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An Analysis of the Competitive Position of Cattle Finishing in Utah and Selected Western States, 1969

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AN ANALYSIS OF THE COMPETITIVE POSITION OF CATTLE FINISHING IN UTAH WITH SELECTED WESTERN STATES, 1969

by

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ABSTRACT

An Analysis of the Competitive Position of Cattle Finishing in Utah and Selected Western States, 1969

by

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Utah's cattle feeding industry was described by using both secondary and primary data. The primary data were collected through use of a personal interview survey.

Primary data were also collected in Idaho, while secondary data were used for Arizona, California and Colorado.

Intrastate analysis of feeding costs showed definite cost savings were achieved in all states through economies of size.

Interstate analysis of feeding costs showed Utah's larger capacity feedlots to be very competitive with larger capacity lots in other states.

1968 prices for both slaughter and feeder cattle were computed for each state. Prices in Utah were slightly lower for both slaughter and feeder cattle than other states.

A comparison of net return per unit fed in large feedlots indicated Utah's larger feedlots were competitive with feedlots in other states.

(67 pages)

INTRODUCTION

Sale of livestock is a major source of farm income in Utah. Cash receipts from the sale of all farm products totaled more than $197 million in 1968 and the sale of livestock and livestock products accounted for 77 percent of this total (8). Sale of cattle and calves rank as the state's number one source of farm income. Receipts from the sale of cattle and calves exceeded $57 million in 1968 (9). A healthy livestock industry is important both to the state's agricultural industry and her over-all economy.

There has been a trend in recent years toward the consumption of more feedlot finished beef in the United States. This increased consumption by consumers of high quality beef has been accompanied by a large increase over the past ten years in the number of cattle being fattened in the United States. On January 1, 1958, there were 5.9 million head of cattle on feed in the 26 leading cattle feeding states. By January 1, 1968, this number had increased to 11 million head, or an increase of 87 percent (6). The western states have contributed significantly to this growth of the cattle feeding industry. Between 1962 and 1967, the number of cattle fed in four states adjoining Utah increased between 11 percent and 65 percent. During this same period the number fed in Utah decreased 14 percent (10). Utah's feeding industry has not expanded and maintained its share of the fed cattle market.

One apparent question then is why Utah, with an annual net export of feeder cattle, has not kept pace with the trend to increased cattle feeding?

This situation raises questions as to the present status of the feeding industry in Utah and how it compares with the feeding industry in other states. Since cost and return data have not been available for cattle feeding in Utah, answers to these questions have been based largely on personal opinion. As would be expected under these conditions there are many differing opinions.

OBJECTIVES OF THE STUDY

The objectives of this study were:

1. To describe the cattle feeding industry in Utah, 1968.
2. To compare different sizes of feedlots and identify the least cost sizes.
3. To compare costs and returns from feeding cattle in Utah with cattle feeding in other western states.

REVIEW OF LITERATURE

Most feedlot research has been conducted to: (a) describe the feeding industry, (b) identify specific feedlot procedures, or (c) to establish reliable cost data. Since the ultimate goal of this study is to compare costs and returns of feeding in Utah and other western states, this review of literature will include only studies of the latter.

Feed and cattle constitute the major portion of the costs incurred in feeding cattle. However, due to the competitive nature of the feeding industry, these costs are in most studies assumed to be the same for everyone. For this reason, the majority of studies involving cost analysis consider only nonfeed, noncattle costs.

A study of nonfeed costs of commercial feedlots in the Imperial Valley of California was conducted in 1962 by King (5). The objective of this study was to identify least cost sizes of commercial feedlots. The method used by King was to construct hypothetical model feedlots and then determine costs of operation for various levels of output and uses of capacity. The five model feedlots varied in capacity from 3,760 head to 22,560 head. The feedlot capacity was estimated by first establishing output rates for feed mills and then relating this total output to the number of head that could be fed with the quantity of feed processed.

Investment requirements for the five different feedlots decreased from $51.37 per head of capacity for the 3,760 head lot to $34.13 per head of capacity for the 22,560 head lot. Annual fixed cost resulting from such investment requirements plus costs of management and office personnel followed a similar pattern.

Labor requirements were estimated as the amount of labor required to operate the feed mill to full capacity 10 hours a day. Wage rates applied were $2.00 per hour for the mill foreman and $1.65 per hour for all other labor.

Other variable costs included utilities, repairs, fuel, veterinary and death loss. Equipment repairs were estimated as a percentage of the original investment dependent upon the degree of utilization of the feedlot. For a lot used at 100 percent of capacity, repair costs were three percent of investment costs. Death loss was estimated at one percent of the number of cattle placed on feed. Other variable costs were based on statistical analysis of sample data obtained by King.

King's method of comparing various sizes of feedlots was based on the average cost required per head per day. The results of this study demonstrated economies of size.

One of the more recent cost and analyses studies of cattle feeding was done by Williams and McDowell (11) in Oklahoma. Seven hypothetical models were designed varying in size from 300 head to 15,000 head. Budgets were prepared and input-output analyses were made of each particular aspect of feedlot operation. Investment items included land, pens, feed mill, storage, water

equipment, feed distribution equipment, manure handling equipment, office, and scale facilities. The three smallest lots did not use office and scale equipment.

Annual fixed costs (interest, taxes, insurance and depreciation) plus annual cost of management and office personnel calculated on a per head of capacity basis decreased from $17.85 for a lot of 300 head to $5.70 for a lot of 15,000 head.

Variable nonfeed items considered in their study are labor, utilities, fuel, veterinary, death loss, marketing expense and interest on operating capital. Labor requirements were determined for each size facility and the rates applied varied from $1.00 per hour to $1.50 per hour. Electricity costs were based on local REA rates. Fuel costs were calculated on a per hour basis for gasoline using equipment. Veterinary expense, set arbitrarily, varied between $1.50 per head for 700 head or less to $1.00 per head for 5,000 head or more. This varied because they assumed that larger lots could obtain veterinary care at lower rates per unit than small lots. Death loss was assumed to be one percent of the number of cattle fed. Interest on operating capital was charged at six percent annually for purchases of feed, nonfeed variable resources and feeder cattle.

The method of comparison used in their study shows costs compared on a pound of gain basis. This study also provides evidence of significant cost savings resulting from economies of size.

The above studies have both used hypothetical models or in

other words estimated the elementary input-output relationships and then applied costs to these inputs to derive the total cost for various size of feedlots and uses of capacity.

Another method of calculating feeding costs is to use actual feedlot data. This method was used in a California feeding study conducted by Hopkin and Kramer (4). A questionnaire was mailed to 216 feedlots randomly selected throughout the state. There were 81 usable returns which represented 13 percent of the total number of lots in the state, 48 percent of reported feedlot capacity and 70 percent of the cattle fed in California in 1963.

From data received in the survey, Hopkin and Kramer calculated average daily nonfeed costs per animal fed. These costs included depreciation, taxes, insurance, interest, labor, utilities, fuel, repairs, veterinary and miscellaneous items. Feedlots were divided into four size categories: less than 4,000 head, 4,000-10,000 head, 10,000-26,000 head and more than 26,000 head. Average daily nonfeed costs per head fed were calculated from these data.

The findings of this study also indicate important economies of size are possible as feedlot size is increased.

All three of these studies point to the existence of economies of size in the cattle feeding industry. All concur that these savings are most significant as size is increased from small lots under 500 head capacity to approximately 2,000 head capacity. They generally agree that most of the economies of size have been realized by the time feedlot capacity reaches 5,000 head.

All three studies unanimously agreed that significant savings could be achieved by using any size feedlot facility at or near 100 percent of its annual capacity.

METHOD OF PROCEDURE

Basic data used to meet the objectives of this study were obtained from both primary and secondary sources. Data were needed for five states in order to make the comparison stated in the objectives. Besides Utah, these states include Arizona, California, Colorado and Idaho. Secondary data were available for all states except Utah and Idaho. Primary data were collected in these two states. Secondary sources were used to obtain price data for all states.

Utah Primary Data

Sample

The Statistical Reporting Service estimated the number of feedlots in Utah at the end of 1968 to be 499 (10). Limited time and money made it impossible to contact all of these feeders. A sample was designed to provide representation for all sizes of feedlots and for every part of the state where cattle are fed. To facilitate the compiling of a sampling list, four size categories were established. (a) 50 - 99 head, (b) 100 - 199 head, (c) 200 - 299 head, and (d) over 300 head. Extension Agents in each county were asked to list the names of all feeders in their county who fed over 300 head in 1968. They were also asked to provide the names of six cattle feeders in each of the other three size categories. If the county had only six feeders

or less in any one of these size groups the agent was to include all of the names for that group. No lots feeding less than 50 head in 1968 were included in the sample. From these lists a stratified sample was selected. It included all feedlots feeding over 300 head of cattle in 1968. This group constitutes only 12 percent of the total number of feedlots and since the number is so small it seemed advisable to interview, so far as possible, every feeder in this group. The remainder of the sample was drawn to include one feedlot in each of the remaining groups in every county so far as the county had feeders in the group. In the few counties with heavy concentrations of feedlots, two names were selected for each of the smaller size categories to insure these counties more representation in the sample. The sample stratified in this manner gives a representative picture of the smaller feedlots throughout the state. The enumerator attempted to contact every feeder on the sampling list. If the operator was not immediately available the enumerator was to arrange another time if possible. Due to the great distances involved and lack of time this was sometimes impossible; in this case a substitute feedlot was interviewed. A total of 89 respondents were surveyed.

Enumeration

A schedule of questions was designed to be asked through a personal interview with the feedlot owner or manager. The first section contained questions that were general in nature and

designed to ascertain such things as capacity, type of ownership, number of years the operator has fed cattle, months of purchase and ownership of cattle. The purpose of these questions was to help describe the cattle feeding industry in Utah, 1968.

Questions in the second section were designed to give detailed cost information for nonfeed costs. The operator was asked to provide cost information for such items as utilities, veterinary expense, fuel and repair. A list was made of feedlot facilities and equipment and investment in each item recorded. The operator was also asked to give the age of each item and its expected remaining life. Questions were included to provide labor requirements and labor costs.

The third section contained questions designed to supply information about the weight of feeders fed, length of feeding period, weight of cattle at slaughter and average gain per day. If a feedlot fed both steers and heifers this information was recorded for both.

The last section of the questionnaire was designed to provide information about ration composition and feed costs. To alleviate cost differences caused by seasonal price fluctuations, all respondents were asked to price feed at its value during harvest time in 1968.

Tabulation

To make analysis among different size groups possible the 89 completed schedules were divided into seven groups according to

the number of head of cattle fed in the feedlot in 1968. These size groups are: (a) 50 - 99, (b) 100 - 199, (c) 200 - 299, (d) 300 - 499, (e) 500 - 999, (f) 1000 - 1999, (g) 2000 and over. A few of the questionnaires were not complete in all sections. Rather than exclude them entirely, they were used where the data were complete and omitted in those areas where data were lacking. This accounts for some tables showing a total of less than 89 feedlots. Tabulation procedure included compiling total information such as pounds gained, days on feed, feed fed, feed cost, investment, fixed costs, nonfeed variable costs, etc., for all feedlots in each size group. Once the various items had been totaled, averages were readily calculated.

Calculation of averages

Average costs per pound of gain were calculated from tabulated data. Costs excluding purchase of the feeder animal were divided into categories as follows: (a) fixed costs, (b) nonfeed variable costs, and (c) feed costs. When costs for an item had been totaled for all feedlots in a particular size group this amount was then divided by the total pounds gained for all lots in that group to give an average cost per pound of gain for each item. All cost items added together and divided by total pounds gained then gave the average cost per pound of gain for each size group.

Fixed costs are those costs that remain constant regardless of the number of head of cattle fed. They include depreciation, interest, taxes and insurance on the feedlot facilities. Depreciation and interest were calculated from investment information

obtained in the interview with interest computed at seven percent of present value. Taxes and insurance were arbitrarily assessed at one percent of the present value of the facility. This was necessary because most of the operators could not separate these costs from tax and insurance costs on their other property. Consultation with tax and insurance authorities concerning this matter indicated that one percent of the present value would approximate these costs. This procedure has been used by others i.e., Hopkin and Kramer, Williams and McDowell and King.

Nonfeed variable costs include labor, utilities, fuel, veterinary, repair, death loss and interest on cattle and feed. The average cost per pound of gain for each of these items was computed from data obtained in the survey.

Death loss was calculated using the following procedure. Weight of an average size feeder half way through the feeding period was 830 pounds. This figure was multiplied by the percent death loss and the resulting amount represented the pounds of gain lost per animal fed due to death. Pounds lost were multiplied by the value per pound. This resulting value was divided by the average gain for the feeding period to give the cost per pound of gain.

Interest on capital invested in cattle and feed was computed at seven percent per annum for the portion of a year the capital was actually used. This amount was divided by the average pounds gained during the feeding period to give interest cost per pound of gain. Other nonfeed variable costs were simply totaled from information given in the interview.

Feed cost per pound of gain was determined by totaling all feed costs and dividing this amount by total pounds gained. It is signficant that feed accounts for approximately 80 percent of all costs excluding purchase of animal.

Idaho Primary Data

In collection of Idaho data, emphasis was placed on the larger capacity feedlots and the sample limited in area to major cattle feeding counties in the southern end of the state. The Idaho sample was stratified in size and restricted in area because the large feedlots in this area produce the major portion of Idaho's fed beef. Extension agents in four counties were asked to provide the names of cattle feeders in their counties and the enumerator selected his sample list from these names. Twenty-seven feeders in the four counties were interviewed in Idaho. The same schedule of questions and interviewing procedure was followed as in Utah and the results tabulated in the same manner.

Secondary Data

Data for feedlots in Arizona were obtained from a 1968 Arizona study by Gum and Wildermuth (3). In this study, costs are calculated on a pound of gain basis which makes comparisons with the Utah and Idaho data convenient. This study is for the 1968 feeding season and parallets the data collection period in Utah. The study presents a breakdown of three different sizes plus custom feeding.

Data from Colorado were obtained from a study directed by Gee. This study, also for 1968, consists of two parts, one publication dealing with farm feedlots (2) and the other large commercial lots (1). Again, cost information is provided on a cost per pound of gain basis. This study was conducted in the northeast quarter of Colorado which is one of the highly concentrated feeding areas in the United States.

Data from a 1965 study by Hopkin and Kramer (4) were used for California. Two problems were encountered in using these data for comparative purposes. The study is for the 1964 feeding period, while data for the other four states were for 1968. This necessitated updating of the cost data presented in this work. Cost and price indexes published in the Farm Cost Situation (7) were used to update these data. The second problem emerged because the California cost data are presented as cost per head per day rather than cost per pound of gain as in the other states. These data were converted to cost per pound of gain by dividing the average pounds gained per head per day into their cost per head per day. One must recognize in so doing that the average pounds gained in 1968 may have been higher or lower than those reported in 1964, and that this would have a significant bearing on costs per pound of gain converted from costs per head per day. Since more recent data were not available for California, the 1964 material was converted and used as presented in the Hopkin and Kramer study.

Price information for both feeder and slaughter cattle was obtained entirely from secondary sources. Buying and selling price

of cattle is extremely important to the success of the feeder. To insure consistency in reporting of this information, weekly market reports for terminal markets in each of the states were used. The publication, Market News, Livestock Division, Consumer and Marketing Service, U.S.D.A., gives prices for various classes of livestock at terminal markets each week. These prices were recorded for the fourth week of each month for 1968 and an average then taken for the year. This provides a reliable and consistent record of prices in each state both for feeder and slaughter cattle. It also shows the fluctuations within each state during the year.

DESCRIPTION OF CATTLE FEEDING INDUSTRY IN UTAH

The purpose of this section is to describe the cattle feeding industry in Utah. Location patterns are discussed in relation to crop production, population and climate. The various sizes of Utah's feedlots will also be noted and total number of cattle fed.

General Description

The bulk of Utah's cattle feeding operations is located in six counties along the Wasatch Front and three counties in central Utah. Thesenine counties fed 91.5 percent of the cattle fattened in Utah in 1964, table 1. This same geographic area also produced 80 percent of the feed grain for this same year. The same nine counties contained 85 percent of Utah's population in 1960 and considering population growth trends likely contain an even higher percentage today. There is a definite relationship in Utah between location of cattle feedlots, feed supply and potential markets for meat.

Cattle finishing is almost nonexistent in a large portion of Utah. In 1964, 13 counties fattened less than 300 head of cattle per county. All cattle fattened in these counties accounted for only 1.6 percent of the cattle fattened in Utah in 1964. Figure 1 illustrates the concentration of fed cattle throughout the state.

Climate is a variable which plays an important role in the success or failure of cattle feeding enterprises. Utah, except

for the extreme southern portion, has an advantageous summer climate while winter weather poses some problems. During winter months, December through March, feeding gains are often adversely affected by cold and wet weather. Many feeders have minimized these adverse winter conditions by careful selection of feedlot sites and by well planned construction of facilities. In summer months when hot humid areas often experience poor gains due to extreme heat, Utah's cooler climate is a definite advantage. The advantage of this cooler climate is often wasted since many feedlots do not feed during the summer.

Table 1. Feed grain and feed cattle production, selected counties, Utah, 1964

County	Feed grain	Cattle fed
	Tons	Head
Box Elder	68,823	12,133
Cache	59,416	6,483
Davis	6,774	10,131
Millard	14,027	12,459
Salt Lake	21,087	2,451
Sanpete	12,198	6,419
Sevier	9,895	11,548
Utah	32,071	15,440
Weber	7,796	30,897
Nine county total	232,087	107,961
State total	292,378	117,992
Nine county percent of state total	79.5	91.5

Source: U.S. Department of Commerce, Bureau of Census, Volume 1, Part 44, Utah, 1964 Census of Agriculture.

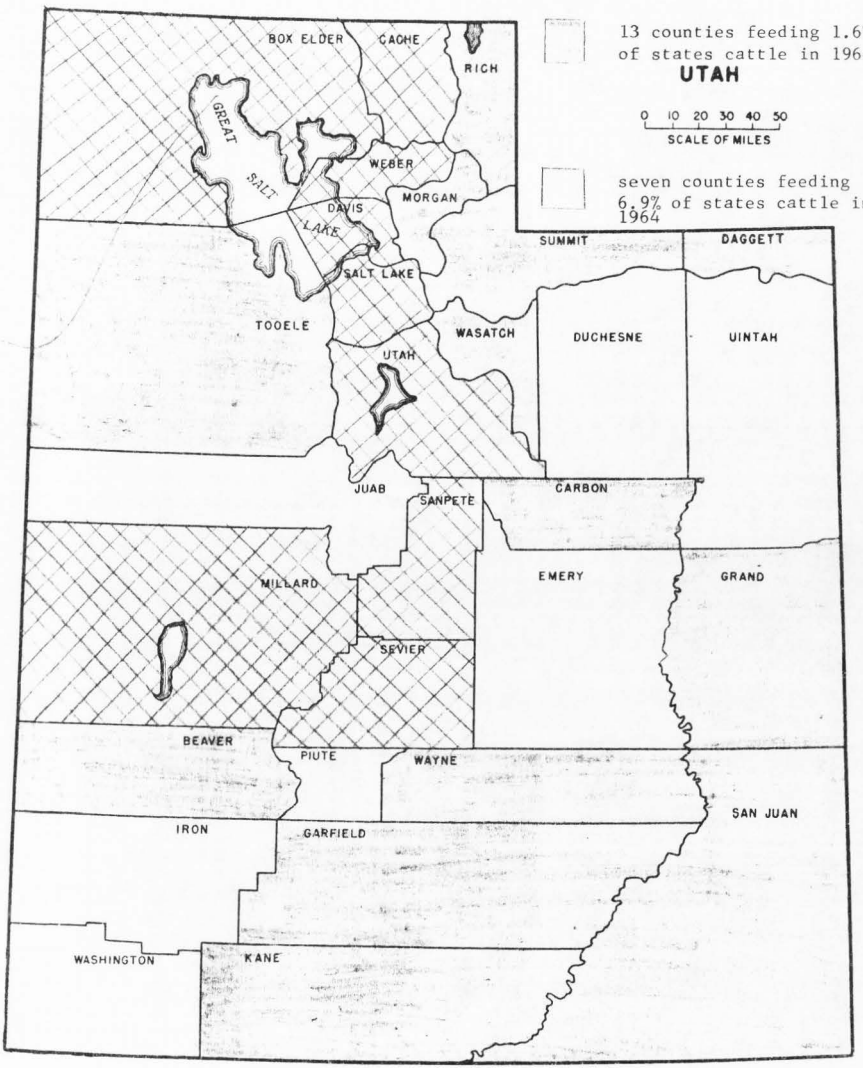

Figure 1. Concentration of fed cattle in Utah, 1964

Utah's cattle feeding industry is composed predominately of small feedlots. By standards of the industry, feedlots under 1,000 head capacity are considered small. According to 1968 USDA figures for feedlot size and numbers, 96 percent of Utah's feedlots have a capacity of less than 1,000 head. Contrast this to California where only 41 percent of the feedlots are under 1,000 head capacity. This same USDA report reveals that the four percent of Utah's feedlots with over 1,000 head capacity account for 36 percent of the fat cattle marketed in the state.

The number of feedlots in Utah has decreased substantially during the past decade. This is emphasized by USDA figures which place the number of feedlots feeding 1,000 head or less, at 962 in 1962 and at 480 in 1968, table 2. This is a decrease of 50 percent in six years. This was accompanied by an increase of 27 percent (but only 4 feedlots) for feedlots feeding more than 1,000 head. During this same six years the percentage of fat cattle marketed by the feedlots over 1,000 head capacity has increased from 26 percent to 36 percent.

Survey Description

The following information about Utah's feeding industry is based on data collected in the survey. This data has been organized to give an overview of some of the more common practices employed in most Utah feedlots.

Table 2. Number of cattle feedlots by size group, and number of fed cattle marketed by size group, 1962 and 1968, Utah

Year	No. of feedlots		No. of cattle mktd.		% of cattle mktd.	
	Under 1000 cap.	Over 1000 cap.	Under 1000 cap.	Over 1000 cap.	Under 1000 cap.	Over 1000 cap.
	Feedlots		1000 Head		Percent	
1962	962	15	82	29	74	26
1968	480	19	64	36	64	36

Source: U.S. Department of Agriculture, Number of Cattle Feedlots by Size Groups and Number of Fed Cattle Marketed, 1962-1967, Statistical Reporting Service, July, 1968, pp. 2-3.

U.S. Department of Agriculture, Cattle on Feed, Statistical Reporting Service, January, 1969, pp. 22 - 33.

Ownership

Over one-half of the feedlots interviewed were owned by a single proprietor and another one-fourth were partnerships. Only 12 percent are corporately owned and many of these are family corporations. This ownership pattern demonstrates the fact that most Utah feedlots are either a part of or an extension to the family farm, table 3.

The majority of feedlot owners interviewed had been feeding cattle for many years. Seventy percent of those interviewed had fed cattle for 20 years or more while only four percent had started within the past five years. Data in table 4 indicate the number of years feedlot owners surveyed had fed cattle. Results of the survey would indicate that as feeders in Utah have stopped feeding new operators have not been induced to invest capital in the feeding industry.

Table 3. Type of ownership of Utah cattle feedlots surveyed, 1968

Feedlot Capacity	Single Proprie-torship	Partner-ship	Coopera-tive	Corpora-tion	Total
		Number of feedlots			
50 - 99	5	3	-	-	8
100 - 199	15	4	-	-	19
200 - 299	9	3	-	1	13
300 - 499	4	6	-	-	10
500 - 999	12	5	-	3	20
1000 - 1999	4	3	1	4	12
2000 & over	2	2	-	3	7
Total	51	26	1	11	89
% of Total	58	29	1	12	100

Table 4. Number of years feedlot operators surveyed have fed cattle, Utah, 1968

Feedlot Capacity	Less than 5	5 - 9	10 - 14	15 - 19	20 & over	Total
			Years feeding			
50 - 99	-	1	1	1	5	8
100 - 199	2	1	-	2	14	19
200 - 299	-	-	3	-	10	13
300 - 499	-	-	1	-	9	10
500 - 999	-	1	2	2	15	20
1000 - 1999	2	-	-	3	7	12
2000 & over	-	3	1	1	2	7
Total	4	6	8	9	62	89
% of Total	4	7	9	10	70	100

Investment capital for feedlots in this survey has been obtained primarily from either commercial banks or the owner had his own capital, table 5. Investment in new or improved facilities in Utah has been undertaken only as fast as capital could be accumulated to finance such investments. This coincides with the fact that expansion to large scale feedlots has been very slow in Utah.

Table 5. Source of investment capital for Utah feedlots surveyed, 1968

Capacity	Commercial bank	Production credit	Own	Other	Total
		Number of feedlots			
50 - 99	5	-	3	-	8
100 - 199	8	3	7	1	19
200 - 299	5	3	5	-	13
300 - 499	4	2	4	-	10
500 - 999	7	3	9	1	20
1000 - 1999	5	1	4	2	12
2000 & over	5	1	-	1	7
Total	39	13	32	5	89
% of Total	44	15	36	5	100

Use of feedlot capacity

Feedlot capacity is normally defined as the number of cattle the feedlot will accommodate at one time. Annual capacity is the

number of cattle that can be fed in the feedlot in one year and is dependent on length of feeding period and size of feedlot. Since a normal feeding period is usually something less than 200 days it is possible to feed more than one lot of cattle during the year. Therefore, if an operator makes full use of the feedlots annual capacity more than one lot of cattle will be fed per year. Use of annual capacity has a significant influence on fixed costs and on some variable costs.

Forty-two percent of the feedlots surveyed were used at less than full capacity, table 6. One reason more feeders in Utah do not utilize their facilities the entire year is a large number of farm feeders feed only in the winter when other farm work is not competing as much for labor. Some farm feeders interviewed were finding it possible to feed during summer months by using modern feeding equipment and techniques.

Average weights and gains

Feeder cattle in the lots surveyed averaged 614 pounds when placed on feed. This starting weight varied among size groups from 563 pounds to 674 pounds with the groups in the middle tending to start lighter cattle, table 7.

Cattle in the survey were on feed an average of 158 days with size group averages varying between 200 days and 147 days. Large capacity feedlots use a shorter feeding period than smaller capacity feedlots.

Average pounds gained per day on feed ranged between 1.8 pounds and 2.9 pounds. Average gain per day generally increased as the

Table 6. Use of capacity by feedlots surveyed in Utah, 1968

Feedlot Capacity	Less than capacity	Capacity	More than capacity	Total lots
		Number of feedlots		
50 - 99	5	3	-	8
100 - 199	6	9	4	19
200 - 299	7	4	2	13
300 - 499	5	4	1	10
500 - 999	11	3	6	20
1000 - 1999	3	3	6	12
2000 & over	-	1	6	7
Total	37	27	25	89
% of Total	42	30	28	100

Table 7. Average weights, gain and days on feed, by size group, of feedlots surveyed, Utah, 1968

Feedlot Capacity	Ave. days on feed	Ave. in weight	Ave. out weight	Ave. daily gain
	Days	Pounds	Pounds	Pounds
50 - 99	177	661	988	1.8
100 - 199	166	674	1053	2.3
200 - 299	186	621	1011	2.1
300 - 499	200	581	1026	2.2
500 - 999	181	563	1086	2.9
1000 - 1999	151	595	1039	2.9
2000 & over	147	622	1025	2.7
State average	158	615	1043	2.7

capacity of the feedlot increased. Average weights, days on feed, and gain for cattle in the survey are summarized by size group, table 7.

Purchases

Purchase of feeder animals, as reported in the survey, followed a definite seasonal pattern. The last four months of the year account for 60 percent of all purchases with October and November totaling 43 percent of the years feeder purchases. Purchases during the other two four month periods were divided almost evenly. This high seasonal purchase in the fall coincides with the end of summer grazing season and farm feeders heavy work season. It also emphasizes the fact that 72 percent of the states feedlots are filled only once or less each year and remain empty a part of the year.

Forty-four percent of the cattle in the survey were obtained by feedlot operators through direct purchase, 25 percent were purchased at auction, 22 percent by order buyer and eight percent were raised by the feeder. All but the smallest group relied heavily on direct purchase. The very small feedlots raised a significant number of their feeders, table 8.

Ration

The typical ration used by feedlots in the survey, figured as an average for the entire feeding period, consisted of 82 percent concentrates and 18 percent roughage. Barley was the predominant concentrate fed and accounted for 59 percent of the

total ration. A typical ration fed in Utah is composed of: barley 59 percent, wheat or corn 7 percent, beet pulp 12 percent, protein supplement 4 percent, silage 11 percent and alfalfa 7 percent. Milo and oats were fed in isolated instances. Larger capacity lots fed higher concentrate rations than smaller lots, with some feeding over 90 percent concentrates for the entire feeding period. Use of higher concentrate rations is one reason large feedlots were able to finish cattle in fewer days than smaller feedlots. Another way to analyze rations is to compare different rations on a cost basis. This places more emphasis on the concentrates, particularly supplements, as they cost more per pound. Data in table 9 illustrate the percentage cost of each component in the ration for each size group.

Table 8. Method of procurement of feeder cattle for Utah feedlots surveyed, 1968

Feedlot Capacity	Raised	Auction	Order	Direct	Total
			Percent		
50 - 99	54.3	27.9	0.0	17.8	100
100 - 199	32.0	5.0	26.2	36.8	100
200 - 299	18.5	30.3	11.5	39.7	100
300 - 499	24.4	32.5	24.4	18.7	100
500 - 999	14.8	17.8	33.0	34.4	100
1000 - 1999	4.0	26.7	39.0	30.3	100
2000 & over	1.8	28.4	11.5	58.3	100
Total all lots	7.9	25.5	21.8	44.8	100

Table 9. Ration composition according to cost of feed for various size groups, Utah, 1968

Ration	Size of Feedlot						
	50 - 99	100 - 199	200 - 299	300 - 499	500 - 999	1000 - 1999	2000 & over
	Percent of ration						
Barley	56.2	59.9	51.3	57.6	60.3	57.1	69.1
Wheat	5.3	5.2	7.8	--	7.7	3.5	2.9
Corn	-0-	-0-	3.7	--	1.7	12.3	3.0
Beet pulp	6.9	8.7	4.1	12.0	11.8	12.2	12.9
Alfalfa	14.4	8.9	11.4	13.4	4.8	5.2	2.5
Corn silage	8.7	5.6	3.3	7.6	4.1	1.5	.3
Supplement	7.7	9.3	4.9	9.2	9.1	7.4	8.9
Milo	-0-	1.5	--	--	--	--	--
Oats	.8	-0-	--	--	--	--	--
Mix	-0-	-0-	13.5	--	--	--	--
Haylage	-0-	.9	--	.2	.5	.8	.4
Roughage	23.1	15.4	14.7	21.2	9.4	7.5	3.2
Concentrate	76.9	84.6	85.3	78.8	90.6	92.5	96.8

COST ANALYSIS OF VARIOUS SIZE FEEDLOTS

This section presents results of cost analysis. Feedlots are divided into the same size groups as the previous section. Investment requirements are presented on a per head capacity basis. Costs are itemized and identified for various size groups and the group showing least cost per pound of gain is identified.

The nature of the cattle feeding industry stresses cost minimization.

> The generally accepted objective of feedlot operators, as of other entrepreneurs, is to maximize profits. But in highly competitive industries, such as cattle feeding, where individual operators cannot significantly influence prices either of resources or of the product sold, this generally requires cost minimization. To the individual firm in a highly competitive environment, profit maximization is, in effect, equivalent to cost minimization achieved through operational efficiency. (11, p. 2)

This analysis assumes feeder animal costs to be the same for every operator. Feed will be treated as a variable cost.

Investment Costs

If cattle costs are assumed to be the same to all feedlots, cost savings must originate with fixed and variable costs. Fixed costs originate from investment in land, feeding pens, working pens, feed mill and storage facilities, watering equipment, feeding equipment,

office and scales. Feedlot operators were asked to give, item by item, the initial investment, age and expected remaining life of their facilities. In calculating total investment partial units of equipment were allowed if the equipment was used for nonfeedlot work part of the time. An example would be a feeder who used a tractor and loader one half for feedlot and one half for farm work. In this instance only 50 percent of the investment in the tractor and loader was charged to the feeding enterprise.

An inverse relationship exists between investment per head of capacity and capacity of the feedlot. As feedlot capacity increased the investment per head of capacity decreased. An investment of $99.82 per head of capacity was required for lots feeding 50 - 99 head, table 10. Investment costs are reduced consistently with each increase in feedlot size to a low of $40.73 for those lots with 2000 head and over capacity.

Fixed Costs

Costs were calculated on a pound of gain basis. Costs for all feedlots in a particular size group were totaled and this amount was divided by the total pounds gained by the size group.

Fixed costs arising from feedlot investment are depreciation, taxes, insurance and interest on investment. Depreciation was calculated item by item using the straight line method for total number of years the operator estimated equipment and facilities would be used. An average value for the feeding year was

Table 10. Relation of investment costs to capacity for cattle finishing feedlots, Utah, 1968

Feedlot Capacity	No. of feedlots	Total capacity	Total investment	Investment per head cap.
	Number	Head	Dollars	Dollars
50 - 99	7	450	44,920	99.82
100 - 199	13	1,710	160,320	93.75
200 - 299	14	2,995	202,488	67.61
300 - 499	11	3,970	216,826	54.62
500 - 999	20	12,450	647,282	51.99
1000 - 1999	15	17,700	813,315	45.95
2000 & over	7	22,100	900,044	40.73
Total	87	61,375	2,985,195	48.64

calculated by averaging beginning and ending inventories for the year. Interest on this average value or investment was computed at seven percent per year. Tax and insurance costs were calculated at one percent of present value of equipment or facilities. Significant economies of size were noted for these fixed costs. Fixed cost per pound of gain was 4.43 cents for lots feeding 50 - 99 head compared to .56 cents for lots feeding 2000 head and over, figure 2.

One slight deviation from the general downward slope of this curve for fixed costs should be noted. Observation in table 11 shows that as size increased from 500 - 999 head to 1000 - 1999 head

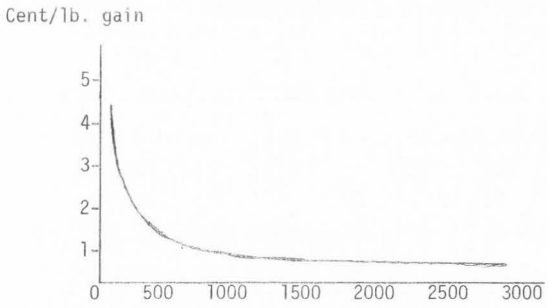

Figure 2. Fixed costs per pound of gain for yearling steers and heifers, Utah, 1968.

fixed costs also increased from 1.07 cents to 1.27 cents and then dropped to .56 cents for lots over 2000 head. This can be explained, in part, by the presence of two lots in the 1000 - 1999 head size group which had extremely high investments in facilities and could not be considered typical for the group. One lot had capacity for 6,000 head but fed only 1800 head in 1968. This, of course, increased fixed costs per pound of gain for this feedlot. Had this lot tripled the number fed, fixed costs per pound would have been reduced from 2.73 cents (for 1800 head) to .91 cents (5400 head). This assumes that the average gain per head on the additional 3600 head of cattle would have been equal to the 1800 actually fed. The importance of optimum use of feedlot capacity to minimize fixed costs is demonstrated here. The other lot was atypical because of a high investment in a feed mill originally used in a large turkey enterprise. This owner, no longer feeding turkeys, uses the mill for his cattle feeding enterprise, however it is

much larger than needed for the number of cattle fed. When these two lots were removed from this group, fixed cost per pound of gain for the group would fit the downward sloping cost curve. Cost savings do occur in Utah through increased efficiency of larger capacity feedlots.

Table 11. Fixed cost per pound of gain for feeding yearling steers and heifers, Utah, 1968

Item	Number of head fed						
	50-99	100-199	200-299	300-499	500-999	1000-1999	2000 & over
	Cents per pound						
Fixed costs							
Depreciation	2.40	.86	.75	.72	.54	.54	.22
Taxes, int., ins.	2.03	1.00	1.08	.72	.53	.72	.34
Total fixed costs	4.43	1.86	1.82	1.44	1.07	1.26	.56

Nonfeed Variable Costs

Economies of size are not restricted to fixed costs. They also extend to some variable costs. Variable costs are costs which vary with number of cattle fed. Nonfeed variable costs include: labor, utilities, fuel, veterinary, repair, death loss and interest on operating capital.

Labor

The major feedlot labor requirements are: management, feed preparation, feeding, receiving and shipping cattle, bedding,

checking and doctoring. Labor costs varied from 3.25 cents per pound of gain for smallest lots to .77 cents per pound of gain for the largest. Labor costs decreased consistently as feedlot capacity increased. These cost savings are the result of mechanization and specialization of workers. The survey indicated that feedlots with capacity of 200 head or more use self-unloading trucks or wagons. As capacity increased to 500 head or more labor cost per pound of gain had dropped to less than one cent. Labor for any size feedlot can be reduced by use of self-feeders, particularly if prepared feed is purchased.

Utilities, fuel and repair

Utilities, fuel and repair costs were calculated from information given by respondents. Utility, phone and electricity costs per pound of gain were higher for the smallest and largest size groups with the least cost sizes falling in between. Fuel costs did not follow any particular pattern. Repair costs, which are indirectly associated with investment, tended to follow the investment pattern of decreasing as feedlot capacity increased. Other or miscellaneous costs consisted primarily of water bills and were insignificant for all size groups.

Death loss

Average death loss for every size group exceeded 1.0 percent. Death loss varied from 1.9 percent for the smallest sizes to 1.1 percent for the largest feedlots. In every size group there was considerable variation in reported death loss with some feedlots

reporting as low as 0.5 percent and some as high as 3.0 or 4.0 percent. Percentage death loss for each size group was used in calculating death loss cost for that size group. Cost per pound of gain due to death loss decreased as feedlot capacity increased.

Interest on operating capital

Interest on operating capital was the highest nonfeed variable cost required to produce a pound of gain for all but the two smallest size groups. In these groups it was exceeded by a higher labor cost. Interest cost on operating capital varied little from one size group to another.

Significant economies of size are possible for nonfeed variable costs, table 12. As feedlot capacity increased from the smallest to the largest size group the percentage decrease in fixed costs is much greater than the percentage decrease for variable costs. However the real dollar savings are greater for variable costs.

Fixed and nonfeed variable costs per pound of gain added together are depcited by the average cost curve in figure 3. The most significant economies of size have been achieved at approximately 500 head of feeders. All costs savings are important, however nonfeed costs account for only 20 percent of total cost required to produce one pound of gain. This means that a 50 percent reduction in nonfeed costs is not equivalent to a 50 percent reduction in overall cost of production. As actual savings for nonfeed costs become smaller they simultaneously become less significant to overall costs of production.

Table 12. Nonfeed variable cost per pound of gain for feeding yearling steers and heifers, Utah, 1968

Item	Number of head fed						
	50-99	100-199	200-299	300-499	500-999	1000-1999	2000 & over
	Cents per pound of gain						
Variable costs							
Labor	3.25	2.21	1.30	1.17	.99	.99	.77
Utilities	.11	.08	.05	.08	.10	.11	.11
Fuel	.35	.09	.26	.37	.16	.20	.13
Veterinary	.29	.29	.17	.10	.15	.28	.20
Repair	.89	.35	.38	.26	.20	.25	.17
Other	.01	.01	.01	.01	.01	.01	.01
Death loss	.96	.96	.95	.67	.79	.60	.52
Int. & feed on cattle	1.42	1.41	1.40	1.40	1.44	1.40	1.39
Total nonfeed variable costs	7.28	5.40	4.52	4.06	3.84	3.85	3.30

Minimizing feed costs is extremely important to profitable cattle feeding since they constitute approximately 80 percent of total cost required to produce a pound of gain.

Feed Costs

Feed costs in this study are based on information given by the survey respondents. Operators were asked to provide information as to the amount of feed consumed and the price per unit for various

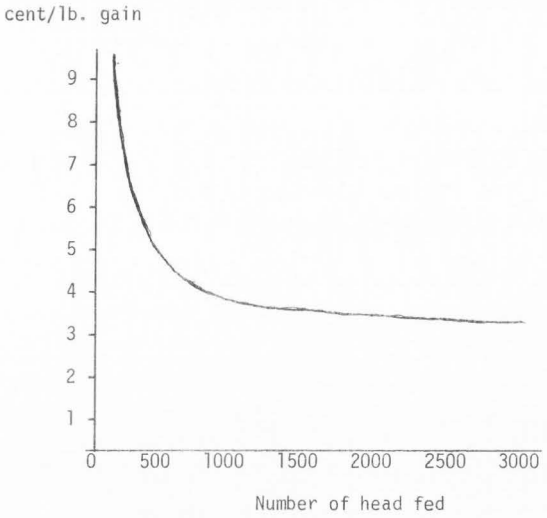

Figure 3. Fixed and nonfeed variable costs per pound of gain for yearling steers and heifers, Utah, 1968

feeds. If feed was produced by the feeder he was asked to value that feed at market price. All operators were asked to price feed according to local market prices during harvest time for a particular feed. Feed cost per pound of gain ranged from 17.01 cents for feedlots of 500 - 999 head capacity to 20.68 cents for lots with 50 - 99 head, table 13. Larger feedlots can often obtain lower prices as a result of quantity discounts. However, if because of its size a large feedlot must import, from other areas, large amounts of feed, all feedlots can experience external diseconomies of scale in the form of increased freight rates. Many smaller feeders who do not purchase feed in volume buy from other farmers

in their own area and in this way avoid freight charges. Good management seemed to be the key to keeping feed cost per pound of gain at a minimum in all size groups. This can be accomplished through shrewd buying practices and careful handling and development of superior rations.

Table 13. Feed costs per pound of gain for feeding yearling steers and heifers, Utah, 1968

Item	Number of head fed						
	50-99	100-199	200-299	300-499	500-999	1000-1999	2000 & over
	Cents per pound						
Feed costs	20.68	18.34	19.23	19.06	17.01	17.79	18.40

Total Cost Per Pound of Gain

Results of this study show that feedlots in the 500 - 999 head size group had the lowest total cost per pound of gain followed closely by the group feeding 2000 head or more. All size groups feeding less than 500 head per year had higher total costs than groups feeding over 500 head. These small feedlots had higher fixed costs, nonfeed variable costs and feed costs than lots feeding over 500 head, table 14. These data show definite cost savings are achieved by Utah cattle feeders through economies of size.

Table 14. Total cost per pound of gain for feeding yearling steers and heifers, Utah, 1968

Item	Number of head fed						
	50-99	100-199	200-299	300-499	500-999	1000-a 1999	2000 & over
	Cents per pound of gain						
Fixed costs							
Depreciation	2.40	.86	.75	.72	.54	.54	.22
Taxes, int., ins.	2.03	1.00	1.08	.72	.53	.72	.34
Total fixed costs	4.43	1.86	1.82	1.44	1.07	1.26	.56
Variable costs							
Labor	3.25	2.21	1.30	1.17	.99	.99	.77
Utilities	.11	.08	.05	.08	.12	.12	.11
Fuel	.35	.09	.26	.37	.16	.20	.13
Veterinary	.29	.29	.17	.10	.15	.28	.20
Repair	.89	.35	.38	.26	.20	.25	.17
Other	.01	.01	.01	.01	.01	.01	.01
Death loss	.96	.96	.95	.67	.79	.60	.52
Int. on feed & cattle	1.42	1.41	1.40	1.40	1.44	1.40	1.39
Tot. nonfeed var. costs	7.28	5.40	4.52	4.06	3.84	3.85	3.30
Feed costs	20.68	18.34	19.23	19.06	17.01	17.79	18.40
Tot. variable costs	27.96	23.74	23.75	23.12	20.85	21.64	21.70
Total costs/lb. gain	32.39	25.60	25.57	24.56	21.92	22.90	22.26

[a] These figures include the two atypical lots discussed on pages 29 - 33.

INTERSTATE ANALYSIS

The purpose of this section is to analyze and compare feeding costs, gross and net returns from cattle feeding in Arizona, California, Colorado, Idaho and Utah. The competitive position of Utah's cattle feeders was ascertained from this analysis and comparison. Information used in this cost analysis and comparison was taken from studies conducted in the respective states. Price information was obtained from terminal market reports within each state.

To facilitate analysis of feedlot costs two general size groups were considered. One group contained small capacity feedlots for each state and the other group larger capacity feedlots. Since size groupings in the different state studies were vastly different, a direct size comparison between states was not possible. The use of two different size groups helped identify economies of size. Cost analysis for both large and small capacity groups was divided into four areas: (a) fixed costs, (b) nonfeed variable costs, (c) feed costs, and (d) total costs.

Small Capacity Feedlots

Feedlots in the small capacity group in Colorado, Idaho and Utah include those feedlots with less than 500 head capacity. In Arizona and California, the small capacity group included feedlots under 4,000 head capacity. Cost comparison among states in this small group were possible between Colorado, Idaho and Utah and between

Arizona and California. Further direct comparisons among states was impossible because of extreme differences in feedlot sizes included in the group.

Fixed costs

Fixed costs were similar for all states except Colorado where they were noticeably lower. Fixed cost per pound of gain in Colorado was .86¢ while in Idaho and Utah it was 2.12¢ and 1.77¢ respectively, table 15. These data indicate that small farm feeders in Colorado have a significantly lower investment cost per head of capacity than small feeders in Idaho or Utah. This premise was substantiated by personal contacts with small Colorado feeders where the use of concrete appeared to be less prevalent than was observed in Utah or Idaho feedlots. Fixed cost per pound of gain in both Arizona and California was also near 2.00¢.

Nonfeed variable costs

There was little variation among states in nonfeed variable costs with a spread of only 1.46¢ per pound of gain between Utah's low figure of 4.50¢ per pound of gain and Idaho's high figure of 6.04¢ per pound of gain, table 15.

Labor was the largest nonfeed variable cost for smaller feedlots in all states. Utah had the lowest labor cost at 1.54¢ per pound of gain followed in order by Arizona, Colorado, California, and Idaho. There are two areas pertinent to labor costs, time required per unit of output and wage rate per unit of time.

Table 15. Total cost per pound of gain in small capacity feedlots for feeding yearling cattle, Arizona, California, Colorado, Idaho, and Utah, 1968

Item	Ariz. under 4,000	Calif. under 4,000	Colo. under 500	Idaho under 500	Utah under 500
			Cents per pound of gain		
Fixed costs:					
Depreciation	.96	1.08	.35	.93	.83
Taxes, ins., int.	.86	1.08	.51	1.19	.94
Total fixed costs	1.82	2.16	.86	2.12	1.77
Variable costs:					
Labor	1.73	2.15	1.89	2.32	1.54
Utilities	.22	.25	--	.15	.08
Fuel	.19	.23	--	.19	.20
Repair	.41	.52	.61	.43	.34
Veterinary	.31	.37	--	.10	.17
Other	.18	.12	.83	--	.01
Death loss	.49	.60	--[a]	1.33	.83
Int. on cattle & feed	1.45	1.58	1.92	1.52	1.41
Total nonfeed var. costs	4.98	5.82	5.25	6.04	4.58
Feed cost	17.44	18.64	19.22	19.14	18.72
Total variable costs	22.42	24.46	24.47	25.18	23.31
Total costs/lb. gain	24.24	26.63	25.33	27.29	25.09

[a] Death loss not included.

Utility costs are one of the less important nonfeed costs. They accounted for only four percent or less of the total nonfeed variable costs. Utah had the lowest utility cost followed by Idaho; Arizona and California had higher utility costs. Since small feedlots are much larger in Arizona and California it suggests the possibility

that utility costs may increase as feedlot size is increased from the very small capacity lots. The survey revealed that many small feedlots in Utah and Idaho do not use any electricity.

Fuel costs, like utilities, comprise only a small fraction of the total nonfeed variable costs. Fuel costs were nearly identical for all states.

Repair costs reflected some variation between the low in Utah at .34¢ per pound of gain and the high in Colorado at .61¢ per pound of gain. The Colorado figure includes fuel costs. Repair costs in Arizona and California were .41¢ and .52¢ per pound of gain respectively. If a fuel cost allowance of .20¢ per pound of gain is subtracted from the Colorado repair cost they become very close to the repair costs of the other states.

There was a rather wide variation in veterinary expense. It ranges from .10¢ per pound of gain in Idaho to .37¢ per pound of gain in California. Veterinary expense follows a pattern similar to that of utilities where the states with small capacity lots showed a significantly lower cost than states with large capacity feedlots. One reason for this could be that larger feedlots will more often have a set routine of vaccinations, dipping, spraying, dehorning, etc. for all animals than do smaller capacity feedlots.

Other expenses reflected extreme variation between .83¢ per pound of gain in Colorado and none reported in Idaho. One reason for this large spread is that different items are included in other costs for the various states. The Colorado study included

veterinary, utilities, selling costs, trucking and livestock taxes. It would be almost certain that veterinary and utility expenses constitute a major portion of other expense in Colorado. Other expense in Utah is negligible. In Arizona and California other expense included such things as, promotion, odor control, rental fees and water bills. Larger capacity lots in Arizona and California tended to show higher other costs, probably because they are more likely to be involved in such things as promotion and odor control where small feedlots normally would not be.

Cost per pound of gain due to death loss was highest in Idaho at 1.33¢ followed by Utah, California and Arizona respectively. There was an inverse relationship between veterinary expense and death loss costs. States with highest veterinary costs, Arizona and California, had lowest costs due to death loss.

Interest on operating capital is the second largest nonfeed variable costs. Interest cost in Arizona, California, Idaho and Utah centered closely around 1.50¢ per pound of gain, while Colorado had a somewhat higher cost at 1.92¢ per pound of gain.

Feed costs

Feed cost accounts for 75 to 80 percent of the total cost per pound of gain. Arizona had the lowest feed cost followed by California, Utah, Idaho and Colorado respectively. Feed cost was lower in the two states which have larger capacity feedlots in this size group. A possible reason could be lower prices due to larger quantities purchases. Another possibility could be better

feed conversion. It seems unlikely that feedlots in Arizona and California would enjoy any price advantage due to location since market reports indicate that these areas generally have higher feed prices than the intermountain states for feeds common to both areas.

Total cost per pound of gain

Total cost per pound of gain for small capacity feedlots was 24.24¢ in Arizona and 26.63¢ in California. Utah had the lowest cost of the three intermountain states at 25.09¢. Colorado's cost was lower than Idaho but the Colorado total does not include a death loss cost. A spread of three or four cents per pound of gain constitutes a considerable difference in the profitability of a feedlot. For example, for a lot feeding 500 head that gain an average of 400 pounds for the feeding period a difference of 3.00¢ per pound of gain means approximately $6,000 in net revenue. Total cost per pound of gain for the feedlots in the small capacity category were summarized by data in table 15.

Large Capacity Feedlots

As with the small size group there is a large variation in the range of capacities included in the large size group. The large capacity group includes feedlots over 500 head capacity in Idaho and Utah. The largest capacity feedlots interviewed in these states were 1,000 head in Idaho and 3,500 head in Utah. In Arizona and California the large group will include feedlots between 10,000 and 26,000 head capacity. Cost per pound of gain

in the Colorado study was presented as a total cost with no breakdown for specific items or cost areas. Because of this, Colorado data are discussed only in the total cost section.

Fixed cost

Fixed costs, depreciation, taxes, insurance, and interest were lower in Arizona than in California and lower in Utah than in Idaho, table 16. Analysis of fixed cost data indicates the possibility of economies of size as both states with larger capacity lots have lower fixed costs than the two states with smaller capacity lots. This premise is substantiated by comparing fixed cost data in tables 15 and 16. Fixed costs in all four states were considerably lower for the large capacity group than for the small capacity group. Total reduction in fixed costs for all four states was 60 percent in favor of large capacity lots.

Nonfeed variable costs

Labor is the second largest nonfeed variable cost in all four studies. This cost was .59¢ per pound of gain in Idaho and .92¢ in Utah. Arizona at 1.10¢ per pound of gain was slightly lower than California at 1.36¢. Idaho and Utah, the states with the smaller capacity lots, both had lower labor costs than the other two states. One probable reason for this would be lower wage rates in Idaho and Utah as compared with Arizona and California. The interstate comparison suggests possible diseconomies of size related to labor usage. However, an intrastate comparison of labor data (tables 15 and 16) indicates that definite economies

Table 16. Total cost per pound of gain in large capacity feedlots for feeding yearling cattle, Arizona, California, Colorado, Idaho and Utah, 1968

Item	Ariz. 10,000-26,000	Calif. 10,000-26,000	Colo. 800 - 26,000	Idaho 500 - 10,000	Utah 500 - 3,500
		Cents per pound of gain			
Fixed costs:					
Depreciation	.33	.37		.42	.40
Taxes, ins., int.	.34	.43		.52	.49
Total fixed costs	.67	.80		.94	.89
Variable costs:					
Labor	1.10	1.36		.59	.92
Utilities	.15	.17		.08	.11
Fuel	.10	.12		.19	.20
Repair	.27	.34		.14	.20
Veterinary	.24	.28		.18	.21
Other	.18	.08		.01	.01
Death loss	.49	.60		.55	.60
Int. on cattle & feed	1.41	1.58		1.52	1.40
Total nonfeed var. cost	3.94	4.53		3.26	3.65
Feed cost	17.44	18.64		17.99	18.03
Total costs/lb. gain	22.05	23.97	22.37	22.19	22.57

of size are possible for labor costs since labor cost in all four states is lower for the large capacity group than the small capacity group. Economies of size based on intrastate comparisons would seem more meaningful than those based on interstate comparisons where differences in data collection etc. between studies could enter in.

Utility costs show very little absolute variation between states. This variation is of little significance since utilities constitute only a small fraction of total nonfeed variable cost. Comparison of utility data suggests the possibility of economies of size. All states show significant percentage reductions in utility costs as size increases except Utah where this is little change.

Fuel cost was near .10¢ per pound of gain in Arizona and California and almost .20¢ in Idaho and Utah. It was lower in all states for larger capacity group than for smaller capacity group, again suggesting the possibility of economies of size. Fuel costs, like utilities, constitute a very small portion of the total nonfeed variable costs.

Repair costs show Idaho low at .14¢ per pound of gain followed by Utah at .20¢, Arizona at .27¢ and California at .34¢. The intrastate comparison (tables 15 and 16) again suggest definite possibilities for cost savings through economies of size. The four states all show significantly lower repair costs for larger capacity feedlots.

Veterinary costs show little variation between states and no definite pattern evolves on the intrastate comparison of large and small capacity groups.

Other costs, which included promotion, odor control, rental fees and water bills, were higher in Arizona and California than in the two intermountain states. The reason for this is that Idaho and Utah feedlots do not engage in these kinds of activities.

Cost per pound of gain attributed to death loss was lowest in

Arizona at .49¢ and highest in California and Utah at .60¢. This important item was nearly the same for all four states.

The largest nonfeed variable cost is interest on operating capital. This cost was higher in California, 1.58¢ per pound of gain, than Arizona at 1.41¢, and lower in Utah, 1.40¢ per pound of gain than Idaho, 1.53¢. Intrastate comparisons show little or no change as feedlot capacity is increased.

Further observation of data in table 16 shows that total nonfeed variable costs are lower in Idaho than Utah and lower in Arizona than California. The two states with the smaller capacity lots in this group have a slightly lower nonfeed variable cost than states with larger capacity lots. A low labor cost is the major factor which pushes nonfeed variable costs in Idaho and Utah lower than in Arizona and California. Comparison of data in tables 15 and 16 shows that for all states nonfeed variable costs are considerably lower for the large capacity group than the small capacity group. This evidence indicates that definite economies of size do occur for nonfeed variable costs.

Feed costs

Feed cost per pound of gain for large capacity feedlots was near 18.00¢ for all four states. Intrastate comparison of feed costs is not possible for Arizona and California since these studies used the same feed cost for all size groups. Comparison of feed data (tables 15 and 16) shows both Idaho and Utah with lower feed costs for large capacity feedlots, indicating again the possibility of achieving cost savings through economies of size.

Total costs

Total costs required to produce one pound of gain were 22.05¢ in Arizona, 23.97¢ in California, 22.37¢ in Colorado, 22.19¢ in Idaho, and 22.57¢ in Utah. Variation among the four states showing the lowest total cost was only .52¢ per pound of gain. Total cost in California was somewhat higher than the other four states. These data indicate that feedlots in Utah's large capacity group can be competitive on a cost basis. A comparison of total cost data in table 16 with data in table 15 shows that significant cost savings are achieved in every state through economies of size. Without exception total cost per pound of gain is reduced as capacity of the feedlot is increased. Those feedlots under 500 head of capacity show especially high gain costs.

Total Revenue

Total revenue is dependent on two factors: selling price per unit and quantity sold.

Prices

Data used to establish prices were taken from secondary sources. The U.S. Department of Agricultures Market News, Livestock Division, published feeder and slaughter cattle prices each week from the major terminal markets in each state. Using data from this publication makes it possible to follow prices established in the market over a period of time. A 1968 price for each state was calculated by recording prices reported in the fourth week of each month and

averaging for the year. This procedure was followed for slaughter steers, table 17, and slaughter heifers. The highest average slaughter steer price for 1968 was in Colorado at $27.28 per hundred pounds and the lowest average price was in Utah at $26.59 per hundred pounds. Fluctuations within each state during the year were much greater than variation among states. Slaughter heifer prices ranged from $26.50 per hundred pounds in Colorado to $25.41 per hundred pounds in Idaho. The difference of $1.09 reflects a greater variation in heifer prices than steer prices.

Table 17. Choice slaughter steer prices at selected western terminal markets, monthly, 1968

	Arizona	California	Colorado	Idaho	Utah
			Dollars per cwt.		
January	26.25	26.37	26.05	25.37	25.63
February	27.00	27.12	26.50	26.00	25.75
March	26.50	27.25	26.33	26.75	26.00
April	27.00	27.25	26.38	25.50	26.50
May	27.37	27.62	26.50	26.87	26.88
June	28.25	28.00	26.80	27.50	27.50
July	28.50	28.00	28.18	27.50	27.50
August	27.37	27.12	28.13	26.75	27.25
September	26.50	26.25	27.67	26.50	26.50
October	26.25	25.87	27.70	25.82	25.88
November	27.37	27.50	28.50	25.82	26.88
December	27.50	27.75	28.50	27.25	27.25
Average	27.16	27.18	27.28	26.65	26.60

Selling weight

Selling weight is needed to complete the calcualtion of total revenue. From data provided in each state study it was possible to

calculate an average selling weight for slaughter cattle in each state. Column one, table 18, shows average selling weight of slaughter cattle for each state as calculated from the separate studies. Cattle were slaughtered at lighter weights in Idaho and Arizona and heavier weights in Colorado and Utah. Column two, table 18, gives average slaughter steer prices for 1968. These prices multiplied by the weights gives an average total revenue, per unit, for each state (column three, table 18). These figures represent only state averages as reflected by available data. It must be recognized that individual feedlot selling practices and prices received within each state would vary rather widely around these averages.

Table 18. Average slaughter cattle weight, slaughter price and gross return, Arizona, California, Colorado, Idaho and Utah, 1968

State	Ave. slaughter weight	Slaughter steer price/cwt.	Total Revenue
	Pounds	Dollars	Dollars
Colorado	1,048	27.28	285.90
California	1,033	27.18	280.77
Arizona	1,025	27.16	278.39
Idaho	1,000	26.65	266.50
Utah	1,043	26.59	277.33

Net Returns

Net return is the residual after total costs have been subtracted from total revenue. The calculation of net returns will be illustrated using the average costs and prices for each state during 1968. Total costs are calculated by adding purchase cost of feeder animals to total gain costs.

Feeder cattle prices, column 2, table 19, were derived in the same way as slaughter cattle prices. Feeder prices were highest in Colorado followed by California, Arizona, Idaho and Utah respectively. Comparison of data in tables 18 and 19 shows that feeder and slaughter cattle price relationships among states follow the same pattern. While Utah feeders received less for fat cattle they also paid less for feeder cattle. As with slaughter prices there is greater variation within each state during the year than among states. The feeder weights were averages calculated in each state study. The price multiplied by the weight gives an average feeder animal cost for each state, table 19.

Table 19. Average feeder cattle weights, feeder prices and total feeder cost, Arizona, California, Colorado, Idaho and Utah, 1968

State	Ave. feeder weight	Ave. feeder price/cwt.	Total feeder cost
	Pounds	Dollars	Dollars
Arizona	600	26.09	156.54
California	681	26.22	178.56
Colorado	666	26.30	175.16
Idaho	630	25.98	163.67
Utah	615	25.86	159.04

Total cost of gain is derived from data in Table 20. Column one, pounds gained, was calculated by subtracting average feeder weight from average slaughter weight. Cost per pound of gain, used in column two, is the gain cost for large capacity feedlots in each state.

Average net margin is calculated in table 21 by totaling average feeder costs and average gain costs and subtracting these from average total revenue in each state. Based on data used in this study, Arizona had the highest average net return per animal fed, Colorado, Utah, Idaho and California followed in order. The difference between the high and the low net return per unit fed was $10.34.

Table 20. Average pounds gained and cost of gain for cattle in finishing feedlots, Arizona, California, Colorado, Idaho and Utah, 1968

State	Average pounds gained	Cost/pound gain	Total gain cost
	Pounds	Cents	Dollars
Arizona	425	22.05	93.71
California	325	23.98	84.41
Colorado	382	22.87	85.45
Idaho	370	22.20	82.14
Utah	428	22.55	96.51

All factors must work together to achieve success in cattle finishing. High prices alone will not insure profits if feeding costs are too high and low feeding costs will not insure success if prices for slaughter cattle are extremely low.

Data presented in table 21 may indicate a small advantage or disadvantage for one state compared to another. However, it should again be noted that these calculations only reflect state averages and that individual feedlot practices would vary rather widely around these averages. The net margin as depicted here seems close enough that no one cattle feeder in any state should feel his feeding enterprise cannot succeed. Shrewd feedlot management within any state will improve on average performances reflected by various state studies.

Table 21. Average feeder cattle cost, gain cost, total cost, total revenue and net margin per unit, Arizona, California, Colorado, Idaho and Utah, 1968

State	Feeder cost	Gain cost	Total cost	Total revenue	Net margin
			Dollars		
Arizona	156.54	93.71	250.25	278.39	28.14
California	178.56	84.41	262.97	280.77	17.80
Colorado	175.16	85.45	260.61	285.90	25.29
Idaho	163.67	82.14	245.81	266.50	20.69
Utah	159.04	96.51	255.55	277.33	21.78

SUMMARY AND CONCLUSIONS

Utah's cattle feeding industry is primarily centered in six counties along the Wasatch Front and in three counties in central Utah. These same nine counties produce the bulk of the state's feed grain and over one-half of the roughage.

The cattle feeding industry in Utah is characterized by small farm feedlots. The largest number of cattle fattened by one feedlot in Utah during 1968 was 10,000 head. Contrast this to Arizona, California, Colorado and Idaho, where the largest lots range from 26,000 to 100,000 head.

Seventy percent of the cattle feeders surveyed have fed cattle 20 years or more, while only four percent have started feeding in the past five years. The number of operators feeding cattle and numbers of cattle fed have both declined in Utah during the past few years. This decline has coincided with a period of rapid expansion in other western states.

The trend toward large specialized feedlots within the cattle feeding industry has reduced feeding margins and made the industry extremely competitive. Utah cattle feeders must face this competition from feeders in other states. They must also compete with other industries within the state for a limited feed supply.

Analysis of data collected in the survey offers evidence that the very small feedlots (under 500 head) are economically

inefficient. Very high overhead and labor costs make it impossible for these small lots to produce gain at costs as low as larger feedlots. These results are in agreement with similar studies in other states.

Further analysis of a sample of Utah's feeding data shows feedlots in the largest size group (over 2,000 head) have lower fixed and nonfeed variable costs than any of the smaller size groups. This is added evidence that economies of size do exist in the feeding industry.

Feed costs were lowest for feedlots in the 500 - 999 head size group. The variation between this group and the two larger size groups was just over 1¢ per pound of gain.

In the Utah survey the 500 - 999 head size group had the lowest total cost per pound of gain at 21.92¢ followed closely by the largest size group (over 2,000 head) with 22.26¢ per pound of gain.

Interstate analysis pointed out that very large feedlots do not exist in Utah. It further emphasized what are "large" feedlots in Utah comprise a very small percent of the total number of feedlots in the state. Comparison of costs per pound of gain achieved by the larger feedlots in the various states show the following: (a) Arizona, 22.05¢, (b) Idaho, 22.19¢, (c) Colorado, 22.37¢, (d) Utah, 22.55¢, (e) California, 23.98¢. Variation among the four states showing the lowest cost is only one-half cent per pound of gain. Since these figures represent averages we can assume there are feedlots in each state which will improve on these average figures.

These data would indicate that Utah's larger more efficient feedlots can compete on a cost of gain basis with feedlots in these other states.

A study of prices in the respective states indicates that prices in Utah were lower for both feeder and slaughter cattle. Most of the risk in cattle feeding evolves around cattle prices and the price fluctuations can literally "make or break" the cattle feeder. By keeping the feedlot full the year around an operator can hedge against price uncertainty.

A net margin per animal fed was calculated for each state. Average feeder and slaughter cattle prices were combined with the gain costs of feedlots in the large size group in each state. This net margin was highest in Arizona ($28.14) and lowest in California ($17.80). Utah ($21.78) was in the middle of the five states. It should be noted that 1968 cattle prices were very favorable for cattle feeders and it would be unwise to assume every year would show a net margin this large. This net margin figure indicates that Utah's larger more efficient feedlots can compete with the feedlots in other states.

Expansion of Utah's feeding industry will depend primarily on the following four factors: (a) availability of capital to increase both size and number of large feedlots, (b) availability of skilled management, (c) feed supply--to expand significantly the industry will have to bid feed away from present use, and (d) cattle supply--there is a net export of cattle from the state; however, if these cattle are to be fed they must be bid away from present buyers.

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