geographical areas.

Size of Feedlots

Table 17 gives the distribution of feedlot sizes, as measured by capacity, in each area on January 1, 1967. While the majority of the lots in each area had less than 1,000 head capacity, 94 percent of these small lots were located in the Western Corn Belt. California had the greatest number of large (8,000 head and over) lots, followed by the Texas-Oklahoma area. The Pacific Northwest had fewer large feedlots than any of the other areas compared.

Type of Ownership

Type of feedlot ownership is directly related to size in all of the areas studied. A predominance of the smaller feedlots are operated on a sole-proprietorship basis, and the majority of large feedlots (over 5,000 head) are corporations (Table 18). Corporations are relatively less important in the Western Corn Belt (where lots tend to be smaller) than in the other areas. Partnerships are common, particularly in the case of small and medium-sized lots, in all areas except California. A few cooperative feedlots exist among large feedlots in California, Colorado, and the Western Corn Belt.

Longevity of Operation

In all regions the smaller feedlots have been feeding cattle longer than the larger ones (Table 19). In all areas except Texas more than 50 percent of the feedlots with less than 1,000 head had been operating for more than 10 years in 1966-1967. Most of the larger operations have been in existence less than 10 years in all regions except the Western Corn Belt and Colorado. The largest proportion of new lots (six years or younger) are located in Texas and Oklahoma, illustrating the fact that most of the recent growth in feedlot

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9/ Ronnie L. Burke, Characteristics of Beef Cattle Feedlots: California, Colorado, Western Corn Belt, Marketing Research Report No. 840, Economic Research Service, USDA, 1969.

10/ Raymond S. Dietrich, The Texas-Oklahoma Cattle Feeding Industry: Structural and Operational Characteristics, Bulletin 1079, Texas Agricultural Experiment Station, College Station, December 1968.

Table 17. Size Distribution of Feedlots in Each Area, by Capacity Categories, January 1, 1967

Area	Capacity				
	Under 1,000	1,000 - 1,999	2,000 - 3,999	4,000 - 7,999	8,000 and over
Pacific Northwest[a/]	1,419	68	52	31	13
Western Corn Belt[b/]	87,674	371	129	63	20
California	231	98	80	60	72
Colorado	1,172	32	28	18	16
Texas	1,397	115	72	50	41
Oklahoma	1,400	21	18	5	6
TOTAL	93,293	705	379	227	168

Source: Number of Cattle Feedlots by Size Groups and Numbers of Cattle Marketed, 1957-1967, SRS 14, July 1968.

a/ States of Washington, Oregon, and Idaho.

b/ States of Iowa, Nebraska, and Minnesota.

Table 18. Type of Feedlot Ownership, by Area and Capacity Category, 1966-1967

Area and type of ownership	Capacity						
	Under 1,000 head	1,000-1,999 head	2,000-4,999 head	2,000-7,999 head	5,000-9,999 head	8,000 head and over	10,000 head and over
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Pacific Northwest:							
Sole proprietorship	49	39		22	---	0	
Partnership	40	17		22	---	0	
Corporation	11	44		56	---	100	
Western Corn Belt:							
Sole proprietorship	77	56		55			
Partnership	23	36		17			
Corporation a/	0	8		28			
California:							
Sole proprietorship	75	50	---	43	---	0	---
Partnership	13	0	---	0	---	0	---
Corporation a/	12	50	---	57	---	100	---
Colorado:							
Sole proprietorship	38	42	---	17	---	10	
Partnership	56	0	---	25	---	20	
Corporation	6	58	---	58	---	70	
Texas:							
Sole proprietorship	79	53	35		24		35
Partnership	18	40	32		29		5
Corporation	3	7	33		47		60
Oklahoma:							
Sole proprietorship	85	29	25		50		0
Partnership	15	43	50		50		0
Corporation	0	28	25		0		100

a/ Includes cooperatives.

Table 19. Number of Years Feedlots in Operation, by Capacity Category and Area, 1966-1967

Geographic region and feedlot capacity size category	Longevity of cattle feeding operations (years)					
	Less than 3	3 to 5	6 to 9	10 to 20	Over 20	TOTAL
	(%)	(%)	(%)	(%)	(%)	(%)
Pacific Northwest:						
Less than 1,000	0	6	14	43	37	100
1,000-1,999	0	6	18	40	36	100
2,000-7,999	0	6	22	50	22	100
8,000 and over	0	0	50	50	0	100
Western Corn Belt:						
Less than 1,000	5	11	7	45	32	100
1,000-1,999	0	0	20	44	36	100
2,000-7,999	6	0	6	41	47	100
California:						
Less than 1,000	0	0	12	50	38	100
1,000-1,999	0	50	0	50	0	100
2,000-7,999	0	14	44	28	14	100
8,000 and over	20	20	40	20	0	100
Colorado:						
Less than 1,000	19	12	12	32	25	100
1,000-1,999	14	14	29	29	14	100
2,000-7,999	8	0	25	8	59	100
8,000 and over	0	20	10	50	20	100
	Less than 3	3 to 6	7 to 11	12 to 21	Over 21	TOTAL
Texas:						
Less than 1,000	9	44	21	18	8	100
1,000-1,999	13	47	40	0	0	100
2,000-4,999	12	50	32	0	6	100
5,000-9,999	18	29	29	24	0	100
10,000 and over	20	45	15	15	5	100
Oklahoma:						
Less than 1,000	8	23	15	46	8	100
1,000-1,999	29	29	14	14	14	100
2,000-4,999	0	50	25	12.5	12.5	100
5,000-9,999	0	50	0	50	0	100
10,000 and over	25	50	0	25	0	100

numbers has occurred in this area of the United States. The Pacific Northwest is the only region where none of the feedlots surveyed had been in operation less than three years.

Feedlots Combined with Other Business Activities

Table 20 shows the extent to which feedlot operations are specialized or are combined with other business activities. The larger feedlots in each area tend to be more specialized than the smaller feeding operations. This relation can be seen by comparing the percentages across the top line of each area category in Table 20. Combinations of feeding and farming or ranching enterprises tend to be associated with smaller feedlot capacities than feeding activities of agribusiness enterprises, including meatpacking and food processing firms.

Regional differences in extent of cattle feeding specialization are closely related to variations in size of feedlots. That is, cattle feeders are more specialized in those areas where more large feedlots are located: California, Texas, and Oklahoma. Within the largest size category no significant difference in specialization is detected among the regions compared. In the two smallest size categories (less than 2,000 head), however, feeding specialization is more prevalent in the Western Corn Belt and Colorado than in the other four areas.

Procurement of Feeders

Auction markets are the most important source of feeder cattle in all six feeding areas, with about two-thirds of all cattle placed on feed in Oklahoma, California, and Texas procured through auctions. This type of market is less important in the Western Corn Belt and Colorado; in these areas direct purchases from farms and ranches are relatively more numerous. In all regions except California, the proportion of cattle bought directly from farms and ranches increases as lot size expands, with auction volumes moving in the opposite direction. Terminal markets handle less than 10 percent of the feeder cattle purchased in all six areas.

English and English crossbred beef cattle constitute the majority of cattle fed in all the regions compared. Okies and Brahma-crossbred cattle are relatively more important in Oklahoma (45 percent), Texas (43 percent), and California (20 percent). The proportion of Okies fed in all areas tends to increase as lot size increases. Dairy breeds and crossbreeds are most important in the Western Corn Belt (7 percent) and California (6 percent), and they are relatively unimportant in the other feeding areas.

Custom Feeding

The percentage of cattle fed on a custom or consignment basis in each area is as follows:

Table 20. Combinations of Other Business Activities with Feedlot Operations, all Areas, by Size Category

Area and principal business of owner	Size, by Feedlot Capacity Category						
	Under 1,000	1,000-1,999	2,000-4,999	2,000-7,999	5,000-9,999	Over 8,000	Over 10,000
	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Pacific Northwest:							
Feedlot only	6	11	--	38	--	50	--
Feedlot and feed-growing enterprise	43	61	--	50	--	0	--
Feedlot, feeder enterprise, and feed growing enterprise	51	22	--	6	--	0	--
Feedlot, slaughter plant	0	6	--	6	--		--
Feedlot, nonmeat food processing	0	0	--	0	--	50	--
Western Corn Belt:							
Feeder	30	64	--	61	--	--	--
Rancher	0	4	--	6	--	--	--
General farming	66	28	--	22	--	--	--
Other	4	4	--	11	--	--	--
California:							
Feeder	0	50	--	43	--	40	--
Rancher	12	0	--	14	--	20	--
General farming	50	50	--	14	--	0	--
Other	38	0	--	29	--	40	--
Colorado:							
Feeder	25	57	--	59	--	80	--
Rancher	0	0	--	8	--	0	--
General farming	69	14	--	33	--	10	--
Other	6	29	--	0	--	10	--
Texas:							
Feedlot	6	20	50	--	41	--	60
Farmer or rancher	56	40	3	--	12	--	5
Meat packer	30	7	3	--	0	--	5
Feed company	3	7	9	--	12	--	0
Feedlot-feed company	6	6	0	--	0	--	0
Other	29	20	35	--	35	--	30
Oklahoma:							
Feedlot	0	29	75	--	100	--	75
Farmer or rancher	62	14	13	--	0	--	0
Meat packer	0	14	0	--	0	--	0
Feed company	0	14	0	--	0	--	0
Feedlot-feed company	0	0	0	--	0	--	0
Other	38	29	12	--	0	--	25

California.....66 percent
Oklahoma.....59 percent
Texas.....48 percent
Colorado.....16 percent
Pacific Northwest.....11 percent
Western Corn Belt..... 8 percent

These percentages are directly related to the size distribution of feedlots in each area (Table 17). Custom feeding is most prevalent in those regions where the greatest proportions of large feedlots are located. Within each region the smaller lots own virtually all of the cattle they feed, and custom feeding increases in importance as feedlot capacity expands.

Composition of Feed Rations

Barley and milo were the two major grains fed in California, and alfalfa cubes were the principal source of roughage. Some crop residues (carrots, potatoes, cantaloupes) were also fed.

In Colorado corn and milo were the grains fed most widely, and corn silage was the most common roughage, with some hay and beet pulp also fed.

The major grain fed by Western Corn Belt feedlots was corn, and most roughages fed were corn silage and hay, in that order of importance.

Grain sorghum was the main concentrate fed in Texas and Oklahoma, accounting for 60 and 53 percent of the rations, respectively, in those two states. Corn or grain sorghum silage constituted the bulk of roughage fed in Texas and Oklahoma, with most of the remaining roughage in Texas consisting of cottonseed hulls and alfalfa hay, compared to green chop and cottonseed hulls in Oklahoma.

In the Pacific Northwest, barley was the predominant grain fed. Most feedlots with less than 8,000 head fed rations consisting of corn silage, alfalfa hay, barley, and protein supplement. The proportions of these feeds varied between the growing and finishing rations used. By-products -- mostly potato processing wastes -- were the primary finishing ration ingredient for all of the large feedlots surveyed in the Pacific Northwest.

Financing

Commercial banks are the primary source of borrowed capital in all of the regions compared, with Production Credit Associations being the second most important source of external financing. The larger feeders who have been in business for shorter periods of time tend to rely more on borrowed funds for both operating capital and fixed investment financing than do their smaller counterparts who have been feeding cattle for a longer time. Operating capital for financing feeder cattle and feed is obtained more frequently from financial institutions than are fixed facility investments. No significant differences in feedlot financing arrangements among the regions are discernible from a comparison of the two publications with the findings of the Pacific Northwest study discussed in Part I.

APPENDIX A

DERIVATION OF COST ESTIMATES

Feed Costs

All feedstuffs were valued at their market value delivered to the feedlot.

For each individual feed, total cost was estimated as follows:

Value of beginning inventory, Oct. 1, 1966	$_____
Value of feedstuff purchased, Oct. 1, 1966-Sept. 30, 1967	_____
Sum: Value of beginning inventory plus feedstuff purchased	_____
Less: Value of ending inventory, Oct. 1, 1967	_____
COST OF FEEDSTUFF	$_____

The various feedstuffs were aggregated into the usual classifications: roughages, grains, and supplements.

For each of these classifications, the average feed cost was calculated as follows:

(example - roughages)

$$\text{Average roughage cost per cwt. of gain} = \frac{\sum_{i=\text{1st roughage}}^{\text{All roughages}} (\text{COST OF FEEDSTUFF})}{\text{Total cwt. of gain}}$$

Hired Labor Costs

Estimates were obtained for hours of labor, wage rates, and value of all perquisites. Labor costs were calculated as follows:

Total wages	$_____
Value of perquisites	_____
F.I.C.A. and other employer-paid benefits	_____
Sum: COST OF HIRED LABOR	$_____

Average hired labor cost per hundredweight of gain was calculated as:

$$\text{Average hired labor cost per cwt. of gain} = \frac{\text{Cost of hired labor}}{\text{Total cwt. of gain}}$$

Total Overhead and Animal Health Costs

Estimates of the total annual expenditures were obtained and categorized. Average costs per hundredweight were calculated for the partial budgets.

Veterinary bills, vaccines, and other medical supplies were included in animal health costs. No hired labor other than veterinary service fees were considered animal health costs.

Death Loss

The purchase value of all animals which died in the feedlot or in transport to or from the feedlot was the total death loss. Average death loss per hundredweight was calculated for the partial budgets.

Interest Charges on Operating Capital

Interest was charged on all operating capital, both borrowed and owner's capital, at the rate of interest quoted by the feedlot operator.

Interest charges on operating capital were separated into three categories:

(1) Interest on feeder cattle:

$$\text{Total interest on feeder cattle} = \left(\begin{array}{l}\text{Average value of each lot of feeders purchased in year}\end{array}\right) \cdot \left(\begin{array}{l}\text{Annual interest rate}\end{array}\right) \cdot \left(\frac{\text{Total days per feeding period}}{360 \text{ days}}\right) \cdot \left(\begin{array}{c}\text{*Turnover rate}\end{array}\right)$$

*Where "turnover" is the average number of times the feedlot is refilled per year.

$$\text{Average cost of interest on feeder cattle per cwt. gain} = \frac{\text{Total interest on feeder cattle}}{\text{Total cwt. of feedlot gain}}$$

(2) Interest on feed:

$$\text{Total interest on feed} = \left(\frac{\text{Total cost of feedstuff}}{2}\right) \cdot \left(\begin{array}{l}\text{Annual interest rate}\end{array}\right)$$

$$\text{Average cost of interest on feed per cwt. of gain} = \frac{\text{Total interest on feed}}{\text{Total cwt. of gain}}$$

It was assumed because of the seasonality of crop harvest that sometime each fall a feedlot would have a large percentage of its annual supply on feed and just prior to harvest the following season its inventories would be close to depletion. Therefore, the average inventory value for charging interest costs would be approximately one half the beginning inventory value.

(3) Interest on other short-term capital

Other expenditures which would use short-term capital were (1) hired labor expenditures, (2) direct overhead expenditures, and (3) animal health expenditures. Total death loss was not included as another use of short-term capital, as the interest on capital lost from feeder death was charged for previously as an interest on feeder cattle.

$$\text{Total interest on other operating capital} = \left(\begin{array}{l}\text{Average cost of other operating expenditures for each lot of feeders}\end{array}\right) \cdot \left(\text{Annual interest rate}\right) \cdot \left(\frac{\text{Total days per feeding period}}{360 \text{ days}}\right) \cdot \left(\text{Turnover rate}\right)$$

$$\text{Average cost of interest on other operating capital} = \frac{\text{Total interest on other operating capital}}{\text{Total cwt. of gain}}$$

Depreciation Charges on Fixed Assets

Description of the assets, original purchase prices, and age of the assets were obtained from respondents. A standardized depreciation schedule was used by the writers to maintain a common basis for comparison of depreciation charges.

A straight-line method of depreciation was used, assuming no salvage value for the assets.

Useful life of the major assets was estimated to be the following: 1/

1/ These estimates of useful life may vary somewhat from those reported by individual lots. They are intended to present a common basis of comparison. Several of the larger volume feedlots used a double-declining balance depreciation method or some other accelerated depreciation method when such methods provided a taxation advantage.

Grain storage facilities Feedlot pens and bunks Feed mill structures Scales (livestock and/or feed) Office buildings Watering system	15 year life
Feed wagons Silage loaders (auger or elevator) Crawler tractors Squeeze chutes Roller mills, hammer mills Steam rollers, augers, and other mechanical mill accessories	10 year life
Wheel tractors Michigan loaders Feed trucks and feed boxes (for feedlots with less than 3,000 head annual volume	8 year life
Pickups Cars Feed trucks and boxes (for feedlots with over 3,000 head annual volume)	5 year life

Annual depreciation allowances on the individual assets were then grouped into three categories: (1) feedlot facilities, (2) feed mill and storage, (3) feeding facilities--based upon the physical description and use made of the asset.

The average cost of depreciation per hundredweight for each of these three categories was then calculated for the partial budget entries.

Interest on Fixed Assets

Interest charges were calculated on all individual fixed assets items. Interest charges per item were calculated as follows:

$$\text{Interest on fixed asset investment} = \left(\frac{\text{Depreciated value of assets, Oct. 1, 1966} + \text{Depreciated value of assets, Oct. 1 1967}}{2}\right) \cdot \left(\text{Quoted interest rate on long-term capital}\right)$$

Interest charged on the individual assets were then grouped into three categories: (1) feedlot facilities, (2) feed mill and storage, and (3) feeding facilities.

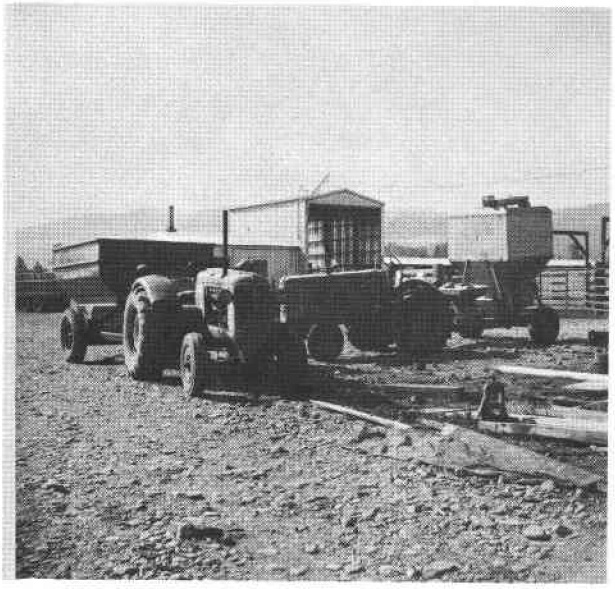
The average cost of interest on fixed assets per hundredweight for each of these three categories was then calculated for the partial budget entries.

Real Estate Taxes

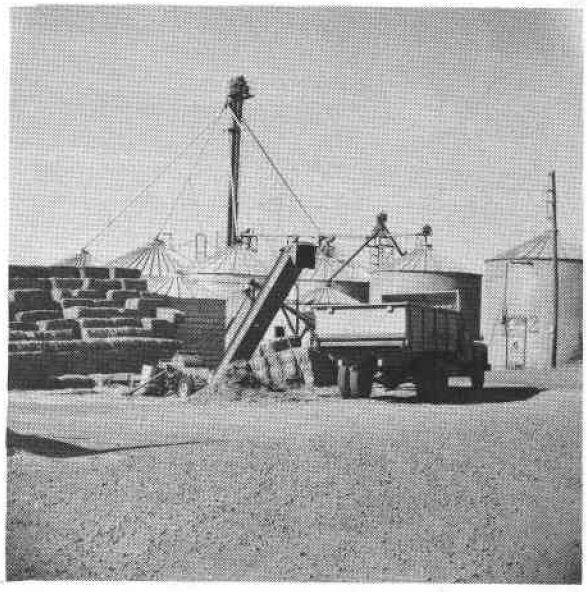
The annual taxation charges for land and attached physical improvements were estimated by the respondent.

Average real estate taxes per hundredweight of gain were then calculated for the partial budget entries.

APPENDIX B. ILLUSTRATIONS OF FEEDLOT FACILITIES, FEED MILLS, AND FEEDING EQUIPMENT



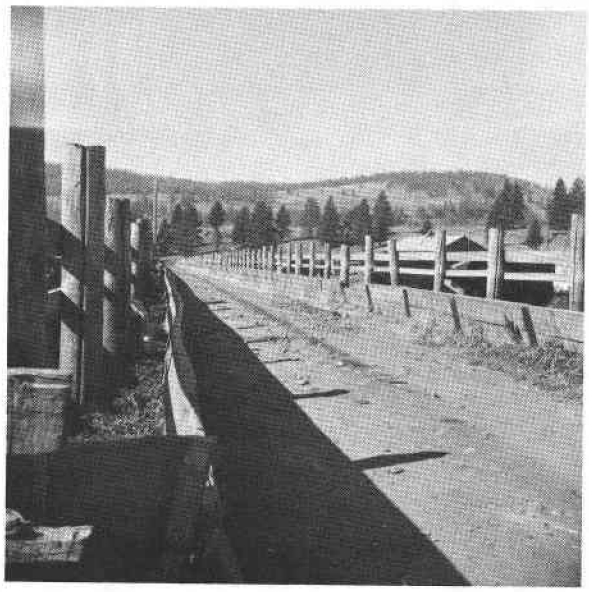
Self-unloading delivery trailers typical of those used.



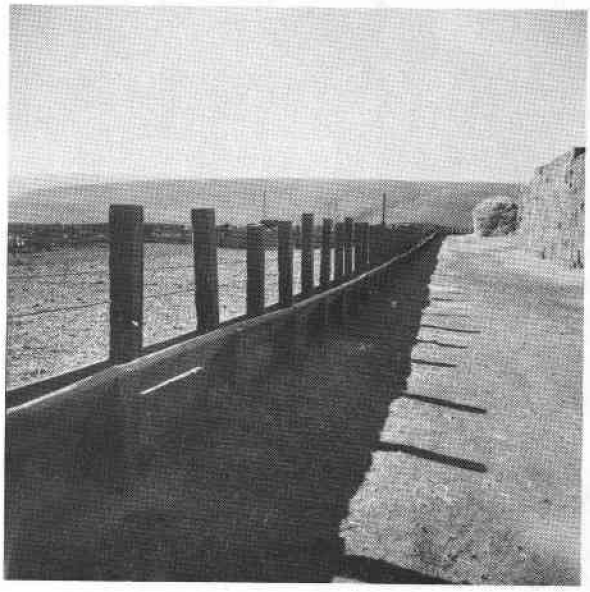
Self-unloading truck used to deliver shredded hay to feedlot. Machine in background is baled hay shredder.

Self-unloading truck in process of delivering a complete ration into fence-line feed bunks.

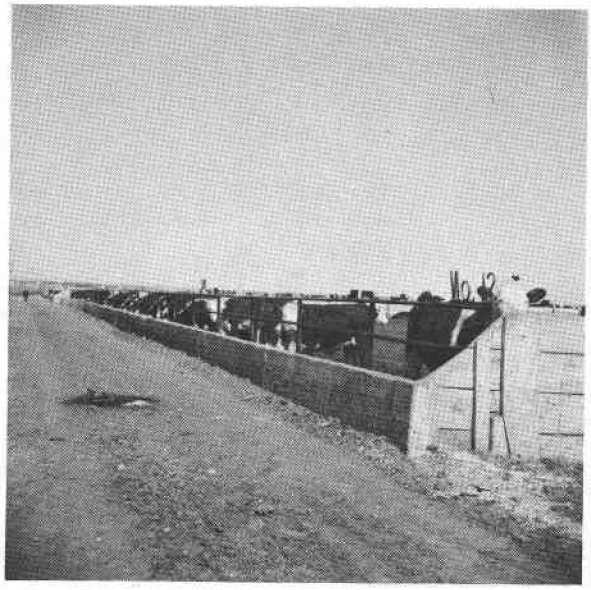
Illustration I. Feedlot delivery equipment



Typical fence-line bunk construction used in Pacific Northwest.



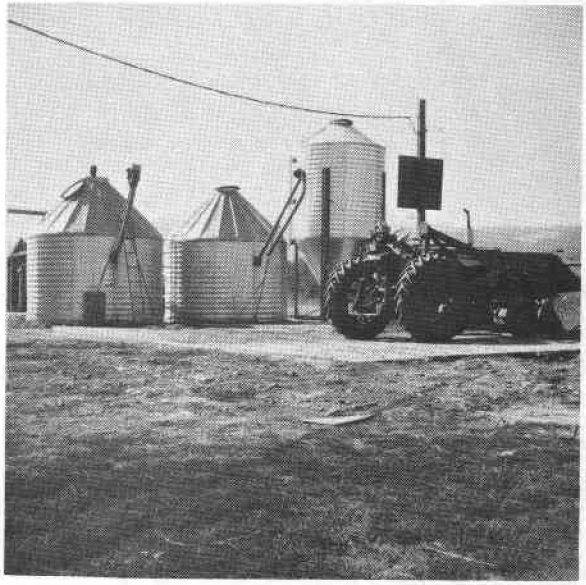
Fence-line bunk using "tie pipe", plank, and cable.



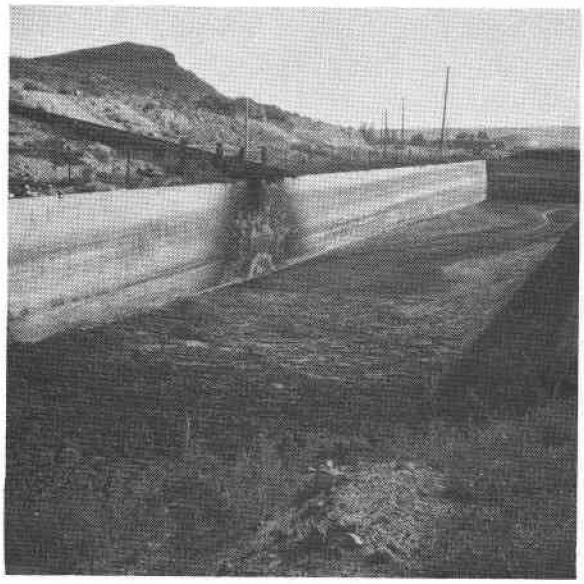
Concrete feed bunks with pipe bunk fences.

Illustration II. Feed bunk construction

These are typical trench pits used for storing silage. The two pits in background are sealed with plastic covers.

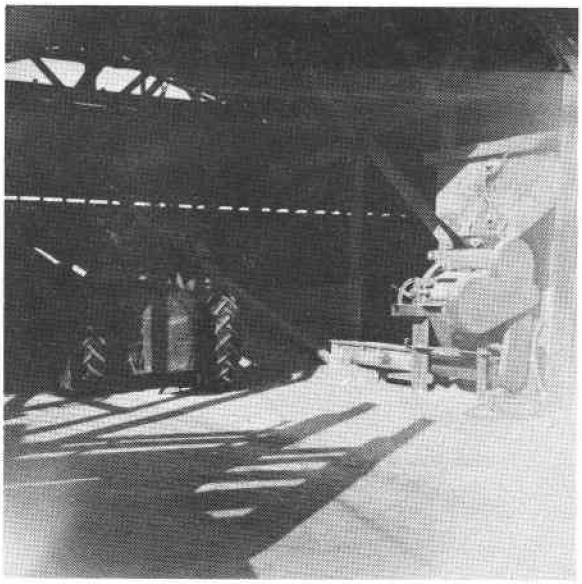


Bins used for concentrate storage. Augers are used for loading bin contents into delivery vehicles.



This is a concrete-lined trench pit used for storing potato "sludge."

Illustration III. Feed storage facilities



Concentrate storage and feed grain roller used by a feedlot producing over 20,000 hundredweight of feedlot gain annually.

Concentrate storage bins, elevator arms, silage truck, and feed mill structure of a feedlot producing between 6,000 and 11,499 hundredweight of gain annually.

Concentrate storage, elevator arms, and feed mill structure of a feedlot producing more than 40,000 hundredweight of feedlot gain annually.

Illustration IV. Feed milling facilities

A chain conveyor is used to move baled hay from storage into the feed mill.

A tractor-mounted scoop used to load delivery vehicles.

A commercial scoop used to load delivery vehicles.

Illustration V. Feed handling equipment