AN ABSTRACT OF THE THESIS OF

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in Agricultural Economics (Major) presented on April 8, 1970 (Date)

Title: A STUDY OF THE FEASIBILITY OF ESTABLISHING A BEEF PACKING PLANT IN CENTRAL OREGON

Abstract approved: James G. Youde

Cattle producers and economic planners in Central Oregon believe that the establishment of a beef packing plant in that area would contribute substantially to the economic growth of the area and aid in the development of the Central Oregon cattle feeding industry. This study was designed to develop information which would substantiate or disprove this belief. The analysis examined three principal subjects: 1) the supply of slaughter cattle in Central Oregon, 2) the marketability of the product of a proposed beef packing plant in Central Oregon and 3) estimate of the costs and returns which could be obtained by a beef packing plant in Central Oregon.

The results derived show that a sufficient number of slaughter cattle were marketed within the procurable distances of a prospective Central Oregon beef packing plant in 1968 to enable

it to slaughter from 25,000 to 50,000 carcasses per year. Feeder and stocker cattle numbers, cow herd numbers, and feed production figures indicate that resources are available with which to increase the cattle feeding industry in Central Oregon.

Several firms involved in processing, wholesaling and retailing of beef in relevant markets indicated an interest in procuring carcass beef or primal cuts of beef from a Central Oregon plant. Economic barriers to entry and competition from existing firms do not appear formidable enough to significantly hamper the operation of a plant in Central Oregon.

The cost and return analyses show that, given average prices and operation of the plant at or near capacity, a beef packing plant in Central Oregon can be profitable and yield a sufficient return. A beef packing plant could also have a significant and favorable economic impact on the economy of the area and would not cause significant further pollution of the region's natural resources.

A Study of the Feasibility of Establishing a Beef Packing Plant in Central Oregon

by

Gerald Walden Huettig

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

Master of Science

June 1970

APPROVED:

Professor of Agricultural Economics
in charge of major

Head of Department of Agricultural Economics

Dean of Graduate School

Date thesis is presented April 8, 1970

Typed by Velda D. Mullins for Gerald Walden Huettig

ACKNOWLEDGMENTS

A special word of appreciation is expressed to the following individuals and organization:

Dr. James G. Youde whose wise and timely counsel and assistance made this project an interesting and challenging experience.

The Jefferson County Livestock Association whose request for the study and financial contributions gave the project a purpose and a means of attaining that purpose.

Mr. Paul Grimshaw who provided important information and advice which expedited part of my research.

Dr. Grant E. Blanch who gave me assistance in gaining admission to the University and who guided and counseled me during the early part of my graduate work.

My wife, Ruth, for her loving advice and encouragement throughout the months of graduate work.

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A STUDY OF THE FEASIBILITY OF ESTABLISHING A BEEF PACKING PLANT IN CENTRAL OREGON

I. INTRODUCTION

The meat packing industry has been in the process of locational adjustment for many years. In the past, the majority of the livestock slaughter occurred in plants located near large centers of population. During the past 30 years, however, the industry has been shifting from the urban areas toward the livestock production centers. This shift has developed from pressures which:

> . . . include: (1) continued shifts in the location of livestock production, (2) changes in location of the human population and in characteristics and buying habits of the consuming public, and (3) continued improvements in transportation, in-transit refrigeration, and communication (Williams and Stout, 1964, p. 84).

It appears that the State of Oregon is currently lagging behind other major livestock producing and slaughtering areas of the United States in this adjustment process. A high percentage of Oregon slaughter is accomplished in plants located near Portland. Thus, a high percentage of the cattle currently slaughtered in Oregon must be transported live 100 miles or more from where they are produced and first marketed.

This apparent adjustment lag in the location of livestock

slaughtering facilities in Oregon is explained by the persistence of the same impediments which have hindered adjustment in other areas. These are identified by Williams and Stout (1964) as transportation rates which have favored interstate shipment of live cattle, prejudices and preferences of local retailers, and limitations on capital resources. In addition, the lag in Oregon can be attributed to the lack of the development of large centers of slaughter cattle production which would attract a large meat packing firm.

Nevertheless, the growth in the beef feedlot industry in various parts of Oregon during the past few years, along with improved methods of transporting fresh meat, has been significant enough to make it apparent that considerable cost savings could result from locating beef slaughtering facilities in the areas of fed cattle production.

The Problem

Cattle producers and economic planners in Central Oregon hold a strong opinion that the establishment of a beef packing plant in that area is desirable, if not necessary, for the growth of the cattle industry as well as the general growth of the economy. However, since they are aware that a great deal of risk and uncertainty are involved in establishing a new firm in the meat

packing industry, they feel that an economic feasibility study is necessary to determine whether or not such a venture can be successful. With this information, it may be possible and desirable to attract an existing meat packing firm into the area which would have established market patterns and managerial competence with which to avoid much of the risk and uncertainty.

If an existing firm could not be attracted, another alternative would be to organize an independent meat packing firm. This would require the drawing of the necessary capital and management either from resources in the local area or from resources of interested individuals or firms in other areas. Regardless of which course of action is attempted, the requisite interest can be stimulated only if the establishment can be shown to be a sound and profitable investment. This requires a study of the supply of slaughter cattle, the demand for fresh beef and by-products of the slaughter operation, and a cost and return analysis of a prospective beef packing plant. An analysis of this problem is the subject of this thesis.

Purposes and Objectives

The decision to invest in a beef packing plant in Central Oregon and the decision as to the size of plant to build and operate will be made in view of the estimated number of cattle the packing

plant could procure, the marketability of the product, and the profits which could be expected from the operation. This study examines these factors as they exist at the present time. The primary objectives are to determine:

1. The supply and trend in supply of slaughter cattle which could be available to a beef packing plant in Central Oregon, and the market patterns and competition which exist for this type of cattle. Also, the ability of the area to sustain the production of slaughter cattle by an examination of trends in production of feeder and stocker cattle, the size of the cow herds, and the production of feed.

2. The marketability of the product by determining a) the production and consumption of beef in the Pacific states, b) the competition existing in the beef market, c) the market structure, and d) prospective market outlets for the products.

3. The potential profitability of a beef packing plant operating in Central Oregon by developing cost and return analyses for synthesized plants of various sizes which utilize two different types of kill floor technology.

The study proceeded in a series of steps. Basically, they included (1) sampling cattle feedlot owners and operators in a three-county Central Oregon area, (2) collecting data on supply of slaughter cattle and marketing patterns of nonfed slaughter cattle, (3) interviewing management personnel of 14 existing meat packing firms in Oregon, Washington, Idaho, and California, (4) interviewing meat buyers for four large retail firms and one purveying firm in Oregon which market large quantities of beef,

and (5) synthesis of model plants and estimation of costs, returns and investments of the model plants.

Chapter II examines the supply of fed and nonfed slaughter cattle available to a Central Oregon packing plant and their market patterns and production trends. It also examines the ability of the Central Oregon area to sustain a cattle feeding enterprise by determining the supply of stocker and feeder cattle produced, the number of beef cows present, and the amount of feed available in that area. Considerations based on estimates given by management personnel of national packing companies are also examined, followed by estimation of hypothetical procurement patterns for model plants synthesized in Chapter IV. A brief discussion on the supply of lambs ends the chapter.

Chapter III explores the marketability of the product. This is done by determining the consumption of beef in the Pacific states and comparing it with actual slaughter and marketings. Then an analysis of the market structure of the beef industry is made, followed by an analysis of barriers to market entry and the competition which exists in the relevant market. Then the possibilities of the prospective plant marketing its product to various firms in the market are explored. An analysis of the marketability of the by-products is then made, followed by an estimate of hypothetical market patterns for model plants

synthesized in Chapter IV. The chapter ends with a brief discussion of the market potential for lamb.

In Chapter IV four model plants are synthesized to determine the estimated costs and returns which could result from the operation of a beef packing operation in Central Oregon. This is done by first determining the cost of building the plants and facilities for units of four sizes, utilizing two types of kill floor technology. Then the costs of operation are estimated by determining the physical requirements from a previous study and applying current cost rates to them. The items included are costs of labor, utilities, investment, transportation, slaughter cattle, taxes, and miscellaneous items. Then the returns from the products are estimated, followed by a statement of operations which shows the estimated net returns, average total costs, returns on sales, and returns on investment. This is followed by a brief analysis of the effects the plant would have on the economy of the area and an estimate of the possible benefits that would be obtained by the cattle producers in the area.

Chapter V gives a brief summary of the information which is followed by recommendations which result from the analysis.

Hopefully, the results are realistic and provide the necessary information upon which sound decisions can be made.

II. SUPPLY OF CATTLE

Introduction to Chapter II

Chapter II discusses the various aspects related to the supply of cattle to a meat packing plant located in Central Oregon. The first section covers the number of cattle that have been fed in feedlots, as well as the steers and heifers fed on pasture and marketed as "grass fat" cattle. The changes associated with the yearly marketings of fed cattle are also discussed. The figures are derived from the Central Oregon counties considered to be the relevant procurement area for fed cattle for a meat packing plant located in Central Oregon. These counties are Gilliam, Sherman, Wasco, Crook, Deschutes, Grant, Jefferson, and Wheeler. They will henceforth be designated as the Relevant Procurement Area, or RPA.

The next section covers the number of nonfed cattle marketed for slaughter and the yearly changes in the marketing of those cattle. The geographical area from which these cattle could be procured will be considered to be the same as the RPA for fed cattle, although nonfed cattle from some other counties will be considered in a later section.

The next section treats the marketing patterns of fed

slaughter cattle, followed by a section which discusses the marketing patterns of nonfed slaughter cattle. Following this is a section which gives a discussion of the number of stocker and feeder cattle produced in the RPA and also five additional counties which are Klamath, Lake, Harney, Morrow, and Malheur. These counties are designated the Central Oregon Perimeter Counties, or COPC. This section also includes a discussion of the yearly changes in production of stocker and feeder cattle and the marketing patterns of those cattle.

The next section covers the number of cows on farms, both beef and dairy, and discusses the trends associated with these two types of cattle in the RPA and COPC.

The potential of the RPA as a slaughter cattle producing area is examined in the next section followed by a discussion of the relative importance of Oregon and the Pacific Northwest as a cattle feeding area.

Then, other considerations concerning the supply of slaughter cattle are discussed followed by cattle procurement estimates. Finally, a brief description of the supply of sheep and lambs is given.

Production of Fed Cattle

To fully understand what is meant by the term "fed cattle", an explanation will be given here. For the purposes of this report, fed cattle are considered to be those cattle placed on feed in feedlots and fed to finishing weights ranging from 950 pounds to around 1, 100 pounds. Also included in this category are the steers and heifers fed on pasture until they have reached the "grass fat" stage, and sold for slaughter at approximately the same weight as the cattle fed in feedlots. The data used in this report do not give a specific breakdown as to how many of the fed cattle are fed in feedlots and how many are grass fed cattle, however, it is estimated that approximately 75% of the fed cattle produced in 1968 were finished in feedlots.

To establish the geographical procurement area for fed cattle, the opinions of management representatives of major national meat packing firms were obtained. One considered a 75-mile radius to be relevant procurement area. The other considered a 120-mile radius to be the relevant procurement area.

If the Culver Junction on U. S. Highway 97 is considered to be the center point of Central Oregon near which a meat packing plant would be located, the eight counties--Gilliam, Sherman, Crook, Wasco, Deschutes, Grant, Jefferson, and Wheeler--all

are well within a 120-mile radius. If a 75-mile radius is considered, the northern one-fourth of Sherman county would be excluded, as would more than one-half of Gilliam county, a small part of Wheeler county and a small part of Crook county. However, since the data used are reported on a county basis, and since all of the eight counties listed above fall within a 100-mile radius of the center point, the entire eight counties will be considered as the relevant procurement area.

Data concerning cattle marketing in the relevant area has been obtained for the years 1963 to 1968 from the Statistical Reporting Service of the United States Department of Agriculture. These figures are shown in Table 1. As can be seen in this table, 42, 900 fed cattle were marketed in 1963. The number of fed cattle marketed increased during the next two years, reaching a peak of 59, 250 in 1965, after 10. 7% and 24. 5% increases in 1964 and 1965, respectively. From 1965 to 1968, however, the number of fed cattle produced in the relevant area declined each year. Decreases of 1. 3%, 5. 0% and 3. 2% are shown for the years 1966, 1967, and 1968, respectively, and the number of fed cattle marketed in 1968 was 53, 800.

To develop an idea of the plans for expansion of cattle feeding operations in the relevant procurement area, a sample of cattle feeders were asked to indicate their plans for expansion of their

Table 1. Slaughter Cattle Produced, Eight Central Oregon Counties, 1963-1968.

	1963	1964	1965	1966	1967	1968
Fed cattle						
Steers	25,150	26,625	33,150	36,400	30,150	35,400
Heifers	17,750	20,950	26,100	22,100	25,400	18,400
Total fed cattle	42,900	47,575	59,250	58,500	55,550	53,800
Percent change		10.70	24.50	-1.30	-5.00	-3.20
Nonfed cattle						
Cull beef cows	22,650	23,600	22,700	24,500	23,800	22,300
Other cull cattle	4,175	3,465	3,710	3,610	3,130	3,196
Total nonfed cattle	28,825	27,065	26,410	28,110	26,930	25,495
Percent change		-0.09	-2.40	6.40	-4.20	-5.30
Total slaughter cattle	69,725	74,640	85,660	86,610	82,480	79,295
Percent change		7.00	14.80	1.10	-4.80	-3.80

Source: Ganger, R. G. 1969. Specialist in County Statistics, U.S. Dept. of Agriculture, Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

feeding facilities on a questionnaire administered in March, 1969. The results of this questionaire indicate plans for expansion of about 67.2% over the 1968 capacity. This estimate seems extremely high in light of past changes and it is conceded that this estimate may have been derived through misinterpretation of the answers to the questions.

In the opinion of the operator of one of the larger cattle feeding operations in the area, the cattle feeding could be expanded by about 30% in the area without requiring the use of large amounts of wheat or feed grains other than barley. If a 30% increase occurred over the five-year period from 1968 to 1973, 69,940 fed cattle would be produced in 1973.

Supply of Nonfed Slaughter Cattle

Nonfed slaughter cattle are defined as the cows and bulls culled from beef herds and cows culled from dairy herds and sold as slaughter animals. The relevant procurement area for nonfed slaughter cattle is considered to be the same eight counties as the relevant procurement area for fed cattle.

Figures showing the number of nonfed cattle produced in the relevant procurement area from 1963 to 1968 are included in Table 1. These figures show that 26,825 cows and bulls were culled from herds and sold as slaughter animals in 1963. The

number of nonfed slaughter animals increased by .09% in 1964, declined by 2.4% in 1965, then increased by 6.4% to a peak of 28,110 animals in 1966. But in 1967, the number decreased by 4.2% and by 5.3% in 1968 when 25,495 nonfed slaughter animals were produced. This is the lowest number of nonfed slaughter animals for the six-year period.

Marketing Patterns of Fed Slaughter Cattle

During the months of March, April, and May, 1969, a survey was administered to the operators of cattle feedlots in three Central Oregon counties. The three counties were Crook, Deschutes, and Jefferson. An attempt was made to obtain information from the operators of each of the cattle feedlots in these three counties. The information sought was the size of the operation in terms of the number of cattle fed per year and the number that could be fed at one time, the number fed during the years 1967 to the present, the number of cattle placed on feed by month in 1968, the number of cattle the operator planned to feed in 1970, cattle ownership arrangements, and information about the selling patterns of slaughter cattle in 1968. Also, questions were asked concerning the operator's plans for expansion, limitations imposed upon him and his attitude toward the establishment of a packing plant in Central Oregon.

Approximately 35 questionnaires were administered in this survey. The person administering the survey took the questionnaire personally to the operator of the feedlot. A few of the operators were able to complete the questionnaire immediately so that the administrator of the survey was able to leave the farm with the completed questionnaire. Many of the operators, however, did not have the necessary information, or for other reasons did not complete the questionnaire immediately. So the administrator left the questionnaire with the operator and asked the operator to mail the questionnaire to the appropriate address when the questionnaire was completed.

A total of 14 questionnaires were returned with varying degrees of completeness. Of the 14, eight contained usable information about the selling patterns of fed slaughter cattle in 1968.

It is not known why the nonrespondents failed to complete the questionaire and return it as requested. But the fact that all the operators of feedlots in the three counties were contacted and given a questionnaire to fill out makes it reasonable to assume that all the feedlot operators in the three counties had an equal opportunity to be in the sample. Furthermore, the variations in the number of cattle marketed by each feedlot indicate that a sample was obtained that is reasonably representative of all the feedlots in the three counties. Recent figures indicate that as of November 26, 1968,

there were 15 feedlots in the three counties with a capacity to feed more than 500 head at any given feeding period. At the same time, there were 46 feedlots with a capacity to feed less than 500 head at any given time (Nicholson, 1969). The survey results show that four of the feedlots marketed less than 500 cattle in 1968, which indicates that these feedlots probably fall into the less than 500 capacity category. Also, another feedlot marketed slightly more than 600 head in 1968 but the months in which the cattle were marketed indicate that not more than 500 were in the feedlot at any one time, so it seems likely that it has less than 500 head capacity. Thus, it appears that 37.5% of the feedlots represented in the sample were large feedlots (greater than 500 head capacity) while five-eighths or 62.5% were small (less than 500 head capacity). This compares with 24.5% large and 75.5% small for the total feedlots in the three counties. It is conceded that these may be rather large differences for some purposes. However, because all the feedlot operators in the three counties were given an opportunity to be in the sample and because the data collected appears to be reasonably representative of all the feedlots in the area, it is reasonable to assume that the information collected can be considered a simple random sample of unequal clusters, each feedlot being a cluster (Seely, 1969, Cochran, 1963, Kish, 1965). It should be pointed out, however, that the results may be slightly

biased because of the proportionately heavier sampling of large feedlots.

In developing the monthly marketing patterns for fed cattle from Crook, Deschutes, and Jefferson counties for 1968, the number marketed each month is considered as a proportion of the total marketed in 1968 as determined from the information on the questionnaires. The estimation of the variance for these proportions developed from cluster sampling is given, according to Cochran (1963, p. 65), by:

$$v(p) = \frac{1 - f}{n\bar{m}^2} \quad \frac{\Sigma a_i^2 - 2p\Sigma a_i m_i + p^2 \Sigma m_i^2}{n - 1}$$

where:

$f = \frac{n}{N}$, n = the number of feedlots in the sample

N = the total number of feedlots in the three counties

m_i = the number of cattle in the ith feedlot

a_i = the number of cattle in the ith feedlot which were in the cth month.

p_c = the proportion of cattle marketed in the cth month

$\bar{m}$ = the average number of cattle per feedlot = $\frac{\Sigma m_i}{n}$

The standard errors of the estimated proportions are the square roots of the estimated variances (Kish, 1965). By taking the standard errors times the appropriate Student t, and adding and subtracting the result to and from the proportion estimate, a

confidence interval for the estimate is determined. In this case t is used at the 95% probability level, thus confidence intervals are determined into which we can say that the true proportion will fall with 95% confidence.

The results of using this procedure are summarized in Table 2. From this table and from the graph in Figure 1, it can be seen that during the period from February to June, relatively low rates of marketing occurred, while with the exception of November, relatively high rates of marketing occurred during the remainder of the year.

The figures in Table 1 show that the total number of fed cattle marketed from the three counties in 1968 were 44, 000 head. Applying the estimated monthly proportions of cattle marketed to the total figure gives the estimated total number of fed cattle marketed per month from the three counties. The results are as follows:

January	3, 996	May	2, 188	September	5, 135
February	3, 352	June	2, 680	October	3, 863
March	3, 418	July	3, 724	November	2, 916
April	2, 996	August	4, 627	December	5, 105

The same procedure was used to determine estimates of the number of fed cattle which were marketed and sent to various destinations. The variance of the proportions is calculated by the

Table 2. Marketing Patterns of Fed Cattle Produced in Central Oregon, 1968.

Monthly marketings	Number	Percent	S. E.
January	2,334	9.0828	0.0048
February	1,958	7.6196	0.0082
March	1,996	7.7674	0.0081
April	1,750	6.8101	0.0086
May	1,278	4.9733	0.0145
June	1,565	6.0902	0.0069
July	2,175	8.4640	0.0041
August	2,702	10.5148	0.0056
September	2,999	11.6706	0.0082
October	2,256	8.7792	0.0169
November	1,703	6.6272	0.0054
December	2,981	11.6006	0.0097
Total	25,697	100.0000	
Destination of cattle marketed			
North Willamette Valley	14,955	58.197	9.107
South Willamette Valley	945	3.677	1.353
California	3,812	14.834	2.833
Southwestern Oregon	5,038	10.605	5.999
Washington	342	1.331	0.406
Total	25,697	100.000	

SOURCE: Answers to questionnaire given by eight operators of cattle feedlots in Central Oregon.

same formula used to calculate the variance of the proportions of cattle marketed each month except that here, p_c is the proportion of cattle marketed to the cth destination and a_{ci} is the number of cattle in the ith feedlot which were marketed to the cth destination.

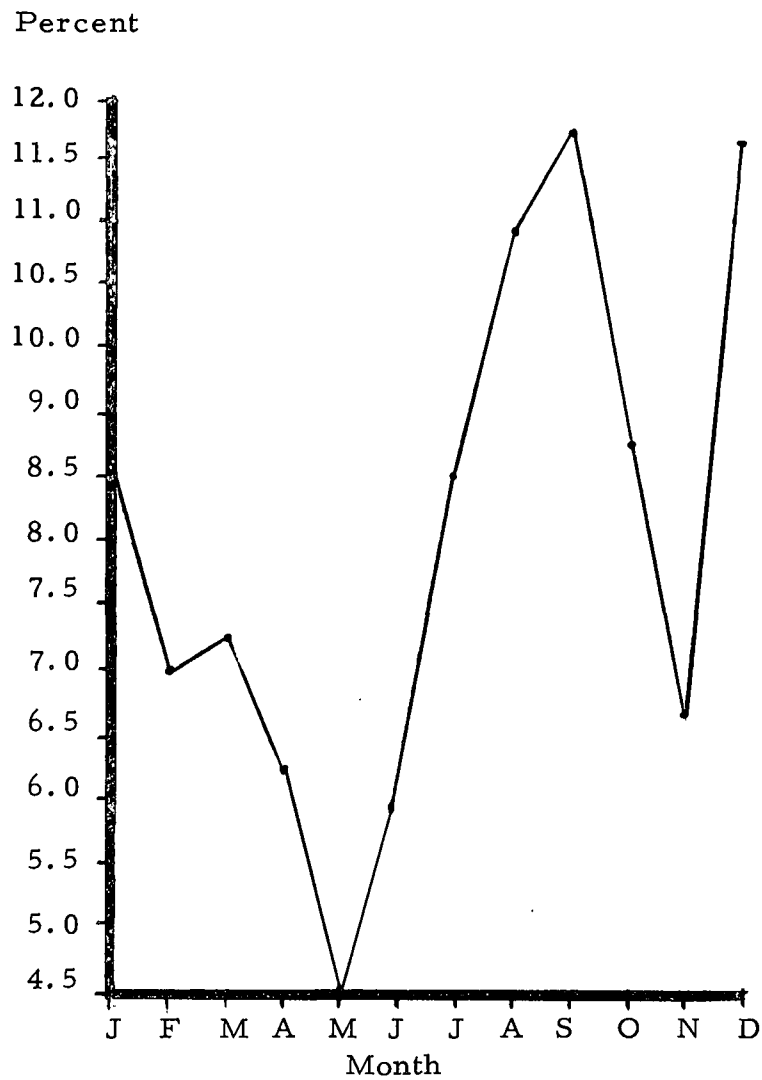

Figure 1. Monthly marketings of fed cattle.

SOURCE: Answers to questionnaire administered to eight operators of cattle feedlots in Central Oregon.

The results of this procedure are summarized also in Table 2. As this table indicates, a majority of the cattle marketed went to packing plants in the northern Willamette Valley, a large proportion went to southwestern Oregon, another large proportion to plants in northern California, and small proportions went to plants in the southern Willamette Valley, Washington, and local plants in Central Oregon. Applying the percentages listed in Table 2 to the total number of fed cattle marketed in the three counties derives the following information:

Northern Willamette Valley	25,607
Southern Willamette Valley	1,618
California	6,527
Southwestern Oregon	8,626
Washington	586
Local	1,036

Data has also been obtained from the Oregon Cattle Movement Project conducted by the Agricultural Development Division of the Oregon State Department of Agriculture (Ross, 1969). Some of the data from this study has been compiled and is shown in Table 3. This table shows the number of cattle which moved under brand inspections for the purpose of slaughter which originated in District 5. Figure 2 shows the geographical separation of the counties of the state into the five districts used in the OSDA study.

Table 3. Destination of Slaughter Cattle Moving From District 5 Under Brand Inspection by Type, 1968.

	Cows	Bulls	Heifers	Steers	Calves	Mixed cattle	Total
District 1	9, 591	1, 041	14, 173	40, 078	1, 512	121	66, 516
District 2	8	13		4			25
District 3	1	1	2, 607	2, 326	71		5, 006
District 4	56	24	137	395	2		614
District 5	3, 596	1, 411	4, 817	8, 154	222	20	18, 220
California		84	388	4, 665			5, 137
Idaho				37			37
Washington		52	2, 534	6, 760	31		9, 371
Iowa			64				64
Total	13, 252	2, 626	24, 720	62, 419	1, 838	141	104, 996

SOURCE: Ross, Edgar R. 1969. Research Analyst, Oregon State Department of Agriculture. Agricultural Development Division. Computer printouts. Salem, Oregon.

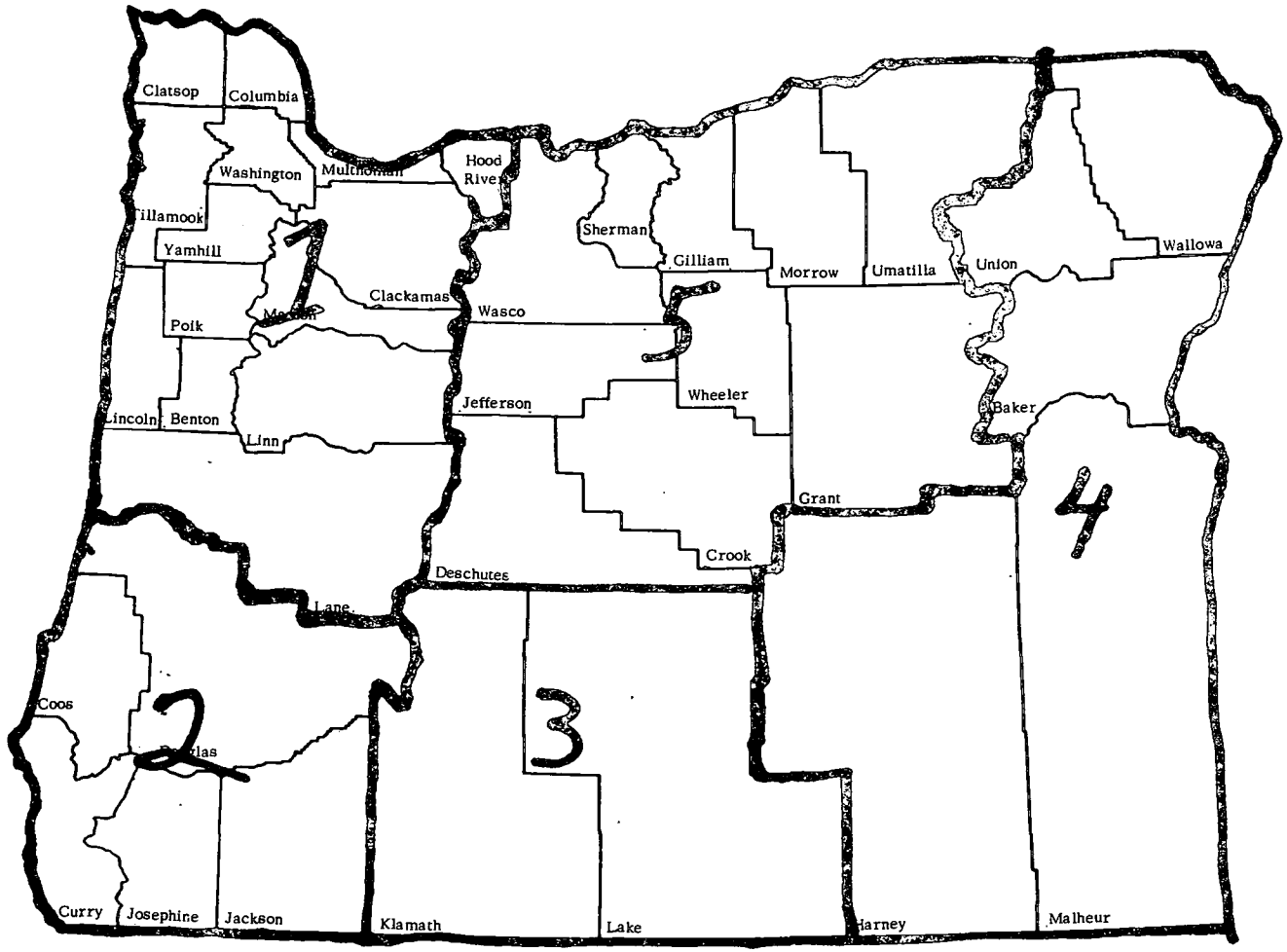

Figure 2. Geographical separation of districts.

SOURCE: Oregon State Department of Agriculture. 1968. Agricultural Development Division. Oregon Cattle Movement Project. Progress Report. Salem, Oregon.

As can be seen in Figure 2, District 5 includes Morrow county and Umatilla county in addition to the relevant procurement area as used in the present study. Therefore, due to the additional counties included in District 5 and due also to the fact that different methods were used in the collection and processing of data, results of the OSDA study cannot be compared directly to the figures developed for slaughter cattle in the RPA. However, it is worthwhile to note the marketing patterns as they are developed by the OSDA study.

Assuming that the heifers and steers sold for slaughter were fed cattle, the total of the steers and heifers originating in District 5 and moving to District 1 is 62.26% of the total fed cattle originating in District 5. Also, the steers and heifers shipped to District 3 numbered 4, 933 or 5.67% and to California 5, 053 or 5.8%, to Washington 9, 294 or 10.7%, and 12, 971 or 14.9% stayed in District 5. The remainder went to Idaho, Iowa, or the other districts in Oregon.

These figures emphasize the proportionately high number of cattle moving from northeastern as well as Central Oregon to the slaughtering plants located around Portland and in the Willamette Valley, the probable primary emphasis being on the Portland area.

Marketing Patterns of Nonfed Slaughter Cattle

This section will discuss the monthly flow of nonfed slaughter cattle from ranches to slaughterhouses and the destinations of nonfed cattle produced for slaughter in the relevant procurement area. Two sets of data are employed as bases for the discussions in this section. The first set of data has been collected from reports and records from the Madras and Redmond livestock auction markets and from brand inspection certificates provided by brand inspectors in Madras and Redmond and the Livestock Division, Oregon State Department of Agriculture. These brand inspections were made on the ranch from which the cattle were sold. The second set of data has been taken from information compiled in the Oregon Cattle Movement Project discussed in the previous section (Ross, 1969).

The first set of data is shown on Table 4. The figures show total marketings of 13, 752 cattle. These are considered to be primarily nonfed cattle although some fed steers and heifers were included in the data taken from the auction reports and records. However, due to the small number of fed cattle included, this fact is not considered to be detrimental to the results obtained.

As stated above, 13, 752 nonfed slaughter cattle are shown to have been marketed through the two auctions or sold directly

Table 4. Monthly Marketings of Nonfed Slaughter Cattle from Central Oregon, 1968.

	Madras auction	Redmond auction	Direct purchases	Total	Percent
January	525	902	10	1,437	10.45
February	170	686	251	1,107	8.06
March	107	468	187	762	5.54
April	609	846	131	1,586	11.53
May	731	695	86	1,512	10.99
June	415	310	16	741	5.39
July	286	230	181	697	5.07
August	335	937	56	1,328	9.66
September	467	289	234	990	7.20
October	364	831	248	1,443	10.49
November	335	430	370	1,135	8.25
December	162	753	99	1,014	7.37
Total	4,506	7,377	1,869	13,752	100.00

SOURCE: U.S. Dept. of Agriculture in cooperation with Consumer and Marketing Services. 1968a. Madras livestock auction weekly reports. Corvallis, Oregon.
U.S. Dept. of Agriculture in cooperation with Consumer and Marketing Services. 1968b. Redmond livestock auction weekly reports. Corvallis, Oregon.
Brand inspection certificates provided by brand inspectors in Central Oregon.

from the rancher to the packer with the brand inspection taking place on the ranch from which the cattle were sold. The remainder of the nonfed slaughter cattle were probably marketed in one of two ways. Either they were sold directly from the rancher to the packer and the brand inspection made at the packing plant rather than the ranch, or they were bought through auctions by order

buyers or speculators who do not identify the packer to whom they deliver or resell the cattle. It is believed that most of the cattle unaccounted for in the data are sold directly to the packer and brand inspected at the plant.

Despite the lack of information on the nonfed slaughter cattle sold directly to packers and brand inspected at the plant, the data in Table 4 are complete enough to give substantial information about the monthly rates at which nonfed slaughter cattle were marketed in 1968. Relatively high rates of marketings occurred during the late fall and winter months, October through February, high rates during April and May and low rates during the summer months of June and July.

Table 5 shows the destination of nonfed slaughter cattle marketed in Central Oregon in 1968, which were shipped out of Central Oregon or slaughtered at packing plants in Bend. Of these cattle, over 50% were transported to packing plants in the northern Willamette Valley, over 25% went to packing plants in the southern Willamette Valley, about 5% went to packing plants in Bend, and the remainder, about 10%, were shipped out of state, mostly to northern California.

Table 3 shows figures on the number of slaughter animals originating in District 5 and the destination to which they were shipped when marketed for slaughter. The first two columns show

Table 5. Destination of Nonfed Slaughter Cattle Marketed in Central Oregon, 1968.

	North Willamette Valley	South Willamette Valley	Bend	Out of state	Total
January	202	153	13	9	377
February	233	86	27	65	411
March	200	144	17		361
April	194	190	32	79	495
May	256	269	48		573
June	377	219	32		628
July	182	167	25	139	513
August	313	209	41		563
September	542	154	24	1	721
October	618	243	42	14	917
November	474	119	16	370	979
December	434	62	35		531
Total	4, 025	2, 015	352	677	7, 069
Percent	56. 94	28. 50	4. 98	9. 58	100. 00

SOURCE: Data taken from records of Redmond auction, Redmond, Oregon, 1969. Brand inspection certificates provided by brand inspectors in Madras and Redmond, Oregon, 1969.
Brand inspection certificates provided by Oregon State Department of Agriculture, Brand Inspection Division, Salem, Oregon.

the number of cows and bulls marketed, that is, the animals classed as nonfed slaughter animals.

15, 878 nonfed cattle are shown to have been marketed from District 5 according to these figures. Of these cattle, about 67% or 10, 638, were slaughtered in the Willamette Valley (and Portland area - District 1) and about 32%, or 5, 080, were slaughtered in District 5 with the remainder going to other Oregon districts or

out of state.

Although the two sets of data shown in Table 5 and Table 3 are not related with respect to geographical area included and method of data collection, they show similar results with regard to the fact that from two-thirds to three-fourths of the nonfed slaughter cattle produced in Central Oregon are slaughtered by packing plants in the Willamette Valley and Portland area.

Without complete information about the movement of nonfed slaughter cattle from the Central Oregon area, it is rather difficult to obtain a true estimate of the number of nonfed cattle shipped to the various marketing areas. About the best one can do at this point is to deduct the number of nonfed slaughter cattle which were slaughtered in Central Oregon from the total number of nonfed slaughter cattle produced and apply the percentages developed in Table 5 to the remainder.

It is estimated that the packing plants in Central Oregon located near Redmond, Prineville, and Madras slaughter 4, 100 cattle[1/] per year. It was estimated in a previous section that about 1, 036 of the cattle slaughtered in local packing plants were fed cattle; thus, about 3, 064 must have been nonfed slaughter animals.

1/ Estimate derived from county agents and other persons involved in the cattle industry within the Central Oregon area.

Table 1 shows that 25, 495 nonfed slaughter cattle were marketed from the RPA in 1968. Subtracting those slaughtered in the Central Oregon plants leaves 22, 431. Applying the percentages developed in Table 5 obtains the following results:

North Willamette Valley	12, 772
South Willamette Valley	6, 393
Bend	1, 117
Out of state	2, 149
Total	22, 431

Similarly, estimates of the number of nonfed slaughter cattle which were marketed during each month can be derived by applying the percentages developed in Table 4 to the total number of nonfed slaughter cattle marketed as shown in Table 1. This results in the following figures:

January	2, 664	July	1, 293
February	2, 055	August	2, 463
March	1, 412	September	1, 836
April	2, 940	October	2, 674
May	2, 802	November	2, 103
June	1, 374	December	1, 879

Production and Marketing of Feeder and Stocker Cattle

The extent to which cattle feeding operations take place in an area is highly dependent upon the availability of feeder cattle. The method used to determine the relevant procurement area for feeder cattle was to determine the origin of stocker and feeder cattle brought into the area. To do this, the data from the OSDA study (Ross, 1969) have been used and are shown in Table 6. These figures show that 48, 476 steers and heifers were marketed under brand inspection in the stocker and feeder classification with their destination being District 5. Of these, 31, 296 originated in District 5, 5, 678 in District 4, Klamath and Lake counties, 4, 719 in District 1, which includes the Willamette Valley, and 1, 195 and 377 originated in District 2 and District 3, respectively.

Also, 3, 328 stocker and feeder heifers and steers went to District 5 through District 1 after having originated somewhere out of state. It is not known from which states these cattle came, but apparently most of them went through the market in Portland.

Other feeder and stocker cattle also came from out of state. Here again, it is not known from which state they came, but a reasonable assumption could be made that they came from the state or states adjacent to the district through which they were marketed. Using this assumption, it can be seen from Table 6

Table 6. Origin of Stocker and Feeder Cattle Moving to District 5 Under Brand Inspection Certificates, 1968.

	Cows	Heifers	Steers	Bulls	Calves	Mixed	Total
District 1	225	1,383	3,336	595	1,815		7,354
District 2	19	455	740	115	44		1,373
District 3	1,235	173	204	294	63	106	2,075
District 4	494	649	5,029	343	634	57	7,206
District 5	6,794	14,059	17,237	2,083	7,342	22	47,537
Out of state thru*:							
District 1	174	976	2,352	175	830		4,507
District 2			76		437		513
District 3		173					173
District 4	36	10	415	12			473
District 5	293	547	662	111			1,613
Total	9,270	18,425	30,051	3,728	11,165	185	72,824

*District in which cattle brought into Oregon from other states were first marketed.

SOURCE: Ross, Edgar R. 1969. Research Analyst, Oregon State Department of Agriculture. Agricultural Development Division. Computer printouts. Salem, Oregon.

that 76 steers came from out of state through District 2. These probably came from California. Also, 173 heifers came in through District 3. These must have come either from California or Nevada. 425 heifers and steers came in through District 4. These could have come from Nevada, Idaho, or Washington.

The main point to be made here is that, of the 48,476 steers and heifers classified as stocker and feeder cattle which were placed in feedlots in District 5, 31,296 or 64.6% of them originated in District 5. Also, substantial numbers came from District 1 and District 4 as well as from out of state through District 1 or District 5.

From this information, it appears that the relevant procurement area for feeder and stocker cattle fed in Central Oregon can safely be assumed to be not only the eight counties considered as the RPA for slaughter cattle as discussed in the introduction to Chapter II, but also the five counties included in the COPC.

Figures showing the number of feeder cattle produced in the RPA have been obtained for the years 1963-1968 and are shown in Table 7. It should be pointed out that these figures exclude the heifers used as replacements and also make an allowance for the number of cattle slaughtered on farms for home use. Since these deductions were taken from the dairy cattle sector only, the figures pertaining to each sector individually are not entirely accurate.

Table 7. Feeder Cattle Produced, Eight Central Oregon Counties, 1963-1968

	Beef calves	Dairy calves	Total	Percent change
	(head)	(head)	(head)	(%)
1963	86,700	2,640	89,340	
1964	91,950	2,170	94,120	5.4
1965	94,100	900	95,000	0.9
1966	89,100	400	89,500	-5.8
1967	89,300	850	90,150	0.7
1968	95,100		95,100	5.5

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

However, when considering both beef and dairy together, reasonable accuracy can be expected. Therefore, these figures are a close estimate of the number of cattle produced which are available for feeding each year.

It can be seen from Table 7 that the number of feeder cattle produced each year during the period 1963-1968 in the RPA has been relatively stable, fluctuating only from a low of 89,340 in 1963 to a high of 95,100 in 1968. As can be expected, increases and decreases have occurred from year to year. A 5.4% increase occurred in 1964, followed by a 0.9% increase in 1965. Then a 5.8% decrease occurred in 1966 followed by a 0.7% increase in 1967 and a 5.5% increase in 1968.

Figures for the number of feeder and stocker cattle produced in the COPC are shown in Table 8. The number of feeder and stocker cattle produced in these counties each year has fluctuated to a greater degree than did the number produced in the RPA. In 1963, 158, 330 feeder cattle were produced compared to 188, 300 produced in 1965. Yearly variations were an increase of 7. 9% in 1964, a 10. 2% increase in 1965, a 0. 7% decrease in 1966, a 3.5% decrease in 1967, and a 0. 8% increase in 1968.

Adding the number produced in the RPA to the number produced in the COPC each year derives the following figures:

1963	247, 670	
1964	265, 020	7. 0%
1965	283,3 00	6. 8%
1966	276, 500	-2. 4%
1967	270, 650	-2. 1%
1968	277, 000	2. 3%

The figures for the total number of cattle produced in both areas show a generally increasing trend as increases occurred during three of the years while only small decreases occurred during two of the years. Thus, it can be concluded that as long as the present trend continues, there will be more than enough feeder and stocker cattle produced within a reasonably close distance of Central Oregon to supply the feedlots of Central Oregon,

Table 8. Stocker and Feeder Cattle Produced, Five Oregon Counties, 1963-1968.

	Beef calves	Dairy calves	Total	Percent change
	(head)	(head)	(head)	(%)
1963	152,900	5,430	158,330	
1964	165,400	5,500	170,900	7.9
1965	185,200	3,100	188,300	10.2
1966	181,800	5,200	187,000	-0.7
1967	175,500	5,000	180,500	-3.5
1968	178,600	3,300	181,900	0.8

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics, U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

even if substantial increases in the number of cattle fed occurred.

In order to get an idea of the monthly marketing patterns for feeder and stocker cattle in Central Oregon, data were collected from the livestock auction markets at Redmond and Madras. This data is compiled and shown in Table 9. There were 42,771 head of cattle classified as stockers and feeders marketed through these two auctions during 1968. The percent marketed per month is illustrated in graphical form on Figure 3. As this graph shows, high rates of marketing took place from January to May. Low rates of marketing took place from June to August. Then marketing increased in September, to a high for the year in October after which time the marketing decreased.

Table 9. Monthly Marketings of Stocker and Feeder Cattle through Madras and Redmond Auctions, 1968.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
MADRAS AUCTION													
Feeders													
Steers	350	551	310	426	442	226	594	157	742	361	519	220	4,898
Heifers	293	204	290	357	421	205	233	73	413	245	185	103	3,022
Total	643	755	600	783	863	431	827	230	1,155	606	704	323	7,920
Calves													
Steers	719	832	627	443	391	366	381	186	586	563	956	704	6,754
Heifers	831	650	802	564	350	328	223	57	585	692	1,105	569	6,756
Total	1,550	1,482	1,429	1,007	741	694	604	243	1,171	1,255	2,061	1,273	13,510
Total Mktgs	2,193	2,237	2,029	1,790	1,604	1,125	1,431	473	2,326	1,861	2,765	1,596	21,430
REDMOND AUCTION													
Feeders													
Steers	647	414	468	797	561	262	307	1,500	556	716	539	442	7,209
Heifers	538	712	463	893	1,448	219	230	696	430	728	411	383	7,151
Total	1,185	1,126	931	1,690	2,009	481	537	2,196	986	1,444	950	825	14,360
Calves													
Steers	409	286	255	159	225	214	178	225	118	732	229	531	3,561
Heifers	493	296	261	177	210	145	184	189	120	731	209	405	3,420
Total	902	582	516	336	435	359	362	414	238	1,463	438	936	6,981
Total Mktgs	2,087	1,708	1,447	2,026	2,444	840	899	2,610	1,224	2,907	1,388	1,761	21,341
TOTAL BOTH MARKETS	4,280	3,945	3,476	3,816	4,048	1,965	2,330	3,083	3,550	4,768	4,153	3,357	42,771
% PER MONTH	10.01	9.22	8.13	8.92	9.46	4.59	5.45	7.21	8.30	11.15	9.71	7.85	100.00

SOURCE: U. S. Dept. of Agriculture. Cooperative Extension Service in cooperation with Consumer and Marketing Services. 1968a. Madras livestock auction weekly reports. Corvallis, Oregon. U. S. Dept. of Agriculture. Cooperative Extension Service in cooperation with Consumer and Marketing Services. 1968b. Redmond livestock auction weekly reports. Corvallis, Oregon.

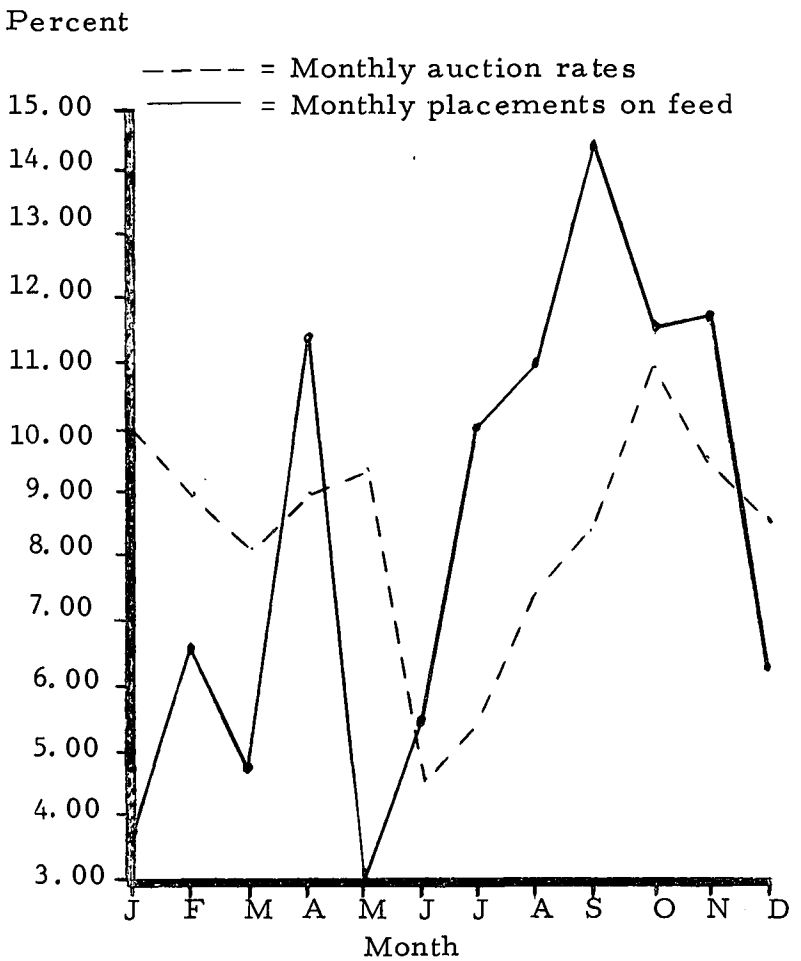

Figure 3. Marketings of feeder and stocker cattle through Madras and Redmond auctions and rates cattle were placed on feed in Central Oregon, 1968.

SOURCE: U.S. Dept. of Agriculture. Cooperative Extension Service in cooperation with Consumer and Marketing Services. 1968. Madras livestock auction weekly reports. Corvallis, Ore.
U.S. Dept. of Agriculture. Cooperative Extension Service in cooperation with Consumer and Marketing Services. 1968. Redmond livestock auction weekly reports. Corvallis, Ore.
Answers to questionnaires given by eight operators of cattle feedlots in Central Oregon.

Responses to the survey questionnaire administered to the operators of the cattle feeding operations in Central Oregon provide data indicating the number of cattle placed on feed each month during 1968. The monthly totals and percentages were derived as follows:

Month	Number	Percent	Month	Number	Percent
January	1,050	3.83	July	2,769	10.08
February	1,743	6.35	August	3,037	11.07
March	1,269	4.63	September	3,977	14.50
April	3,139	11.43	October	3,180	11.58
May	807	2.94	November	3,195	11.65
June	1,507	5.48	December	1,757	6.41
			Total	27,430	100.00

These percentage figures are also illustrated on Figure 3 and show a great deal of variation in comparison to the monthly auction rates. The probable reasons for this are (1) the number of placements on feed are only about one-half the total marketed through the auctions, and (2) there are probably a great deal of cattle placed on feed that are purchased directly from the supplier rather than bought through the auctions.

Another interesting point is the number of feeder cattle that are produced and shipped out of the county in which they were produced to be fed. Table 10 shows the number of beef feeder

Table 10. Marketings of Beef Feeder Cattle Shipped Out of County for Feeding, Eight Central Oregon Counties, 1963-1968.

	Steers	Heifers	Total	Percent change
1963	46,600	23,850	70,450	
1964	46,350	24,375	70,725	0.4
1965	46,000	27,500	73,500	3.9
1966	45,900	24,900	70,800	-3.7
1967	46,000	25,700	71,700	1.3
1968	43,750	31,700	75,450	5.2

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

cattle produced which are shipped out of county for feeding in the RPA and Table 11 shows the number of beef feeder cattle produced which are shipped out of county for feeding in the COPC. A total of

Table 11. Marketings of Beef Feeder Cattle Shipped Out of County for Feeding, Five Oregon Counties, 1963-1968.

	Steers	Heifers	Total	Percent change
1963	83,800	45,400	129,200	
1964	85,800	48,500	134,300	4.0
1965	95,100	60,900	156,000	16.2
1966	93,900	53,700	147,600	-5.4
1967	94,300	54,400	148,700	0.7
1968	102,400	68,500	170,900	14.9

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

246, 350 cattle were shipped out of county from the two areas in 1968. This figure may be somewhat large since some of the cattle slaughtered on farms for home use should probably have been deducted from the beef cattle numbers instead of all being taken from the dairy cattle numbers. Even so, it is evident that considerable numbers of feeder and stocker cattle moved out of the county in which they were produced.

Another point of interest is the movement of stocker and feeder cattle out of the area to other parts of Oregon or to other states. Data from the Oregon Cattle Movement Project provide information about movements of stocker and feeder cattle out of District 5. This information is shown on Table 12. These figures show that a total of 137, 249 heifers, steers and calves classified as stockers and feeders moved under brand inspection from District 5 to some other destination. Of these, 38, 638 head or 28. 15% of them stayed in District 5, while the remainder, 98, 611 head went elsewhere in Oregon or out of state.

Other destinations and percentages of these cattle moving from District 5 were District 1 - 5. 86%, Washington - 25. 1%, California - 16. 94%, Idaho - 13. 04%, and Iowa - 3. 84%, with the rest going to other Oregon districts or other states. Thus, it is evident that over 70% of the District 5 stocker and feeder heifers, steers and calves were shipped out for feeding, many of them

Table 12. Stocker and Feeder Cattle Movements Under Brand Inspection Certificates from District 5, by Type of Cattle and Destination.

	Cows	Heifers	Steers	Bulls	Calves	Mixed	Total
District 1	3, 261	3, 775	2, 921	345	1, 345	190	11, 837
District 2	811	409	485	116	489		2, 310
District 3	642	310	73	10	414		1, 449
District 4	212	1, 138	1, 080	51	684		3, 165
District 5	6, 794	14, 059	17, 237	2, 083	7, 342	22	47, 537
California	4, 426	3, 609	11, 644	415	7, 991	43	28, 128
Idaho	1, 219	6, 443	6, 016	402	5, 435	463	19, 978
Washington	8, 134	11, 014	16, 111	759	7, 325	594	43, 937
Iowa	14	2, 221	2, 413		634	77	5, 359
Nevada	132	329	16	71	123		671
Nebraska		1, 018	484	1	228	68	1, 799
Illinois		447	446	14	323		1, 230
Wyoming	23	297			6		326
Utah			9	6			15
Minnesota			40				40
Colorado		418	198		96		712
Montana	10	62		14	10		96
All other states	21	45	17	12	3		98
Overseas	13	17					30
Total	25, 712	45, 611	59, 190	4, 299	32, 448	1, 457	168, 717

SOURCE: Ross, Edgar R. 1969. Research Analyst, Oregon State Department of Agriculture. Agricultural Development Division, Computer printouts. Salem, Oregon.

moving considerable distances.

Size of Cow Herds

Another important aspect of supply of cattle to a packing plant is the size of the beef cow herds in and around the RPA, the trend associated with the size of the beef cow herds and the size and trends involving the dairy cow herds.

Table 13 gives figures on the number of beef cows, beef calves, the calving percentages and the percentage of replacement of beef cows in the RPA. As these figures show, there were 131, 300 beef cows in the RPA in 1963 and by 1968 this number had increased to 139, 000. The changes in beef cow herd size from 1963 to 1968 were a 5. 3% increase in 1964, a 0. 7% decrease in 1965, a 2. 1% decrease in 1966, a 0. 2% decrease in 1967, and a 3. 0% increase in 1968. Thus, although three of the years showed decreases, the decreases were relatively small and more than offset by increases during the other two years.

The figures showing the number of beef cows, beef calves, calving percentage and percentage of cows replaced for the COPC are shown in Table 14 for the years 1963 to 1968. The number of beef cows in these counties increased from 241, 000 in 1963 to 268, 000 in 1968. The year-to-year changes for these counties were a 9. 5% increase in 1964, a 4. 2% increase in 1965, a 1. 8%

Table 13. Cows, Calves and Replacements, Eight Central Oregon Counties, 1963-1968

	Beef cows	Percent change	Calves	Calving percent	Replacement heifers	Percent of beef cows replaced
1963	131,300		111,400	85	24,700	18.8
1964	138,200	5.3	116,700	84	24,850	18.0
1965	138,100	-0.7	118,200	86	24,100	17.5
1966	135,200	-2.1	114,400	85	25,300	18.7
1967	135,000	-0.2	114,600	85	25,300	18.8
1968	139,000	3.0	119,700	86	24,600	17.6

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

Table 14. Cows, Calves and Replacements, Five Oregon Counties, 1963-1968.

	Beef cows	Percent change	Calves	Calving percent	Replacement heifers	Percent of beef cows replaced
1963	241,000		199,200	83	46,300	19.2
1964	264,000	9.5	212,900	81	47,500	18.0
1965	275,000	4.2	227,800	83	42,700	15.5
1966	270,000	-1.8	227,300	84	45,500	16.8
1967	263,500	-2.4	222,300	84	46,800	17.8
1968	268,000	1.7	226,100	84	47,500	17.7

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

decrease in 1966, a 2.4% decrease in 1967, and a 1.7% increase in 1968.

If the totals of the two areas are added together and the percentage changes calculated, the following figures result:

1963	372, 300		1966	405, 200	-1.9%
1964	402, 200	8.0%	1967	398, 500	-1.6%
1965	413, 100	2.7%	1968	407, 000	2.1%

In comparing the percentage changes which took place in the size of beef cow herds with the percentage changes which took place in the number of feeder and stocker cattle produced, a close similarity is noted. In the cases of both classes of livestock, relatively large increases took place in 1964 and 1965, small decreases occurred in 1966 and 1967 and another relatively large increase took place in 1968. The overall trend for the entire period 1963-1968 appears to be an increasing trend.

While the size of the beef cow herds appears to be increasing in the RPA and the COPC, the opposite is occurring with respect to the size of the dairy cow herds. Table 15 shows the number of dairy cows in the two areas during the years 1963 to 1968. Taking the totals for the two areas and calculating the percent changes derives the following figures:

1963	30,600	
1964	27,600	-9.8%
1965	24,500	-11.2%
1966	22,300	-9.0%
1967	21,100	-5.4%
1968	19,200	-9.1%

Table 15. Dairy Milk Cows and Heifers Two Years Old and Older on Farms, January 1.

Eight Central Oregon counties	1963	1964	1965	1966	1967	1968
Gilliam	400	400	200	200	150	100
Sherman	200	200	100	100	100	100
Wasco	700	700	600	500	500	400
Crook	700	700	900	800	600	500
Deschutes	4,800	4,700	4,000	3,500	3,300	3,100
Grant	800	700	400	400	300	300
Jefferson	2,400	1,000	700	600	600	500
Wheeler	300	300	200	200	300	200
Total	10,300	8,700	7,100	6,300	5,750	4,700

Five Oregon counties	1963	1964	1965	1966	1967	1968
Morrow	700	700	600	500	400	400
Harney	500	500	400	400	400	300
Klamath	2,400	2,200	2,400	2,100	2,100	1,900
Lake	500	500	500	500	450	400
Malheur	16,200	15,000	13,500	12,500	12,000	11,500
Total	20,300	18,900	17,400	16,000	15,350	14,500

SOURCE: U.S. Dept. of Agriculture, Cooperative Extension Service in cooperation with the Oregon Crop and Livestock Reporting Service. 1964-1969. Oregon commodity data sheets: dairy. Corvallis.

It is evident that during the period 1963-1968, dairy production has been replaced to a great extent by beef cattle production or other agricultural enterprises.

The Potential of Central Oregon for Cattle Feeding

In estimating the potential of the area to expand the volume of cattle fed, an estimate of the availability of feed and the uses to which the feed is put is necessary.

To determine the area from which feed can be procured by cattle feeding operations located in Central Oregon, relative distances from which feed is presently obtained were estimated. Although figures are not available, information from a cattle feeder in Central Oregon and from county extension agents attest to the fact that substantial amounts of barley are shipped into Central Oregon from Portland for use as cattle feed. Since Portland is 126 miles from the Culver Junction on U. S. Highway 97, it would appear safe to consider the relevant procurement area to be a radius of 120 miles from this point. Thus, for purposes of this report, the feed procurement area for Central Oregon will be considered to be the same eight counties included in the Relevant Procurement Area for slaughter cattle. This will give an estimate of the potential of the Central Oregon area to provide feed for the cattle produced in the area even though it is recognized that the

Portland market is an important source of supply of feed grains, especially barley.

The amounts of feed produced in the eight counties during the years 1963-1967 are shown in Table 16. To estimate the amount of feed consumed by livestock in the eight counties during those years, the number of each class of livestock present on farms on January 1 and the number of livestock produced during the year was determined. The number of each class of livestock was then multiplied by a factor as computed by the Economic Research Service of the U. S. Department of Agriculture (U.S.D.A., E.R.S., 1963, p. 49) to convert the number of animals to the number of roughage consuming animal units and the number of concentrate consuming animal units. The number of animal units was then multiplied by a factor computed by the Economic Research Service (U.S.D.A., E.R.S., 1967, p. 17) to determine the tons of feed, both roughages and concentrates, consumed by livestock. The results of these calculations are shown in Table 17.

As can be seen from the figures in Table 17, the least amount of hay that was produced in excess of that used in the eight counties was 20, 221 tons, which occurred in 1966. To estimate how many additional cattle could be fed with the hay that is available, consider the following information: A characteristic ration being used in feedlots in 1967 consisted of 20% hay or

Table 16. Feed Produced, Eight Central Oregon Counties, 1963-1967 (Tons).

	1963	1964	1965	1966	1967
Hay [a/]	398, 700	384, 900	370, 600	358, 050	373, 650
Wheat [b/]	306, 390	274, 470	244, 200	245, 670	298, 830
Barley [b/]	98, 352	98, 856	79, 896	91, 440	38, 232
Oats [b/]	4, 432	2, 416	2, 672	2, 640	2, 544
Corn [b/]		84	84	112	
Cull potatoes [b/]	42, 000	42, 000	42, 000	42, 000	42, 000

a/ Includes all varieties of hay.

b/ The tons of grains produced were derived by taking figures for bushels produced from the commodity data sheets and multiplying them by 60 for wheat, 48 for barley, 56 for corn, and 32 for oats, to get pounds produced, then dividing the results by 2, 000 to get tons produced. The tons of cull potatoes produced is an average annual estimate obtained from the Cooperative Extension Service, Jefferson County, Madras, Oregon.

SOURCE: U. S. Dept. of Agriculture, Cooperative Extension Service in cooperation with the Oregon Crop and Livestock Reporting Service. 1963-1968. Oregon commodity data sheet: hay, wheat, barley, oats, corn. Corvallis, Oregon.

Binder, Julius. 1969. Agent, Cooperative Extension Service, Jefferson County, Madras, Oregon. September. Personal communication. Corvallis, Oregon.

Table 17. Feed Consumption and Production Balance, Eight Central Oregon Counties, 1963-1967.

	1963	1964	1965	1966	1967
Total animal units	110, 741. 2	112, 991. 5	128, 616. 5	106, 572. 5	135, 313. 6
Concentrates consumed (tons)	96, 345	98, 303	123, 472	96, 981	124, 489
Concentrates produced a/	408, 174	375, 826	326, 852	339, 750	339, 606
Balance b/	312, 829	277, 523	203, 380	242, 769	215, 117
Concentrates produced c/	102, 785	101, 356	82, 652	94, 080	40, 776
Balance b/	6, 439	3, 053	-40, 820	-2, 901	-83, 713
Roughages produced	398, 700	384, 900	370, 600	358, 050	373, 650
Roughages consumed	311, 398	306, 846	329, 908	337, 829	329, 522
Balance b/	87, 302	78, 054	40, 692	20, 221	44, 128

a/ Wheat, barley, oats, and corn.

b/ Production minus consumption.

c/ Barley, oats, and corn.

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics, U. S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon. Table 16.

equivalent. It was estimated that cattle were fed on the average for 150 days in feedlots consuming 20.6 pounds of feed with a feed conversion ratio of 7.5 to 1.0. The average weight of the cattle when placed on feed was estimated to be 650 pounds and they were slaughtered at a weight of 1,062.5 pounds (Korzan and Richards, 1964). Therefore, each animal consumed 3,094 pounds of feed while in the feedlot, 619 pounds of which was hay. This means that if 619 pounds of hay were used by additional cattle fed in feedlots on a similar ration, the excess hay produced in 1966 would have been sufficient to have fed 65,334 additional cattle. Furthermore, at least one of the cattle feeders in Central Oregon uses a ration consisting of only 5% hay, which would enable the excess hay to feed about four times that number. So it appears that fed cattle production could be increased substantially in the RPA when considering only the amount of hay produced there.

A somewhat more complicated picture is developed when considering the concentrates consumed and produced. Referring back to Table 17, if concentrates available for feeding are considered to be wheat, barley, corn, and oats, large surpluses are seen to exist. The large balances resulting in these figures may be very misleading when considering the number of cattle that could be fed because of the fact that most of the extra concentrate produced is probably wheat, very little of which is used for feeding

cattle. A more realistic estimate of the concentrate production-consumption balance might be obtained by considering concentrates produced excepting wheat. These figures, also given in Table 17, show that when wheat is excluded from the feed grain category, the eight counties show a large deficit in the production-consumption balance of concentrates.

Another important feed which is produced in large amounts is cull or low grade potatoes. It is estimated that an average of 42, 000 tons of potatoes (Binder, 1969) are available for cattle feeding each year. Potatoes are generally classified as concentrates since "based on the composition of their dry matter, they are more like concentrates than roughages, as they are low in fiber." (Morrison, 1957, p. 16). Morrison also points out that it takes four pounds of potatoes to provide the nutrients equivalent to one pound of dried concentrates. Therefore, the total tons of potatoes available were divided by four to derive their concentrate equivalency.

Adding the tons of potato equivalent available for feeding to the concentrates, changes the concentrate production-consumption balance as follows:

1963	16, 939	1966	7, 599
1964	13, 553	1967	-73, 213
1965	-30, 320		

Adding the potatoes to the concentrates changes the balance figures from negative to positive for every year except 1965 and 1967. The large deficit which appears for 1967 is due in part to an increase in the number of beef cattle in the eight counties, but it is due also to a decrease in the amount of barley produced. An examination of the crop production figures indicates that at the same time that production of barley decreased, production of wheat increased, indicating that a substitution of wheat for barley production took place. It seems likely, then, that given adequate price incentives, a substitution in the other direction could be induced, which would make more barley available for cattle feeding.

An important alternative is the substitution of wheat for barley in the feeding rations. Indeed, the operator of one of the large feedlots in the area currently using a ration consisting of 25.25% wheat, which amounts to 35% of the total concentrates in the ration. This operator has considered increasing the proportion of wheat to 50% of the total concentrates.

Taking figures from Table 17, 40,300 cattle were fed, representing 40,300 animal units which consumed 36,673 tons of concentrates in 1966. Assuming that none of the concentrates were wheat, the production-consumption deficit was 83,713 tons. Had half of the concentrates consumed by cattle on feed been wheat, the deficit would have been only 41,857 tons. In the same light,

the surpluses shown for the previous years would have been much greater.

Not a great deal can be said about the potential of the area for expansion of cattle feeding without qualifying the statements. What can be said is that if wheat could be substituted entirely for barley in the rations, the amount of cattle that could be fed would be limited only by the amount of roughage available and the increase could be enormous. If wheat cannot be substituted entirely into the ration, the potential to expand cattle feeding is limited either by the amount of barley that can be procured from outside the area or by the additional amount of barley that can be produced in substitution for wheat production.

The Relative Importance of the Pacific Northwest as a Cattle Production Area

The relative position, as a fed cattle production area, of the area in which a new packing plant is being established is also important to consider. The trends associated with the numbers of cattle on feed in the major cattle feeding areas of the United States are helpful for this purpose and are shown in Table 18.

These figures indicate that Oregon, as a percent of the United States, is declining slightly in relative importance as a cattle feeding state. Also, the southern Plains states are

Table 18. Cattle and Calves on Feed as a Percent of United States Totals, Selected Areas, 1963-1968.

	1963	1964	1965	1966	1967	1968
Oregon	NA	.9	.9	.9	.8	.8
Southern Plains a/	5.5	6.1	6.0	6.3	7.5	8.7
North Central b/	62.6	63.6	63.4	63.2	63.4	62.3
Western region c/	26.4	24.9	25.1	25.3	24.5	24.4
Other western states d/	6.8	6.9	7.1	7.2	7.1	7.6

NA - Not available.

a/ Texas and Oklahoma.

b/ Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas.

c/ Montana, Wyoming, Colorado, New Mexico, Arizona, Utah, Washington, Oregon, California, and Nevada.

d/ Western region less Arizona, Colorado, and California.

SOURCE: Dietrich, Raymond A. 1968. The Texas-Oklahoma cattle feeding industry. College Station. 47 p. (Texas. Agricultural Experiment Station. B-1079)
U. S. Dept. of Agriculture. Statistical Reporting Service. Crop Reporting Board. 1963-1969. Cattle on feed. Washington, D. C.

increasing significantly in relative importance.

In light of the rapid increase in cattle feeding in the southern Plains, concern has been expressed as to the ability of Oregon and the Pacific Northwest to maintain its competitive position in the cattle feeding industry. The concern stems partly from the fear that the large, efficient feedlots in the southern Plains may be able to produce such a large supply of fed beef at relatively low prices

as to over supply the existing markets and move their excess supply into markets presently supplied by the Pacific Northwest cattle feeding industry. To be able to do this over a long period of time would mean that the feedlots in the southern Plains must produce fed beef for a lower cost than do the feedlots in the Pacific Northwest. That this has not happened in the past is shown by the cost comparisons in Table 19.

These figures show that in the 1966-1967 feeding year, Texas had a slight advantage in average total cost over the Pacific Northwest in feedlots with capacities of less than 1,000 head and 2,000-4,999 head, but the Pacific Northwest had the advantage in the 1,000-1,999 head and the 10,000 head or more sizes. According to the primary author of the Pacific Northwest study, the high costs recorded by the feedlots in the 2,000-4,999 head size category are attributable mainly to under-utilization of the feeding facilities. If the feedlots were used to full capacity, it is probable that the average total costs would be lower.

Considering only feed costs, the Pacific Northwest feedlots had a cost advantage over the feedlots in the southern Plains states in every size category except the 2,000-4,999 size category.

Since the southern Plains states are at a significant disadvantage in terms of transportation of the product to the Pacific Northwest, in light of these cost comparisons, it is unlikely that

Table 19. Average Total Cost Per Pound Gain and Average Feed Cost Per Pound Gain by Feedlot Size and by Area, 1966-1967 Feeding Year.

	Less than 1,000 head	1,000-2,000 head	2,000-4,999 head	10,000 head or more
		(dollars)		
Average total cost:				
Pacific Northwest	.2439	.2218	.2492	.1924
Texas	.2430	.2386	.2437	.2235
Oklahoma	.2768	.2843	.2689	.2423
Feed cost:				
Pacific Northwest	.1679	.1639	.1952	.1435
Texas	.1974	.1999	.1922	.1851
Oklahoma	.1689	.1755	.1791	.1764

SOURCE: Johnson, J. B., R. E. Vaile, and J. G. Youde. 1969. Characteristics of the Pacific Northwest beef feedlot industry. Pending publication by Oregon Agricultural Experiment Station, Oregon State University, Corvallis, Oregon.
Dietrich, Raymond A. 1969. Costs and economies of size in Texas-Oklahoma cattle feedlot operations. College Station. 36 p. (Texas. Agricultural Experiment Station. B-1083)

they will be able to obtain a significant share of the Pacific Northwest beef market. Furthermore, the rate of increase in cattle feeding in the southern Plains is currently pushing prices of feeder cattle and feed upward, thus placing that area in more of a disadvantage to the Pacific Northwest states.

Other Considerations on Supply of Cattle Available to a Beef Packing Plant in Central Oregon

The preceding sections have presented figures regarding the number of cattle produced for slaughter in the RPA. In estimating the number of cattle that could be procured for slaughter by a plant located in Central Oregon, several other factors should be considered.

The flow of cattle throughout the year is a matter of great importance relative to supply of cattle to a packing plant. An estimate of the number of fed cattle marketed for slaughter by month in 1968 was given in an earlier section. These figures included only the cattle marketed from three of the eight counties considered to be in the RPA. Assuming that the monthly marketing patterns in the other five counties were the same as the three counties included in the survey, and if the percent of cattle marketed each month as shown in Table 2 were applied to the total number of fed cattle marketed from the RPA (53, 000 in 1968), the monthly flow of fed cattle would appear as follows:

January	4, 887	July	4, 554
February	4, 099	August	5, 657
March	4, 179	September	6, 279
April	3, 664	October	4, 723

May	2,676	November	3,565
June	3,277	December	6,240

Adding the monthly marketings of nonfed slaughter cattle from the RPA to the above figures yields the following results:

January	7,551	July	5,847
February	6,154	August	8,120
March	5,591	September	8,115
April	6,604	October	7,397
May	5,478	November	5,668
June	4,651	December	8,119

Additional information from county agents and cattle marketers indicates rather conclusively that nonfed slaughter cattle produced in the COPC would also be available to a beef packing plant in Central Oregon. It is estimated on the basis of the present destination of the nonfed cattle moving to slaughter that 50% of the nonfed slaughter cattle marketed in Morrow, Klamath, and Malheur counties and all of the nonfed slaughter cattle marketed in Harney and Lake counties are within procurable distance of a proposed meat packing plant in Central Oregon.

Figures showing the number of nonfed slaughter cattle within procurable distance in the COPC are shown in Table 20. As this table shows, an additional 33,480 slaughter cattle marketed from these counties in 1968 would have been within procurable distance

Table 20. Nonfed Cattle Within Procurable Distance in Five Central Oregon Perimeter Counties, 1963-1968. a/

	Number of cattle	Percent change
1963	35, 125	
1964	38, 080	8.4
1965	36, 110	-5.2
1966	37, 725	4.5
1967	37, 425	-0.1
1968	33, 480	-1.0

a/ Includes beef cows, beef bulls, dairy cows; one-half of those marketed in Morrow, Klamath, and Malheur counties, and all marketed in Harney and Lake counties.

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U. S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

of the plant. The total number of slaughter cattle in all the counties then would have been 112, 775 head.

The monthly rates of marketing of the nonfed slaughter cattle for the COPC were not obtained. However, since a high percentage of these cattle are marketed through the Redmond auction, the percentages of nonfed slaughter cattle marketed as derived in Table 4 were used, the following figures derived:

January	3, 499	July	1, 697
February	3, 698	August	3, 234
March	1, 855	September	2, 411
April	3, 860	October	3, 512

May	3,679	November	2,762
June	1,805	December	2,468

Adding these figures to the number of cattle marketed monthly as shown above results in the following:

January	11,050	July	7,544
February	8,852	August	11,354
March	7,446	September	10,526
April	10,464	October	10,909
May	9,157	November	8,430
June	6,456	December	10,587

These are maximum estimates of the number of cattle marketed for slaughter within procurable distances of the proposed packing plant. The next consideration is estimating how many of these cattle could be procured by a packing plant in Central Oregon, given the competitive situation for slaughter cattle. Estimates of the percentage of available cattle that could be procured by a packing plant have been approximated from information given by representatives of two national packers. Management of one firm feels that a plant would expect to procure one-fourth of the available slaughter cattle in a given area. The other firm feels that in order to consider building a plant, it would have to kill 200,000 head per year and would require at least 300,000 head available within a 75-mile radius. This indicates that the plant

would expect to procure two-thirds of the cattle in the area.

If a plant in Central Oregon could procure one-fourth of the slaughter cattle available in the area, the monthly rates of slaughter would range from a low of 1, 614 head in June to a high of 2, 839 head in August. This would provide an hourly kill rate ranging from 10 head to 18 head. If the plant procured two-thirds of the cattle in the area, the monthly rates of slaughter would range from 4, 300 to 7, 562 head with hourly rates from 27 to 48 head.

Another important consideration is the rate of increase of cattle feeding in the area. One of the national meat packers feels that the rate of increase of cattle feeding in the area for which a new plant is being considered should be greater than the average rate of increase for the United States. They estimate that the present rate of increase for the United States is about 6% per year, so the rate of increase in the area should be greater than 6%.

Referring again to Table 1, it can be seen that during the years 1965 to 1968, the number of fed cattle marketed has declined each year. However, if one considers the average rate of change from 1963 to 1968, the number of fed cattle marketed has increased by about 5. 1% per year.

Cattle Procurement Estimates

In Chapter IV, model packing plants are synthesized to develop estimates of plant costs and returns for plants having different rates of output. Different plant outputs require different procurement patterns. These patterns are discussed in this section.

For cattle procurement purposes, the areas will be consolidated into zones as follows:

Zone I - Grant County

Zone II - Morrow, Wheeler, Sherman, Gilliam, and Wasco Counties

Zone III - Malheur and Harney Counties

Zone IV - Klamath and Lake Counties

Zone V - Deschutes and Crook Counties

Zone VI - Umatilla County

Zone VII - Baker and Malheur Counties

Zone VIII - Jefferson County

Zone I is limited to Grant County because it is a large county in which a large number of nonfed slaughter cattle are produced. Zone II consists of five counties to the north of Central Oregon, each of which produce only a small number of slaughter cattle. Zone III contains two southeastern counties producing a large number of nonfed slaughter cattle, and Zone IV consists of

two southwestern Oregon counties producing primarily nonfed slaughter cattle. Zone V contains two Central Oregon counties producing primarily nonfed slaughter cattle with a few fed slaughter cattle. Zone VI is a northeastern county in which large numbers of fed slaughter cattle are produced and Zone VII is also an area in which a substantial number of fed cattle are produced (Johnson and Vaile, 1968). Zone VIII is the area in which a large number of fed cattle are produced and the area in which it is assumed the packing plant would be located.

Zones VI and VII were included to provide a source of fed cattle in addition to those produced in the RPA. This was necessary because the largest plant synthesized in Chapter IV would require more fed cattle than are produced in the RPA. These two areas were chosen because of the large number of fed cattle produced there.

Table 21 shows the location of the cattle by number and percentage in the zones within the RPA and COPC. Also in this table are shown the estimates[2/] of the number of cattle that would be procured from the eight zones for the synthesized plants. The total annual outputs of the plants synthesized in Chapter IV are

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2/ These estimates are hypothetical and are used only for the estimation of cattle procurement costs for model plants synthesized in Chapter IV.

Table 21. Location of Cattle and Source of Cattle by Zones.

Location [a]	Fed cattle	Percent [b]	Nonfed cattle	Percent [b]
(zone)	(head)	(%)	(head)	(%)
I	1,550	7.4	7,300	12.9
II	8,250	39.3	9,990	17.7
III			15,600	27.6
IV			16,780	29.7
V	11,200	53.3	6,825	12.1
VIII	32,800		2,480	

Source [c]	Plant A		Plant B		Plant C		Plant D	
	Fed	Nonfed	Fed	Nonfed	Fed	Nonfed	Fed	Nonfed
I		322	513	1,231		931	1,395	2,150
II		441	2,723	1,691		1,278	7,425	2,950
III		688		2,636		1,992		4,600
IV		740		2,836		2,144		4,950
V		302	3,694	1,155		873	10,080	2,018
VI							4,150	
VII							4,150	
VIII	29,500	2,232	29,500	2,232	29,500	2,232	29,500	2,232

[a] Zone I - Grant County.
Zone II - Morrow, Wheeler, Sherman, Gilliam, and Wasco Counties.
Zone III - Malheur and Harney Counties.

Continued

Table 21--Continued.

Zone IV - Klamath and Lake Counties.
Zone V - Deschutes and Crook Counties.
Zone VIII - Jefferson County.

b/ Percent of total in Zones I-V.

c/ Zones I-V - same as in a/ above.
Zone VI - Umatilla County.
Zone VII - Baker and Malheur Counties
Zone VIII - Jefferson County.

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics. U.S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

18,900, 47,124, 37,800, and 75,600 for Plants A, B, C, and D, respectively.

It is assumed that 90% of the slaughter cattle produced in Zone VIII would be procured by the plant. Therefore, Zone VIII would provide more than enough fed cattle for Plant A. The nonfed cattle are obtained from the other zones in the RPA and COPC in the same proportion as their total numbers available for slaughter, shown in the location of cattle section of Table 21.

Plant B would be required to draw upon the entire RPA for fed cattle, as well as for nonfed cattle. These supplies would be taken from Zones I, II, and V in the same proportion as their total numbers of fed cattle, as shown in the location of cattle section of the table.

Plant C, as with Plant A, would obtain all its fed cattle from the RPA. Plant D has a very large fed cattle requirement, which could not be met with the RPA, given the 1968 production. To fill this requirement, the plant would have to procure 90% of the fed cattle produced in the RPA, and the remaining needs could be filled in equal amounts from Zones VI and VII. It should be realized, however, that this may be extremely difficult to do, given the competition for cattle, which will be increased substantially when the new packing plant at Wallula, Washington, opens.

Supply of Slaughter Sheep

Interest was also expressed concerning the feasibility of including a lamb slaughtering operation with the beef slaughtering operation. In response to this interest, the number of lambs and sheep produced in the RPA during the years 1963 to 1967 were obtained and are shown in Table 22. These figures show that the supply of fed lambs in the RPA has decreased from 49,900 in 1963 to 45,660 in 1967, an 8.5% decrease. Similarly, the number of other sheep present in the RPA has declined substantially during these years.

Table 22. Lambs, Ewes, All Other Sheep Present in the Eight Central Oregon Counties, 1963-1968.

	Fed lambs	Change		Ewes [a]	All other sheep	Total sheep	Percent change
		Number	Percent				
1963	49,900			67,700	15,100	132,700	
1964	65,000	15,100	13.03	60,500	19,500	145,000	9.27
1965	63,700	-1,300	-2.00	48,800	17,500	130,000	-10.34
1966	53,700	-10,000	-15.70	46,500	15,400	115,600	-11.08
1967	45,660	-8,040	-14.98	40,600	13,900	100,160	-13.36

a/ Ewes 1 year old and older.

SOURCE: Ganger, R. G. 1969. Specialist in County Statistics, U. S. Dept. of Agriculture. Statistical Reporting Service. Unpublished worksheets. Portland, Oregon.

III. THE MARKETABILITY OF THE PRODUCT

Introduction

This chapter examines the factors related to the market in which a beef packing plant in Central Oregon would sell its products. The first section examines the trend associated with the demand for beef in terms of per capita consumption and total consumption. In addition, the total slaughter and the total fed cattle and calf marketings are compared with the total consumption and total fed cattle consumption, respectively, in the three Pacific states. Then the deficits between total consumption and total slaughter, and between total fed cattle consumption and total fed cattle marketed are computed. Also, the per capita consumption of pork, lamb and poultry are given and compared with the per capita consumption of beef.

The next section deals with the competition for the beef market as it exists in Oregon as well as in parts of Washington and California, and is followed by a section which analyzes the economic barriers to market entry.

A description of the market structure and the buying and selling practices of some of the firms in the market are explained in the next section. Then the relevant markets for a packing plant in Central Oregon are determined. Also, the prospect of marketing fresh meat to various types of firms in the market are

examined.

The general market for by-products is then discussed followed by a brief discussion of the trend in demand for lamb and mutton. The chapter closes with a description of the distribution of fresh meat which would be incurred by model plants synthesized in Chapter IV.

Production and Consumption of Beef in the Pacific Coast States

The trend in demand for beef appears very favorable in the entire western region, as well as in the three Pacific states. Column 2 of Tables 23, 24, 25 and 26, contain the figures for the per capita consumption of beef for the western region of the United States. These figures were obtained by multiplying the national per capita consumption figures given for each year times the index number which applied to the western region. The resulting figures show that from 1960 to 1968, the per capita consumption of beef increased from 93.7 pounds to 120.3 pounds, a 26.6 pound increase. This is a 28.4% increase over a nine-year period.

To compare the per capita consumption of other meats which compete for the market with beef, figures have been calculated and listed on Table 27. These figures were calculated in the same manner as those for beef, that is, the per capita consumption figures for each type of meat were multiplied by the appropriate index number for the western region. These figures show that the per capita consumption of pork increased by only one pound during the period 1960 to

Table 23. Production and Consumption of Beef in Oregon, 1960-

Year	(1) Population	(2) Per capita consumption	(3) Consumption carcass wt. Col. 1 x Col. 2	(4) Carcass wt. ÷ live weight	(5) Live weight Col. 3 ÷ Col. 4	(6) Average live weight
	(1, 000)	(pounds)	(1, 000 lbs.)		(1, 000 lbs.)	(pounds)
1960	1, 772	93. 7	166, 036	.567	292, 832	986
1961	1, 788	96. 6	172, 721	.573	301, 433	996
1962	1, 817	97. 7	177, 521	.569	311, 988	993
1963	1, 852	103. 6	191, 867	.575	333, 682	1, 010
1964	1, 886	109. 8	207, 083	.574	360, 772	1, 003
1965	1, 937	109. 2	211, 520	.567	373, 051	989
1966	1, 966	114. 4	224,910	.573	392, 513	992
1967	1, 981	116. 5	230, 787	.579	398, 596	1, 002
1968	2, 008	120. 3	241, 562	.583	414, 343	1, 001
1970	2, 055	120. 3	247, 217	.583	424, 043	977
1975	2, 162	120. 3	260, 089	.583	446, 122	977
1980	2, 270	120. 3	273, 081	.583	468, 407	977
1985	2, 378	120. 3	286, 073	.583	490, 691	977

Continued

Table 23. Production and Consumption of Beef in Oregon, 1960-1968--Continued.

Year	(7) Consumption	(8) Slaughter	(9) Slaughter deficit	(10) Fed cattle and calves	(11) Fed cattle consumed marketed	(12) Fed cattle deficit
	Col. 5 ÷ Col. 6		Col. 7-Col. 8			Col. 11-Col. 10
	(head)	(head)	(head)	(1,000 head)	(head)	(head)
1960	296,990	266,600	30,390	117	222,742	105,742
1961	302,644	268,400	34,244	130	226,983	96,983
1962	314,187	261,000	53,187	148	235,640	87,640
1963	330,378	256,800	73,578	136	247,784	111,784
1964	359,693	293,600	66,093	147	269,770	122,770
1965	377,200	332,400	44,800	167	282,900	115,900
1966	395,678	324,300	71,378	189	296,759	107,759
1967	397,800	316,700	81,100	181	298,350	117,350
1968	413,929	347,400	66,529	181	310,447	129,447
1970	434,026					
1975	456,624					
1980	479,434					
1985	502,243					

SOURCE: U.S. Dept. of Commerce. Bureau of Census. 1966, 1967, 1968. Current population report. Nos. 348, 362, 414. Washington, D.C. (Series P-25)
U.S. Dept. of Agriculture. Economic Research Service. 1969. National food situation. Washington, D.C. May.
U.S. Dept. of Agriculture. Economic Research Service. Statistical Reporting Service. Consumer and Marketing Service. 1963-1969. Livestock and meat statistics. Washington, D.C.
U.S. Dept. of Agriculture. Statistical Reporting Service. Crop Reporting Board. 1963-1969. Cattle on feed. Washington, D.C.

Table 24. Production and Consumption of Beef in Washington, 1960-1968.

Year	(1) Population	(2) Per capita consumption	(3) Consumption carcass wt. Col. 1 x Col. 2	(4) Carcass wt. ÷ live weight	(5) Live weight Col. 3 ÷ Col. 4	(6) Average live weight
	(1, 000)	(pounds)	(1, 000 lbs.)		(1, 000 lbs.)	(pounds)
1960	2, 856	93. 7	267, 607	.567	471, 970	1, 017
1961	2, 884	96. 6	278, 594	.573	486, 202	1, 016
1962	2, 944	97. 7	287, 629	.569	505, 499	1, 017
1963	2, 961	103. 6	306, 760	.575	533, 496	1, 031
1964	2, 971	109. 8	326, 216	.574	568, 321	1, 038
1965	2, 984	109. 2	325, 853	.567	574, 696	1, 018
1966	3, 074	114. 4	351, 666	.573	613, 727	1, 035
1967	3, 208	116. 5	373, 372	.579	644, 857	1, 036
1968	3, 276	120. 3	394, 103	.583	675, 990	1, 037
1970	3, 064	120. 3	368, 599	.583	632, 245	1, 033
1975	3, 185	120. 3	383, 156	.583	657, 214	1, 033
1980	3, 366	120. 3	404, 930	.583	694, 563	1, 033
1985	3, 607	120. 3	433, 922	.583	744, 292	1, 033

Continued

Table 24. Production and Consumption of Beef in Washington, 1960-1968--Continued.

Year	(7) Consumption	(8) Slaughter	(9) Slaughter deficit	(10) Fed cattle and calves marketed	(11) Fed cattle consumed	(12) Fed cattle deficit
	Col. 5 ÷ Col. 6		Col. 7-Col. 8			Col. 11-Col. 10
	(head)	(head)	(head)	(1,000 head)	(head)	(head)
1960	464,081	435,500	28,581	220	348,061	128,061
1961	478,545	452,000	26,545	247	358,909	111,909
1962	497,049	463,000	34,049	258	372,787	114,787
1963	517,455	475,000	42,455	267	388,091	121,091
1964	547,515	535,500	12,015	290	410,636	120,626
1965	564,534	564,500	34	308	423,401	115,401
1966	592,973	567,500	25,473	290	444,730	154,730
1967	622,449	564,500	57,949	315	466,837	151,837
1968	651,871	592,500	59,371	332	488,903	156,903
1970	612,047					
1975	636,219					
1980	672,375					
1985	720,515					

SOURCE: U.S. Dept. of Commerce. Bureau of Census. 1966, 1967, 1968. Current population report. Nos. 348, 362, 414. Washington, D.C. (Series P-25)
U.S. Dept. of Agriculture. Economic Research Service. 1969. National food situation. Washington, D.C. May.
U.S. Dept. of Agriculture. Economic Research Service. Statistical Reporting Service. Consumer and Marketing Service. 1963-1969. Livestock and meat statistics. Washington, D.C.
U.S. Dept. of Agriculture. Statistical Reporting Service. Crop Reporting Board. 1963-1969. Cattle on feed. Washington, D.C.

Table 25. Production and Consumption of Beef in California, 1960-1968.

Year	(1) Population	(2) Per capita consumption	(3) Consumption carcass wt. Col. 1 x Col. 2	(4) Carcass wt. ÷ live weight	(5) Live weight Col. 3 ÷ Col. 4	(6) Average live weight
	(1, 000)	(pounds)	(1, 000 lbs.)		(1, 000 lbs.)	(pounds)
1960	15, 862	93.7	1, 486, 269	.567	2, 621, 286	1, 026
1961	16, 451	96.6	1, 589, 167	.573	2, 773, 415	1, 027
1962	16, 990	97.7	1, 659, 923	.569	2, 914, 264	1, 022
1963	17, 556	103.6	1, 818, 802	.575	3, 163, 134	1, 030
1964	18, 003	109.8	1, 976, 729	.574	3, 443, 779	1, 034
1965	18, 426	109.2	2, 012, 119	.567	3, 548, 711	1, 018
1966	18, 669	114.4	2, 135, 734	.573	3, 727, 284	1, 027
1967	18, 992	116.5	2, 212, 568	.579	3, 821, 361	1, 036
1968	19, 300	120.3	2, 321, 790	.583	3, 982, 487	1, 033
1970	20, 761	120.3	2, 497, 548	.583	4, 283, 959	1, 030
1975	23, 224	120.3	2, 793, 847	.583	4, 792, 190	1, 030
1980	25, 973	120.3	3, 124, 552	.583	5, 359, 437	1, 030
1985	28, 997	120.3	3, 488, 339	.583	5, 983, 429	1, 030

Continued

Table 25. Production and Consumption of Beef in California, 1960-1968--Continued.

Year	(7) Consumption Col. 5 ÷ Col. 6 (head)	(8) Slaughter (head)	(9) Slaughter deficit Col. 7-Col. 8 (head)	(10) Fed cattle and calves marketed (1, 000 head)	(11) Fed cattle consumed (head)	(12) Fed cattle deficit Col. 11-Col. 10 (head)
1960	2, 554, 860	2, 476, 000	78, 860	1, 595	1, 916, 145	321, 145
1961	2, 700, 501	2, 514, 000	186, 501	1, 701	2, 025, 376	324, 376
1962	2, 854, 466	2, 565, 000	289, 466	1, 844	2, 140, 850	296, 850
1963	3, 071, 004	2, 680, 000	391, 004	1, 899	2, 303, 253	404, 253
1964	3, 330, 541	2, 957, 000	373, 541	2, 061	2, 497, 906	436, 906
1965	3, 485, 964	3, 004, 000	481, 964	2, 282	2, 614, 473	332, 473
1966	3, 629, 293	3, 121, 000	508, 293	2, 219	2, 721, 970	502, 970
1967	3, 688, 572	3, 050, 000	638, 572	2, 049	2, 766, 429	717, 429
1968	3, 855, 263	2, 919, 000	936, 263	2, 068	2, 891, 447	823, 447
1970	4, 159, 183					
1975	4, 652, 612					
1980	5, 203, 337					
1985	5, 809, 154					

SOURCE: U. S. Dept. of Commerce. Bureau of Census. 1966, 1967, 1968. Current population report. Nos. 348, 362, 414. Washington, D. C. (Series P-25)
U. S. Dept. of Agriculture. Economic Research Service. 1969. National food situation. Washington, D. C. May.
U. S. Dept. of Agriculture. Economic Research Service. Statistical Reporting Service. Consumer and Marketing Service. 1963-1969. Livestock and meat statistics. Washington, D. C.
U. S. Dept. of Agriculture. Statistical Reporting Service. Crop Reporting Board. 1963-1969. Cattle on feed. Washington, D. C.

Table 26. Production and Consumption of Beef in Three Pacific States, 1960-1968.

Year	(1) Population	(2) Per capita consumption	(3) Consumption carcass wt. Col. 1 x Col. 2	(4) Carcass wt. ÷ live weight	(5) Live weight Col. 3 ÷ Col. 4	(6) Average live weight [1/]
	(1, 000)	(pounds)	(1, 000 lbs.)		(1, 000 lbs.)	(pounds)
1960	20, 490	93.7	1, 919, 912	.567	3, 386, 088	
1961	21, 123	96.6	2, 040, 482	.573	3, 561, 050	
1962	21, 751	97.7	2, 125, 073	.569	3, 734, 750	
1963	22, 369	103.6	2, 317, 429	.575	4, 030, 311	
1964	22, 860	109.8	2, 510, 028	.574	4, 372, 871	
1965	23, 347	109.2	2, 549, 492	.567	4, 496, 458	
1966	23, 709	114.4	2, 712, 310	.573	4, 733, 525	
1967	24, 181	116.5	2, 816, 727	.579	4, 864, 813	
1968	24, 584	120.3	2, 957, 455	.583	5, 072, 821	
1970	25, 880	120.3	3, 113, 364	.583	5, 340, 246	
1975	28, 571	120.3	3, 437, 092	.583	5, 895, 526	
1980	31, 609	120.3	3, 802, 563	.583	6, 522, 406	
1985	34, 982	120.3	4, 208, 334	.583	7, 218, 411	

Continued

Table 26. Production and Consumption of Beef in Three Pacific States, 1960-1968--Continued.

Year	(7) Consumption[2/] Col. 5 ÷ Col. 6	(8) Slaughter	(9) Slaughter deficit Col. 7-Col. 8	(10) Fed cattle and calves marketed	(11) Fed cattle consumed	(12) Fed cattle deficit Col. 11-Col. 10
	(head)	(head)	(head)	(1, 000 head)	(head)	(head)
1960	3, 315, 931	3, 178, 100	137, 831	1, 932	2, 486, 948	554, 948
1961	3, 481, 690	3, 234, 400	247, 290	2, 078	2, 611, 268	533, 268
1962	3, 665, 702	3, 289, 000	376, 702	2, 250	2, 749, 277	499, 277
1963	3, 918, 837	3, 411, 800	507, 037	2, 302	2, 939, 128	637, 128
1964	4, 237, 749	3, 786, 100	451, 649	2, 498	2, 178, 312	680, 312
1965	4, 427, 698	3, 900, 900	526, 798	2, 799	3, 320, 774	563, 774
1966	4, 617, 944	4, 012, 800	605, 144	2, 698	3, 463, 459	765, 459
1967	4, 708, 821	3, 931, 200	777, 621	2, 545	3, 531, 616	986, 616
1968	4, 921, 063	3, 858, 900	1, 062, 163	2, 581	3, 690, 797	1, 109, 797
1970	5, 205, 256					
1975	5, 745, 455					
1980	6, 355, 146					
1985	7, 031, 912					

[1/] Not used in this table

[2/] Sum of number consumed from the three Pacific states.

SOURCE: U.S. Dept. of Commerce, Bureau of Census. 1966, 1967, 1968. Current population report. Nos. 348, 362, 414. Washington, D. C. (Series P-25)

U.S. Dept. of Agriculture. Economic Research Service. 1969. National food situation. Washington, D. C. May.

U.S. Dept. of Agriculture. Economic Research Service. Statistical Reporting Service. Consumer and Marketing Service. 1963-1969. Livestock and meat statistics. Washington, D. C.

U.S. Dept. of Agriculture. Statistical Reporting Service. Crop Reporting Board. 1963-1969. Cattle on feed. Washington, D. C.

Table 27. Per Capita Consumption of Pork, Lamb, and Poultry in the Western United States, 1960-1968.

Year	Pork	Lamb[1/]	Poultry[2/]
	(pounds)	(pounds)	(pounds)
1960	57.1	5.0	33.4
1961	54.6	5.4	36.7
1962	55.9	5.5	36.2
1963	57.5	5.0	36.8
1964	57.5	4.4	37.5
1965	51.5	4.9	40.0
1966	51.0	4.2	42.3
1967	56.2	4.1	44.7
1968	58.1	3.9	44.0

1/ Includes lamb and mutton.

2/ Includes ducks, geese, chickens and turkeys.

SOURCE: U.S. Dept. of Agriculture. Economic Research Service. 1968. Food consumption prices and expenditures. Washington, D.C. July. (Agricultural Economics Report no. 138)
U.S. Dept. of Agriculture. Economic Research Service, 1969. National food situation. Washington, D.C., May. (NFS-128)

1968 and the per capita consumption of lamb decreased by 1.1 pounds during that period. The per capita consumption of poultry underwent a marked increase of 10.6 pounds, although this was less than half the increase in per capita consumption of beef. Thus, it is apparent that beef is increasing in demand considerably over other closely competing products.

To estimate the total number of cattle consumed in Oregon during the years 1960 to 1968, the per capita figures were multiplied by the number of people living in Oregon. These population figures are shown in Column 1 of Table 23. The results of these calculations are shown in Column 3. Since the per capita consumption figures are given in terms of carcass weight equivalents, the figures derived in Column 3 were divided by the factors shown in Column 4 to convert the carcass weight equivalents to live animal weight equivalents. This factor was obtained by dividing the average dressed weight of all cattle slaughtered in the United States (48 states) by the average live animal weights of all cattle slaughtered in the United States (48 states). The resulting figures are given in Column 5. Then the total live weights of beef consumed were divided by the average slaughter weights to obtain the number of animals consumed. The average slaughter weights are those for cattle slaughtered in Oregon and are shown in Column 6.

The results of the calculations for the number of animals

consumed in Oregon from 1960 to 1968 are given in Column 7. These figures show that the total consumption of cattle in Oregon increased from 296, 990 head in 1960 to 413, 929 head in 1968, which is an increase of 39. 4%. This includes both the increase resulting from per capita consumption increases and population increases.

To develop projections of the number of cattle that will be consumed in Oregon in future years on a basis of population alone, calculations were made using population estimates for the years 1970, 1975, 1980 and 1985. The per capita consumption was held constant at the 1968 level and the same procedure was followed as explained above to obtain consumption for previous years. The results show that in Oregon, 434, 026 cattle will be consumed in 1970, 456, 624 in 1975; 479, 434 in 1980; and 502, 243 in 1985, assuming that the population projections are accurate and per capita consumption remains constant.

A rather large deficit has existed between the number of cattle consumed and the number of cattle slaughtered in Oregon during the past. To show the magnitude of this deficit, total cattle slaughter was subtracted from total consumption for the various years. The resulting deficits are shown in Column 9 of Table 23. As these figures show, the deficit between consumption and slaughter has increased from 30, 390 head in 1960 to 66, 529

head in 1968, and was as high as 81,100 head in 1967.

Figure 4 shows a graphical representation of the annual fluctuations of the deficit between cattle consumption and cattle slaughter. Two things become apparent from this figure. The first is that relatively wide fluctuations have existed and the second is that the general trend indicated is one of an increasing deficit between consumption and slaughter. The first point is probably due to the fact that the number of slaughter cattle which are available to Oregon slaughtering firms varies considerably from year to year.

The second point is probably due to the fact that, in keeping with a general trend in the meat packing industry, more and more slaughtering is taking place near areas of production, particularly in areas where large numbers of cattle are fed. In the past, large numbers of slaughter cattle have been shipped in from neighboring states to packing plants in Oregon located in or near Portland. Now, however, it appears that more of the slaughtering is taking place near the feedlots in the neighboring states and carcasses are being shipped in to the Oregon market in the place of the live cattle.

Another important point to consider is the relationship between the number of fed cattle consumed and the number of fed cattle produced in Oregon. Precise figures on amounts of fed beef consumed and amounts of nonfed beef consumed are not available.

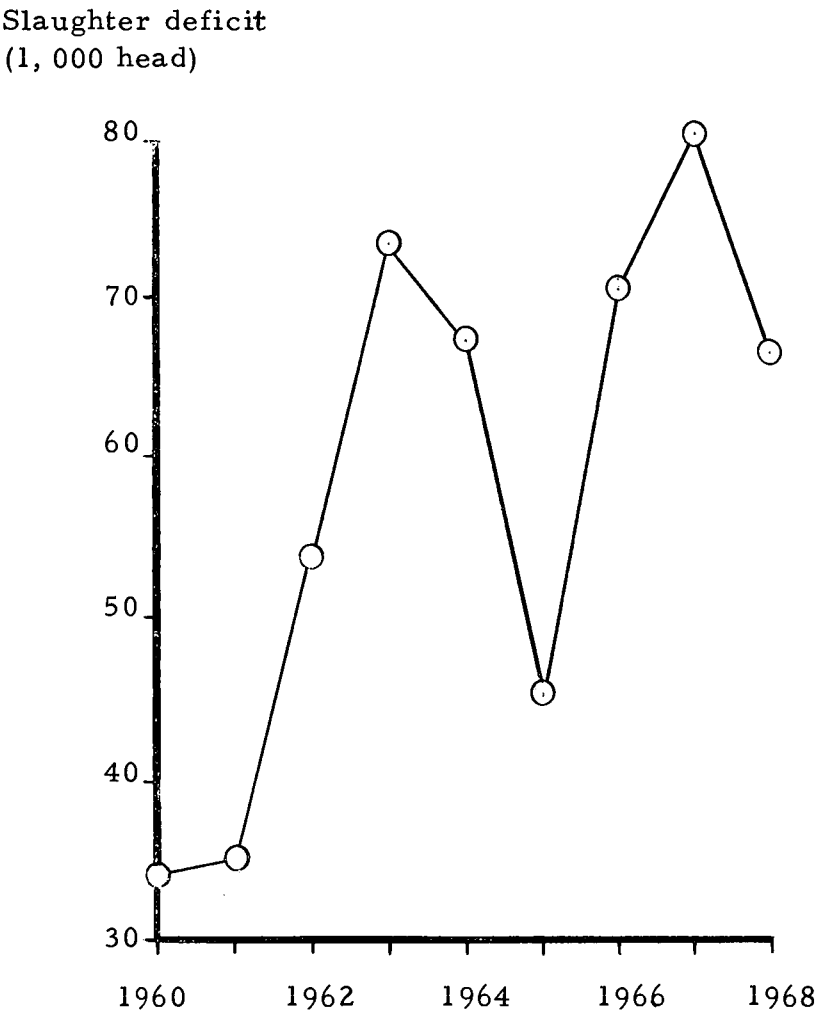

Figure 4. Deficit between cattle consumption and slaughter in Oregon, 1960-1968.

However, an estimate of the percentage of fed beef consumed in relation to total beef consumed can be obtained by comparing the number of fed cattle marketed in relation to total slaughter in the western states. These figures show that the fed cattle marketings represent about 75% of the total number of cattle slaughtered in the 17 western states. Thus, it would seem reasonable that 75% of the beef consumption in Oregon is fed beef.

Applying this percentage figure to the estimated total consumption results in the figures shown in Column 11 of Table 23. The number of fed cattle and calves marketed are shown in Column 10, and the differences are given in Column 12. As these figures and the graph in Figure 5 show, the fed cattle deficit in Oregon has had some fluctuation and exhibits a general upward trend.

Comparisons between cattle consumption and production were also made for Washington and California (Tables 24 and 25), then added to the figures developed for Oregon. The totals for the three states are given in Table 26. As can be seen from this table, the deficit of cattle slaughtered with respect to cattle consumed has increased substantially in every year but one (1964) since 1960. Also, the deficit in fed beef production has increased substantially in every year except 1962 and 1965.

In projecting the total consumption of beef in the three Pacific states, the figures developed show that consumption can be expected

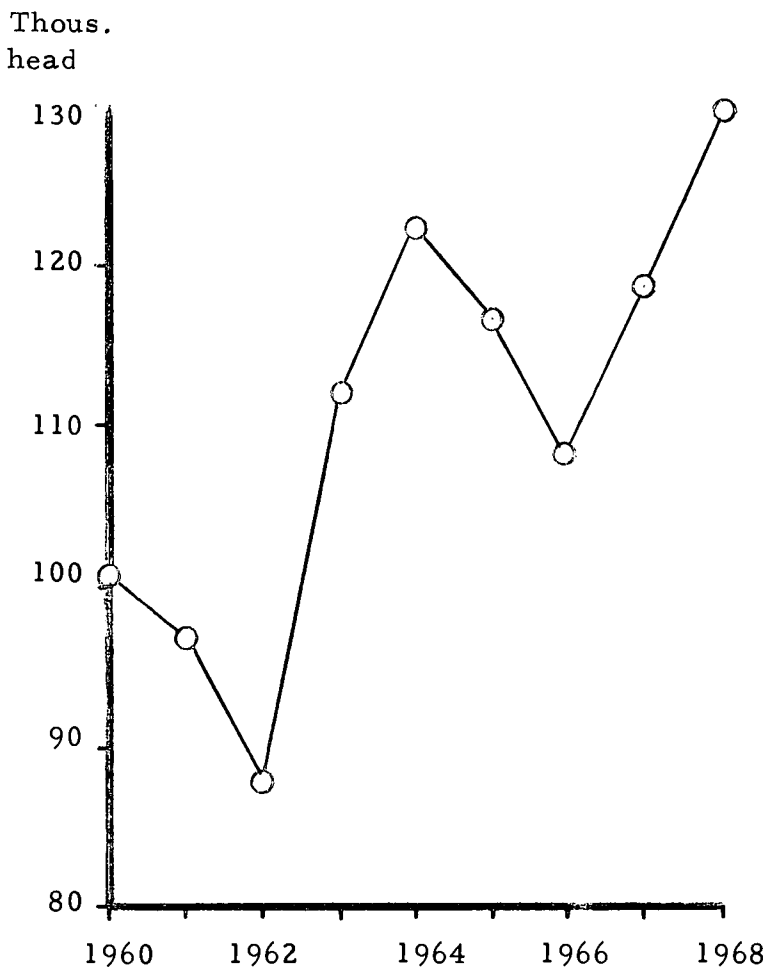

Figure 5. Deficit between fed cattle consumption and fed cattle marketings in Oregon, 1960-1968.

to increase from 5, 205, 256 cattle in 1970 to 7, 031, 912 in 1985. This would be an approximate increase of 2. 3% per year over the 15 -year period, assuming that the per capita consumption of beef remained constant at the 1968 level.

It should be noted here that some predictors in the beef industry estimate that the increase in consumption during the next few years will be greater than that shown by the figures in this study since per capita consumption is expected to continue to increase. Also, it is noted that the population figures used were taken from the Bureau of Census, which provides several estimates of future population. These estimates are based on possible birth rates and net immigration rates. The estimate used is the series considered to be very conservative, thus the estimates for future consumption of beef are considered to be very conservative.

Nevertheless, the figures indicate that the demand for beef in the West Coast states should remain relatively strong in the future, barring unforeseen circumstances which could cause severe adverse fluctuations in either demand or supply of beef.

Market Competition

Information concerning the volume of meat marketed and the area in which it was marketed was obtained in general terms from the existing plants which were interviewed. This information shows that the packing plants in Portland along with a plant in Albany slaughter about 247, 000 head of cattle per year. This accounts for about 75% of the total Oregon slaughter.

These plants all have a general market area which consists of the Portland metropolitan area and surrounding suburbs. In addition, they sell meat in the medium to large cities north and south of Portland which are located near Interstate 5. These cities are located as far south as Roseburg and as far north as Seattle. Also, one firm obtains contracts for large amounts of frozen ground beef from the U. S. D. A. school lunch program and also sells large quantities of frozen ground beef and fabricated cuts to the military.

Other Oregon plants which were interviewed were the Long Creek plant, Eastern Oregon Meat Packers at Baker, and TP Packing Company at Klamath Falls. The Long Creek plant is horizontally integrated with the Coast Packing Company in Portland, so its entire production is marketed through the Portland firm. The other two plants are relatively small plants and serve

primarily the local area in which they operate.

Two other firms from outside Oregon which supply beef to the relevant market were also interviewed. One was the James Allan and Sons plant located at Gooding, Idaho. This firm presently supplies carcasses to a Portland retail firm at relatively high volume. It also supplies carcasses to firms in Seattle and other parts of Washington as well as California; however, the remaining extent of its market is not known.

Minch's Wholesale Meat at Red Bluff, California, markets part of its production in southern Oregon as far north as Medford, however most of its volume is distributed in the local area around Red Bluff and in the San Francisco Bay area.

A new, large packing plant is currently under construction by Cudahy at Wallula, Washington. This plant will be in operation in October or November, 1970. It will have a cattle killing capacity of about 113,000 per year. It is intended that this meat be distributed in all of the population centers of the Northwest and California. It is expected to market beef in Spokane, Seattle, Portland, and California. Most of the beef marketed in California will be cow beef.

Numerous other small packing plants exist in Oregon, but it was not possible to interview all of them. It is reasonable to infer that they operate primarily as custom slaughtering businesses

and are confined in their marketing primarily to the local area in which they operate, so they would not represent a great deal of, if any, market competition to a Central Oregon plant.

Analysis of Economic Barriers to Market Entry

An analysis of economic barriers to market entry is an important part of a study to determine the feasibility of establishing a new firm in a given industry. In making such an analysis, it is first necessary to identify the relevant theory, then examine empirical evidence to determine whether actual facts are in accord with the theory. If so, some predictions may be made, in this case, as to the degree of difficulty of entry into the fresh meat packing industry a new firm might have and the effects a new entrant might have on the industry.

To determine the degree of difficulty of entry a new firm might have, it must be determined to what extent the conditions of easy entry are or are not fulfilled. These conditions are "(1) established firms have no absolute cost advantages over potential entrant firms; (2) established firms have no product differentiation advantages over potential entrant firms; and (3) economies of large scale firms are negligible, in the sense that the output of a firm of optimal (lowest-cost) scale is an insignificant fraction of total industry output." (Bain, 1956, p. 12)

Condition (1) means that a new entrant firm should be able to secure just as low a minimal average cost of production after entry as the existing firms had before it entered. This, according to Bain, implies that "(a) established firms have no price or other advantages over entrants in purchasing or securing any productive factor (including investible funds); (b) the entry of an added firm should have no perceptible effect on the going level of any factor price; and (c) that established firms have no preferred access to productive techniques." (Bain, 1956, p. 12) A corollary to (a) is that capital requirements are not so great as to prevent a new firm from being established without excessive risk.

Condition (2) means that either no product differentiation exists or that if it does exist, the new firm is able to obtain a price-cost relationship comparable to that presently held by existing firms, when costs include selling costs, which implies that existing firms have no net price or selling cost advantage over new firms because of buyer preferences.

Condition (3) implies that a new firm entering at lowest cost scale will have no perceptible influence on the price of the product. If this condition fails to hold, the new firm must anticipate either lower industry prices or higher costs of production than could be obtained by operating at optimal scale if it chooses to operate at less than optimal scale.

Absolute Cost Advantage

In his rather thorough study of barriers to entry in various industries of the United States, Bain found that sources of absolute cost advantages could be placed in four categories. They are:

(1) The disadvantage of entrant firms in acquiring expert management personnel.

(2) The disadvantage of entrant firms in acquiring "production know-how" of the unpatented variety, which is nevertheless not freely available because of secrecy or a lack of general dissemination of specialized knowledge.

(3) The control through patents of various production techniques by established firms--a control which permits them to exclude the entrant from access to such techniques or to assess a royalty for use that may be a disadvantage to the entrant.

(4) The control by established firms of essential natural-resource supplies (generally minerals), with the result that entrants either could not secure adequate supplies of this sort or would have to employ inferior or high-cost supplies. (Bain, 1956, p. 148)

Bain found that in many industries, including the meat packing industry, the first source of absolute cost advantages was considered to be the most critical. This undoubtedly would be true for a new plant in Central Oregon. The management is responsible for the acquisition of markets and establishing firm relationships with those to whom the plant must sell its product, which is probably the most important function in the entire process.

In addition, the manager must coordinate the procurement of slaughter cattle and the slaughtering process with the marketing process. The ability of the manager to accomplish this, along with the determination of prices to pay for cattle and the prices to ask for the product, will be most important in obtaining a successful operation.

The importance of expert management has been demonstrated many times in the meat packing industry. A most recent example is a medium size plant established in Idaho. This plant apparently had all the prerequisites for a successful operation except an experienced and adept manager who could coordinate the operation of the plant and develop marketing outlets for the product. Consequently, since the plant was unable to operate under the original ownership, it was leased to another large established firm which sent a qualified manager to the plant. It is now operating, apparently successfully.

The second source of disadvantage is considered to be very minimal. The production aspect of the operation of the packing plant does not require a high degree of skill nor is there a great deal of secrecy over "production know-how" within the industry.

The third source is not considered important at the present time; however, it may become more important in the future. With regard to this, Swift and Company has developed a method of

assuring tenderness in meat through a patented process they call ProTen. . This method is used now for about 30% of Swift's fresh beef production and the branded product allows Swift to obtain as much as two cents per pound for it more than the untreated beef (Meyers, 1969). This process is not used in Swift's Nebergal plant located at Albany at the present time, and it is not expected to be introduced at that plant in the foreseeable future. It is used for limited numbers of cattle in Swift's H and H Packing Company at Yakima, Washington, and some of this beef is marketed in small quantities in Oregon stores. Therefore, this process does not affect the Pacific states' beef market at the present and will not, at least in the foreseeable future (Henshaw, 1970). However, the success which Swift is experiencing with ProTen is strongly acknowledged (Swift and Company, 1968) and should be looked at as a possible source of advantage some time in the future.

Another patented process has been developed by Armour and Company. This is an electronic device which measures tenderness in beef. This innovation also has not been used to a great extent in the West, however, it is very probable that it will see considerable use in the near future (Cournot, 1970). This could give Armour an absolute cost advantage over other existing packing plants.

The fourth source of disadvantage also is considered to be

minimal. The primary resource a packing plant must obtain is cattle. The extent of this disadvantage would depend upon the volume at which a Central Oregon plant attempted to operate. At relatively small volumes, it would have little, if any, disadvantage because it could procure most of its cattle from feedlots near the plant. However, if the plant sought to operate at such a high volume that it was necessary to procure a high percentage of all the cattle within procurable distance of it, competitors would either bid up the prices for slaughter cattle, obtain cattle from other sources, or decrease their volume. The end result probably would be a combination of all three of these alternatives, and it is not likely that the existing plants could bid up the prices of cattle a great deal over that which they would otherwise have been.

Another source of disadvantage which should be considered here is the ability of the firm to acquire capital. The national packers have access to amounts of capital which presumably far surpass those of an independent firm in Central Oregon. If this were true, the existing plants would have the advantages of greater flexibility in choosing investment alternatives as well as a possible cost advantage of having to pay less interest on capital.

In summary, the present situation appears to be consistent with Bain's previous finding which is that, except for an initial difficulty of obtaining management personnel and expertise, the

absolute cost barrier to market entry in the fresh meat packing industry is minimal at the present time.

Product Differentiation Advantages

Product differentiation advantages were also found by Bain to be negligible in the fresh meat packing industry. This is because fresh meat has characteristics which do not lend themselves well to differentiation. Consumers buy on a basis of grade and appearance rather than by brand.

The new developments such as the ProTen and Tender-Test methods of guaranteeing tenderness in beef could, however, lead to product differentiation advantages, as the meat to which both of these innovations is applied is packaged and labeled appropriately. Also, a meat packing firm performing fabricating and portion control cutting services could develop a differentiated product if the firm could maintain consistent quality and weight in the cuts of meat it produced. At this point in the development of the demand for such services, it would appear that a firm providing these services could obtain a large and stable clientele for its product if it could be relied upon for consistency in the quality and weight of the cuts of meat it sells.

A method of measuring the degree of differentiation involved in the marketing of a product is to determine the amount of

advertising done for that product. A large advertising expenditure would indicate a high degree of differentiability, and vice versa (Bain, 1959). Figures for 1964 show that 67 firms which slaughtered cattle only, incurred advertising expenditures which amounted to only .2% of sales (National Commission on Food Marketing, 1966), which indicates a low product differentiation barrier to entry at that time.

Economies of Scale Advantages

To understand what is meant by economies of scale as a barrier to market entry, it is helpful to describe what must not occur in the market when a new firm enters if economies of scale are not a significant deterrent to entry. This is, "that an entrant firm, even if it enters at an optimal or lowest-cost scale, will add so little to industry output that its entry will have no perceptible effect on going prices in the industry. In order to avail itself of the lowest costs available to established firms, the entrant need not augment industry output enough to make the industry price less attractive; thus, the pursuit of economies of scale to the ultimate is possible and provides no deterrent to entry." (Bain, 1956, p. 13)

Bain reported some conclusions as to the significance of economies of scale as a barrier to entry based on a study using data covering a period from 1949 to 1952. His results showed that a single optimal plant supplying fresh meat was of such size as to

supply from 1/50% to 1/5% of the national market, 1/10% to 1% of the largest submarket, and 1/4% to 2-1/4% of the smallest major submarket. He concluded on a basis of this information that scale economies in the fresh meat packing industry were relatively unimportant (Bain, 1956).

The next problem is to determine whether or not Bain's conclusion holds now, almost 20 years later. To determine this, it would be helpful to know what changes have taken place with respect to costs of production and whether or not the minimum optimal scale is different and, if so, to what extent it is different. When the percentages given by Bain are applied to the total 1950 national slaughter, it turns out that the optimal scale plant might have a capacity ranging from 14 head per day to 138 head per day.

In conversations with individuals involved in the management of three of the large national meat packing firms, opinions have been expressed as to the smallest optimal size of packing plant. Swift and Company indicated that the optimal plant would kill 400, 000 cattle per year, although they would consider operating a plant with a kill of 50, 000 cattle per year. Wilson and Company indicated that 200, 000 head per year was a realistic estimate of optimal plant size. Along the same line, Harold B. Meyers reported that Iowa Beef Packers operates a plant at a capacity of over 400, 000 head per year (Meyers, 1969). Their operations,

however, include breaking, fabricating and vacuum packing of meat. At the present time, Cudahy is building a plant in Washington which will have a capacity of about 120, 000 per year.

In a comparison of studies of economies of scale in meat packing plants, Franzeman and Kuntz (1966) found that economies were gained until the plant reached a capacity of 60 head per hour, or about 120, 000 head per year, but diseconomies were encountered for plants with larger capacities. Logan and King (1962) found, however, that economies were gained as capacity continued to increase to as high as 120 head per hour or about 240, 000 head per year. The diseconomies of scale found in the former study were attributed to the inclusion of rendering and cold offal work-up operations which were excluded from the latter study.

From this, it would appear that the optimal plant producing fresh beef only ranges in capacity from 120, 000 per year to 240, 000 per year, depending upon the extent to which by-products are processed within the plant.[3/] Since the total 1968 national

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3/ This conclusion is based primarily on the fact that the new Cudahy plant is being built at a scale of approximately 120, 000 per year. The economies of scale studies may lack relevance because they do not include costs of assembling cattle nor do they include costs of marketing and distribution.

slaughter was 35, 026, 400 head of cattle, the optimal plant would range in size from . 34% to . 65% of the national capacity. Thus, the optimal plant is larger now both in terms of absolute size and in terms of percent of national capacity than it was during the period in which Bain's study was conducted.

Assuming that a plant in Central Oregon would carry on rendering and cold offal work-up operations, it could be assumed that the optimal size would be 120, 000 per year. The total cattle slaughter in Oregon in 1968 was 347, 400 so the optimal plant would produce 34. 5% of the Oregon cattle slaughter. The total cattle slaughter in the three Pacific states in 1968 was 3, 858, 900 cattle so the optimal plant would produce 3. 1% of the Pacific states' slaughter. In terms of the Pacific states' market then, the optimal plant would appear to have a relatively small barrier to entry with respect to size of plant, however, if the market for the product is narrowed down to just the state of Oregon, the barrier is relatively large. Since any meat packing plant must have Federal inspection which qualifies it to market its product across state boundaries which a plant in Central Oregon would probably do, it would consider its market to include all three Pacific Coast states. Thus, its barriers to entry would be considered to be very slight.

Given the fact that the economies of scale barrier to entry is relatively very large with respect to the Oregon market alone,

can it then be predicted what effect a new entrant will have on the market and whether or not the reaction by established firms could be severe enough to prevent the new firm from remaining in the market once it had entered, and whether or not the new firm will be greatly disadvantaged because of the economies of scale barrier?

Bain (1956) discussed six conjectures as to existing firms' possible reactions to a new entrant, four of which contain relevance to this situation. The possible actions and reactions are (1) that the entrant firm enters at considerably less than optimal scale so that his presence on the market is insignificant to established firms. His average cost is then higher than existing firms (providing they are operating nearer to optimal scale), but market prices are unaffected by his entry. Another possibility is that (2) the entrant enters at significantly large scale and established firms react by maintaining previous prices and permit entrant to secure as much of the market as he can. Or, (3) the entrant enters at significantly large scale and established firms maintain previous output which causes the industry price to be lowered. The fourth conjecture falls somewhere between (2) and (3) above. It is that (4) the entrant enters at significantly large scale and established firms decrease output but by less than in (2) so that prices decrease but by less than in (3).

In analyzing (1) with respect to the Oregon market, a plant

producing about 5,000 cattle per year would have only 1.4% of the market, which is insignificant. To determine the relatively higher costs at which a plant of this size would operate, Sanders, Frazier and Padgett (1964) reported that Georgia plants slaughtering 34,380 head per year had total costs[4/] of $2.82 per head, whereas a plant with an annual output of 5,556 head had total costs of $5.46 per head, almost twice that of the larger plant. Furthermore, the smaller plant had a lower wage scale than the larger plant. This, along with the fact that the availability of cattle for slaughter near a plant located in Central Oregon is much greater than 5,000 head per year, gives sufficient cause to conclude that the plant should attempt to enter the industry at annual rates of 5,000 head per year or more.

With the supply of cattle the plant would have to draw from, it is most likely that the plant would attempt to operate at a rate of 25,000 head to 50,000 head per year, which would be from 7.2% to 14.39% of the Oregon market. This would appear to be sufficient to provoke some sort of reaction by established firms. This reaction is quite likely to correspond to conjecture (4) listed above.

4/ Excluding costs of procurement, selling and delivery.

Insofar as economically practical, the established firms would choose to react according to conjecture (2) and maintain prices at the present levels. However, the extent to which they would pursue this course of action would be limited by increasing costs associated with unused plant capacity, as well as a reluctance to give up established market shares. They would be able to do this to an extent, however, because of current purchasing policies of several major retail firms. This policy is that the meat must be inspected by the firm's buyer prior to purchase and the buyers will not travel long distances to make these purchases. Therefore, the Central Oregon plant would be excluded from this share of the market.

On the other hand, for firms which do not pursue this type of buying policy, the competition is very rigid. One packer claims that a price difference of one-fourth cent will cause a buyer to purchase from another supplier even though the supplier with the higher prices has sold consistently in large volumes and with high quality to the buyer for a long period of time. Other packers claim that the only criteria that a new entrant is required to meet in order to sell in the market is that he price his product relatively close to prices being taken by existing packers and that the product has comparable quality, yield and cutability.

Even so, at some point, the plants would choose to minimize

their losses by accepting lower prices for their product rather than lose their sales to a new entrant. The extent to which the existing firms would pursue (3) would be limited by the amount to to which prices could fall without inflicting operating losses on the existing plants in the long run. It would appear that this would not be very great, as the Portland packers are quick to point out that their profits as a percent of sales are very low. One packer, in fact, claims a profitability of 0.5% of his sales. This compares with a national average of 1% in the meat packing industry (American Meat Institute, 1969).

In summary, current empirical evidence when applied to theoretical principles concerning economic barriers to market entry in the fresh meat packing industry indicates that at the present time the barriers to entry are insignificant. The major disadvantages a new entrant would most likely encounter are management and capital limitations. It is important to note, however, that recent developments and current trends could very likely produce product differentiation and absolute cost advantages which would pose significant barriers in the near future.

The Market Structure and Conduct

The segments of the meat marketing system which are of interest in this section consist of wholesale and retail levels.

Detailed descriptions of the market structures for meat as they have existed in the past and have developed to the present may be found in various sources (Fowler, 1961, and Williams and Stout, 1964).

The wholesale meat sector consists of various firms including (1) the meat packers, (2) "packing house branches" which are storage warehouses and sales offices for slaughtering plants located in another region of the country, (3) meat wholesalers operating independently of packers, and (4) merchandise agents, or brokers.

The packing plants are first in the line of wholesale meat distribution. A large percentage of their meat goes directly to the retailer although considerable amounts are sold to or through the other types of wholesalers. The "packing house branches" are few in number and are involved in a relatively small amount of the meat distribution in the Pacific states. Midwestern packers such as Iowa Beef Packers and American Beef Packers do have branch houses in the large population centers of the West Coast.

The meat wholesalers operating independently of the packers consist of the "purveyors" which specialize in the fabrication of cuts for restaurants and other institutions, and "jobbers" which cater to the needs of the small retail stores.

The retail sector is made up of the retail grocery stores,

dining establishments, delicatessens and meat markets. Of these, the retail grocery stores distribute the largest proportion of the red meat, although the dining establishments are obtaining an increasing percentage of the meat distribution at the retail level, as is discussed below.

Very little data is available from the sources consulted concerning the amounts of meat distributed by the various types of firms on a local or regional basis. Some information is given on a nationwide basis for 1963 by the Bureau of Census as compiled by the National Commission on Food Marketing (1966). The study conducted by this commission reveals that in 1963, U.S. packers supplied 94% of the nation's red meat, while 6% was imported. Forty-nine percent of the nation's red meat went directly from the packer to retail stores, while 34% went to merchant wholesalers, brokers, and agents, and 14% went to branch houses. In total, the retail stores handled 75% of the red meat, merchant wholesalers, brokers, and agents handled 35% and branch houses 14%.

Of the total amount of meat handled in the United States, 99% of it was consumed domestically and 1% was exported. Thirty-five percent of the meat was consumed in hotels, institutions, government facilities, etc., (HRI), while 64% was consumed in households.

Recent information shows that the percentage of the beef marketed in the United States which is consumed through the HRI

trade has increased to 40% (Marks, 1970). Thus it appears that the percent of the beef consumed in the HRI trade has increased by about 5% since 1963.

Information for Oregon concerning the trends in the market of meat by the various types of firms also would be useful. These trends can be seen by comparing the trends in the types of businesses which handle the meat. This information is given in Table 28. Of special interest is the fact that the largest percent increase

Table 28. Comparison of Firms in Oregon Which Handle Fresh Meat Between 1963 and 1967.

Type of firm	Number in 1967	Sales in 1963	Sales in 1967	Percent change in sales
		($1,000)	($1,000)	
Grocery stores	1,963	571,095	701,604	22.9
Meat and fish markets	194	14,455	17,835	23.4
Eating places[a/]	2,539	146,801	190,039	29.5

[a/] Eating places include restaurants, lunchrooms, caterers, cafeterias, and refreshment places.

SOURCE: U.S. Dept. of Commerce. Bureau of the Census. 1969. Census of business, 1967. Retail trade: Oregon. Washington, D.C. 54 p. (BC 67-RA39)

in sales by firms marketing beef at the retail level was obtained by the eating places category, which corresponds to the HRI trade as discussed above. Thus, to strive to supply these types of

firms which represent an expanding market might well be an action which could develop a large and consistent clientele for a meat packer and fabricator.

A great deal of variation in the methods of buying and selling are evident from interviews with firms in the Portland area. The large retailers prefer to buy as consistently as possible from the same firms, but at the same time maintain considerable freedom to change to other suppliers if doing so gives them a "better buy". One large grocery chain, for example, buys from a distant packing firm at a consistent rate of two truckloads per week, and will also take consistent amounts from a local packer. It generally takes about the same amounts for a long period of time, but sometimes switches to other suppliers for a short while to obtain lower prices for the meat. To be able to do this, it maintains buying relationships with 13 to 15 suppliers. Another chain maintains a more or less "standing order" with a large local packer. This order varies according to the volume of business the stores undertake and the inventories on hand. Even with this "standing order", the chain maintains a certain degree of variability in suppliers, and would welcome the business of additional suppliers, particularly in the areas of Oregon located long distances away from Portland where less seller competition exists.

Variations in purchasing methods also exist. In some cases,

the buying is done by telephone according to prearranged specifications and the prices to be paid are determined when the meat is delivered. In other cases, the buying is done at the plant and the buyer selects each individual carcass or cut of meat he purchases. Generally, with this type of purchase, the price is agreed upon prior to or at the time of the buyer's selection.

Pricing of the meat is done on a competitive basis. Each packer attempts to set his own prices on the basis of the cost of the cattle, his costs of operation and the supply of meat on hand at the particular time. Although each packer sets his price independently, the prices asked by the various packers in a given locality generally do not vary a great deal if at all. It is said that in order to sell meat, all the packer has to do is price it competitively, and apparently, this is what they strive to do.

Relevant Markets for Carcass Beef

The geographical area in which a meat packing plant located in Central Oregon could market its product can be estimated on the basis of the area in which present firms with similar products market their products. From interviews with personnel involved in the management of several meat packing plants in Oregon, as well as one in Idaho and one in California, it is apparent that the marketing patterns for any given firm depend upon its location,

the degree to which it is horizontally integrated, the distance to the markets and the distribution pattern the plant has in the market area.

Information from interviews indicates that the established packing plants located in and near Portland market a large portion of their product in the Portland area but also distribute significant amounts as far north as Seattle and as far south as Roseburg and Klamath Falls. A relatively large plant in Albany markets its product in southern Washington and northern California, as well as in western Oregon. A small independent plant in Baker, Oregon, markets its product in the local area and as far away as Central Oregon points located 250 miles from the plant.

The distribution patterns of these plants are characterized by a large percentage of meat being distributed in the local area, where mileage and therefore transportation costs are relatively low. To supplement the local market, the plants send their product to the relatively heavily populated areas to the north and south of Portland where distribution costs become increasingly higher. These higher costs can be withstood, however, because the plants do have a large local market where they can distribute a high proportion of their product at relatively low distribution costs.

A large packing plant located at Gooding, Idaho, markets most of its product in large population centers which are long

distances from the plant. To do this, the plant must be able to deliver entire truckloads to a single destination, such as the Safeway warehouse in Portland. Also, this plant is horizontally integrated with a large plant in San Francisco to which it delivers truckloads of carcasses. Its distribution costs under this arrangement are relatively low, whereas if the firm attempted to deliver small lots to individual stores in the distant markets, it would probably incur such high distribution costs that it would be forced to discontinue operations.

Another small plant located in Long Creek, Oregon, markets its entire output through an established firm in Portland with which it is horizontally integrated. Therefore, the distribution costs for this particular plant are very low, whereas if the plant was operating as a single firm and attempted to deliver in small lots to individual firms, its distribution costs would be extremely high.

These marketing patterns make it evident that the market for a given plant's product depends (within limits) not so much on the distance to the market as the distribution arrangements the plant has at the particular market in which it sells. It appears necessary, if not essential, that a plant located a considerable distance from the populated areas in which it intends to market its product must have an outlet which will take a large proportion of its product in truckload lots in order to keep distribution costs from

outweighing any other economic advantages the plant might have.

Although it is possible that a new packing plant could be totally horizontally integrated with an established firm which has marketing channels established, it is more realistic to assume that the plant would have to establish marketing channels of its own, at least at the outset. Furthermore, it would be realistic to assume that the plant would be able to deliver part of its output in truckload lots to a single firm or a small group of firms located near each other, and necessarily be required to distribute the remainder of the product in small lots to firms located long distances from each other. On this basis, a Central Oregon plant could realistically expect to operate competitively in a market covering the western half of Oregon, the northern part of California to Red Bluff, and the western part of Washington.

The Prospect of Marketing Through Established Packing Plants

In interviews with the individuals managing and operating the packing plants, indications were obtained as to whether or not the particular plant would be interested in taking carcasses from a packing plant in Central Oregon. None of the plants located in or near Portland expressed an interest in such an arrangement. However, it is worthy of note that as stated above, one plant is horizontally integrated with a small plant located at Long Creek.

It also is horizontally integrated with a larger plant in Ontario. Furthermore, about one-half of the cattle slaughtered in its Portland plant come from the Central Oregon area. If a plant was operating in Central Oregon and slaughtering a large proportion of the cattle produced in that area, this plant might find it more desirable to integrate further with the Central Oregon plant than to compete with it for slaughter cattle.

A similar situation exists with another plant in Portland. At the present time, it has cattle slaughtered for it on a custom basis by another packing plant. It also has a plant located in Idaho from which it may in the future obtain most of the carcasses it will process through its Portland plant. It seems likely that if it is considering bringing carcasses from Idaho, it would also consider bringing in carcasses from Central Oregon.

Speculation could also be made about other Portland packing plants; however, as with the two instances above, it would be nothing more than speculation.

A definite interest was expressed, however, by a Red Bluff, California, firm. This firm presently procures about 5, 000 head of fed cattle per year for slaughter from the Central Oregon area. In addition, it obtains about 5, 000 head of cows annually from the southern Oregon area. If a slaughtering facility was in operation in Central Oregon, the California firm would be

interested in obtaining as many fed carcasses from it as it presently takes live cattle, that is about 5, 000 carcasses per year. In addition, the California firm would be interested in taking as many cow carcasses as it now takes live cows from southern Oregon, that is, about 5, 000 cow carcasses. If this indeed occurred, the Central Oregon plant would have an immediate outlet for 10, 000 carcasses per year. Furthermore, if an agreement could be reached which would be favorable for both plants, it is possible that an exchange of stock could occur whereby the two plants would be horizontally integrated. Such an arrangement would give the Central Oregon plant the benefit of an established market outlet, and the California plant the benefit of a source of supply of carcasses.

The Prospect of Marketing Through Large Retail Firms

If the management of the prospective Central Oregon plant did not choose to obtain marketing channels through established packing plants, or if it preferred independence in developing marketing channels, it could seek marketing outlets through retail establishments. To obtain a general idea of the possibilities of a new packing plant marketing its product through the retail stores, the meat purchasing agents for four of the major meat and grocery retail firms in Oregon were consulted. Through

these consultations, the present buying policies and attitudes toward new carcass meat suppliers held by these four major retail firms were determined and will be discussed below.

United Grocers, Inc., does not appear to be a favorable prospect as an outlet for carcass meat from a Central Oregon packing plant. Under current policy, the meat buyer for United inspects each carcass or cut of meat which is purchased. Because of the time and costs involved in travelling to Central Oregon from Portland, the buyer could not consider carcasses produced in the distant plant.

The prospect of marketing carcasses to the Fred Meyer, Inc., grocery chain also appears negative. The Fred Meyer meat buyer also holds to a policy of inspecting each carcass or cut of meat that is bought by Fred Meyer, Inc. Since this buyer has adequate suppliers in the Portland vicinity, he will not consider traveling to Central Oregon to make purchases of meat.

Safeway Stores, Inc., would be a prospective buyer of carcasses from a Central Oregon plant. Safeway has a large central warehouse for receiving and processing carcasses and primal cuts. The meat is ordered by the buyer by telephone on a competitive bid basis. Safeway currently buys from plants in eastern Oregon and Idaho as well as the local Portland packing plants. Since Safeway prefers to handle truckloads of 25 carcasses or more,

this could be a very good opportunity for a plant in Central Oregon to sell carcasses on a truckload basis. It should be pointed out, however, that Safeway maintains high standards of quality and cutability which must be met by the supplier. The carcasses are inspected individually at the warehouse by Safeway inspectors, who may accept or reject any or all of the carcasses in a truckload. If the carcasses are accepted the transaction is closed and prices calculated according to the carcass yields. If the carcasses are rejected, the supplier retains them and must sell them to another firm.

Also, it should be pointed out that although Safeway would welcome a new supplier, it already purchases from 13 to 15 reliable suppliers each week; thus, the competition for Safeway's business would appear to be quite intense.

Another possible retail market outlet is the Albertson's Food Centers grocery chain. Albertson's has a meat buying policy in which the orders are placed by telephone seven to ten days prior to the delivery date. The packer is then responsible for delivering the order to the individual store. If the stipulated requirements for carcass yield and cutability are not met by the supplier, Albertson's will request compensation in the form of a price reduction. If the internal meat temperature requirement is not met, Albertson's retains the option to either accept or

reject the delivery. Although Albertson's maintains a relatively constant standing order with a Portland packing firm for meat supplies for its stores in and near Portland, it would also consider procuring meat for these stores from another source. Also, if the Central Oregon plant had a delivery route into southern Oregon, Albertson's would strongly consider doing business with it for its stores in Eugene and Klamath Falls. Also, Albertson's would like to have an additional supplier for its store in The Dalles. Thus, Albertson's Food Centers would be a good outlet for the Central Oregon plant if it chose to make delivery to a large number of stores which would take one or two carcasses per week.

The Prospect of Marketing to Purveyors

Purveyors are considered to be those firms which purchase carcass beef and primal cuts from packing plants and perform the service of breaking, boning and fabricating individual portion controlled cuts for distribution to restaurants, hotels and other institutions (HRI). Information from a manager of a purveying firm tells that there is a growing demand from the HRI sector of the wholesale meat market for the services listed above. In fact, this firm (located in Eugene) has doubled its production every four months for the past two years, so that it processes over 100 carcasses per week at the present time. Not all of this business has resulted from

new demand since some of it has come from the firm's ability to do a "better job" of satisfying the requirements of its customers, the manager reports.

Although this firm presently procures most of its carcasses from a single packing plant, the manager expressed a definite interest in obtaining carcasses from a Central Oregon plant if it was established. The number of carcasses it could handle is not certain, however, but would depend upon the market situation and the quality of beef produced by the Central Oregon plant.

This discussion concerning outlets for carcass meat produced by a Central Oregon packing plant does not purport to be all-inclusive. It does, however, provide a general idea of the possible market outlets that do exist and the general qualifications that go along with them.

To briefly summarize, it can be said that the interest of established Oregon packing plants in taking carcasses from a plant in Central Oregon was not strong. Greater interest might arise, however, if the plant was established and began operations. A strong interest does exist on the part of a Red Bluff, California, firm. It is very likely that this firm would take at least 10,000 carcasses per year from a Central Oregon packing plant, and it is possible that arrangements could be made in which the California firm would handle more carcasses produced by a Central Oregon

plant. It is also possible that the two firms could merge under a single management, which would substantially increase the marketing outlets of the Central Oregon plant.

The retail prospects for a Central Oregon plant appear generally favorable. Although two firms which represent a substantial portion of the retail meat trade in Oregon indicate that they would not consider a Central Oregon plant as a supplier, two other large grocery chain stores indicated a relatively strong interest in procuring an additional supplier, to wit, a plant in Central Oregon.

A strong interest was expressed by the manager of a Eugene meat purveying firm toward procuring carcasses from a new Central Oregon packing plant. Therefore, the prospects of such a plant marketing its product through this firm are considered to be very good.

The Market for By-Products

In general, everything of value produced in the slaughtering operation except dressed meat is classified as by-products of the operation. The by-products then can be divided into two classes: edible and inedible.

The edible by-products include livers, hearts, brains, kidneys, sweetbreads, tongues, and oxtails. These items are usually sold through the same marketing channels as is the dressed

meat. At least one firm, however, markets a large proportion of its edible by-products overseas to European countries such as England and France. Whatever the marketing channel used, packers have described the edible offal market as very good and have had little difficulty moving these products at the going prices.

The inedible by-products consist of inedible tallow and grease, feed and fertilizer material, hides, and glues and adhesives. All of these products are obtained through rendering of raw material taken from the slaughtering operation. Some packing plants conduct their own rendering operations, while others sell all the inedible by-products in raw form to separate firms.

As with the edible by-products, packers have had relatively strong markets for the inedible by-products at the given market prices. Since a local rendering firm, Redmond Rendering, has expressed an interest in handling the inedible by-products produced by a packing plant located in Central Oregon, it shall be assumed that suitable arrangements could be made between the two firms to enable Redmond Rendering to assume the responsibility of rendering the inedibles produced at the proposed Central Oregon plant.

The Demand and Market for Lamb and Mutton

The demand for lamb and mutton has been characterized by a generally decreasing trend. In a lengthy study of demand and prices for meat, Briemyer (1961) indicates that the demand for lamb increased slightly during the 1920's but has declined since that time. The decline was about 1% per year during the 1930's but increased to an average of about 3% annually during the period 1948 to 1960. The data in Table 27 indicates a 2% annual decrease during the period 1960 to 1968.

Many studies (Stelly, 1959, for example) have been made to assess the reason for the decline in consumption of lamb and determine the necessary changes for a reversal in the trend. Williams and Stout summarize the situation as follows:

> The downward shift in demand for lamb apparently stems primarily from a shift in consumer preferences resulting from continued restrictions on supply which, in turn, are the result of effective competition on the farm or ranch for resources used in sheep production. Crops and other livestock have been outbidding sheep for these resources . . . . The demand for lamb probably is affected by availability. In some areas it simply is not stocked by retailers. Low average levels of per capita consumption and sharply differing demands for the different retail cuts of lamb may be jointly responsible . . . . (Williams and Stout, 1964, p. 558)

For the slaughterer, the production of lamb and mutton does not present a profitable enterprise. One important factor in the

operation of a profitable meat packing plant is the ability to specialize in production of one type of product such as beef or pork or lamb. Conversely, diversification in slaughter is discouraged.

The difficulty which a slaughtering plant would face in obtaining an efficient sheep slaughtering enterprise is indicated by the following statement:

> Sheep provide a concrete example. Large numbers of sheep, probably in excess of 600,000 annually, are required for full economies of scale in slaughter under existing technology. Sheep production, however, is widely scattered geographically, and marketings for slaughter vary seasonally and seasonal marketing patterns vary widely among areas. Sheep slaughtering plants, therefore, are forced to compromise among these divergent tendencies. (Williams and Stout, 1964, p. 718)

In an attempt to assess the current attitudes based on experiences of meat packers in Oregon and adjoining states, questions as to the profitability of including sheep slaughter in a diversified operation were asked. The prevailing opinion is reflected in answers such as, "We tried killing a few lambs but without a very large volume, the small, if any, profitability fails to make it worthwhile. I would not encourage a slaughtering plant to attempt a diversified operation." "Lambs are a forgotten thing."

Neither is there optimism apparent in regard to marketing of lamb at the retail level. In response to questions about the future

of the lamb market, some answers were, "I do not foresee a great deal of change in the demand for lamb in the future", "the Oregon area has poor demand for lamb, it is one of the worst in the United States. Better merchandising has helped but progress is slow", "not much change in demand for lamb is anticipated. We do not do as good a job with lamb as we should and would like to do better."

These statements by retailers indicate that in regard to meat, the major emphasis is on beef and will probably remain so unless a major change in production of lamb or in consumer preference toward lamb was to occur. Neither change is expected in the foreseeable future.

Distribution of the Product of Synthesized Meat Packing Plants

Model meat packing plants of four different sizes are synthesized in Chapter IV. The estimated distribution patterns of the fresh meat the model plants would produce are shown in Table 29. This table shows the percentage of the total product which would be marketed at the various destinations according to the type of beef produced; that is, fed or nonfed. Also given are the numbers of carcasses estimated to be marketed at the various destinations.

The Portland market received a high proportion of the plant's product because of its proximity to the proposed Central Oregon

Table 29. Estimated Market Patterns for Beef Carcasses Projected in Synthesized Central Oregon Packing Plants.

Destination	Percent of beef carcasses marketed at each destination							
	Annual plant volume (head)							
	18,700		47,147		37,400		75,800	
	Fed	Nonfed	Fed	Nonfed	Fed	Nonfed	Fed	Nonfed
Portland	35	15	48	35	48	35	48	35
Eugene	20	10	15	10	15	10	16	5
Red Bluff	33	63	15	45	15	45	15	52
Seattle	5	5	10	5	10	5	15	5
Klamath Falls	5	5	10	3	10	3	5	2
Local	2	2	2	2	2	2	1	1
	Number of beef carcasses marketed at each destination							
Portland	4,961	709	16,965	4,123	13,608	3,308	22,216	6,615
Eugene	2,835	473	5,301	1,178	4,253	945	9,072	945
Red Bluff	4,678	2,977	5,301	5,302	4,253	4,253	8,505	9,828
Seattle	709	235	3,534	589	2,835	472	8,505	945
Klamath Falls	709	235	3,534	353	2,835	284	2,835	378
Local	283	96	708	236	566	188	567	189
	14,175	4,725	35,343	11,781	28,350	9,450	56,700	18,900

plant in relation to the other markets and because of the city's large population. Another influencing factor was the interest expressed by two large Portland retail firms in procuring carcasses from a proposed Central Oregon plant.

The Eugene market also received relatively high percentages of the plant's product because of the relatively large population there as well as the interest expressed by the purveying firm to procure carcasses from the proposed plant.

The Red Bluff, California, market received relatively high proportions of fed beef and very high proportions of nonfed beef. The high proportions of fed beef were allotted there because of the interest expressed by the manager to fabricate and sell the fed beef products. The high proportions on nonfed beef were allotted because of the possibility of processing and selling on government contracts for frozen ground beef to the military and to the school lunch programs.

Relatively small allotments were given to Seattle and Klamath Falls, primarily to give the plant market destination flexibility. Also, a small allotment was given to the local area to provide it with a good supply of fresh, high quality beef.

IV. COST AND RETURNS ANALYSIS

This chapter presents a synthesis of four model plants to show the costs involved in establishing and operating them and the returns and profits which might be forthcoming on the basis of a full year's operation, given average prices for factors of production and for the end products of the plants.

The analysis contains various shortcomings due to the need to deal in many cases with average rates of output and prices, assuming that variations do not exist or occur. To the extent that this is true, the information presented in this analysis and the conclusions drawn from the information will be accurate. It should be realized, however, that variations do exist in the "real world", and adjustments to the results obtained in this study should be made accordingly.

In addition to performing the operations of slaughtering beef cattle and preparing carcasses for sale, it was assumed that the plant would perform breaking, boning and cryovacing operations on 20% of the steer carcasses and 20% of the cow carcasses. These functions were included to provide for the general trend in the meat industry toward increased performance of these operations at the packing plant. This does not mean that the plant should necessarily limit itself to that amount of breaking, boning and cryovacing, but

20% of the steers and cows appears to be a realistic estimate of the amount of processed beef the plant could expect to market at the outset of the operation, according to information gathered from existing packing plants. Since it is possible that a plant would find it desirable to break and bone a higher percentage of its product in the future, building space and facilities were included in the cost estimates which would allow the plant to break, bone and cryovac its entire output.

Four different plants were synthesized to show the variability in costs and returns which exist for plants of different outputs and for plants utilizing different kill floor technology. Two plants, which shall be denoted as Plant A and Plant B, utilize the conventional bed type slaughter facility at outputs of 10 head per hour and 25 head per hour, respectively. Their annual volume would be 18, 900 head and 47, 124 head, respectively. The other two plants utilize the rail type slaughter facility. These plants would have outputs of 20 head per hour and 40 head per hour and are denoted as Plant C and Plant D, respectively. Their annual volume would be 37, 800 head and 75, 600 head, respectively.

The plants at different sizes and technology are included to give the decision makers comparisons of sizes of plants and technology. Since the supply of cattle and the marketability of the products studied indicate that the most likely size of plant to

consider is one with an output of about 25 head per hour, plants of both technologies with comparable outputs were included. These are Plant B and Plant C, the former being a bed type, 25 head per hour plant, and the latter being an on rail, 20 head per hour plant. Ideally, plants of equal outputs should have been synthesized for comparison; however, specific information was not available to make this possible, so plants with outputs differing by five head per hour were used.

The physical requirements for labor, utilities, and certain facilities were taken from a comprehensive study of costs of slaughter operations in California (Logan and King, 1962). To these physical requirements were applied current costs and prices which were obtained from the appropriate firms and organizations. Thus were derived the costs of operating the various size facilities.

The costs of buildings and equipment and related facilities (except the sewage facilities) were derived by following guidelines provided by Engineering for Food Company (1969). However, these guidelines did not provide all the information necessary for estimating the physical requirements of the facilities. Thus, it was necessary in some cases to estimate the requirements according to information given by the Logan and King study or by estimating the requirements from the plans of existing packing plants and applying costs given by Engineering for Food Company to these physical requirements. The sewage facilities requirements and cost estimations

were provided by Pailthorp (1970).

The prices for the slaughter cattle are average monthly quotations from the North Portland market, direct feedlot and range sales averaged over the past three years (U. S. D. A., C. M. S., L. D., 1967-1969a). The prices were those quoted for choice steers weighing 900-1100 pounds, choice heifers weighing 700-900 pounds, and utility cows. The prices for meat are average weekly wholesale prices at Portland. The prices for the by-products are average weekly wholesale prices for the West Coast. Other prices and rates used in this study are explained in the respective sections of this chapter.

Costs of Labor

The employees of a meat packing plant can be separated into two categories; those receiving wages specified by a union contract and those receiving salaries. Those in the first category consist of the kill floor crew, the cooler and dock crew, the breakers, boners and processors, yard men, clean-up men and maintenance men. Those in the second category consist of the clerks, typists, bookkeepers, plant supervisor, buyers, sellers and plant managers.

Union Labor Costs

The slaughter operation consists of several functions. The labor requirements vary for each of the functions according to the rate of output and the technology used. Using data from time studies conducted in several California slaughter houses, Logan and King (1962) developed estimates of the number of workers necessary for each function, at various rates of output for the two types of technology. Since these are physical requirements and slaughterhouse operations have shown little significant change since this study was conducted, these labor requirements were assumed to apply to a plant operating in Central Oregon at the present time or in the near future.

A brief description of the functions involved on the kill floor of the synthesized plants and the labor requirements at the specified outputs are given in Table 30 and Table 31. For a more detailed description of the functions and the time requirements for performing the functions on each animal, the reader should consult the source (Logan and King, 1962).

The outputs specified are in accordance with the labor requirements for those outputs. Higher rates of output can be obtained from each of the plants if additional workers are employed. In fact, Logan and King indicate that the highest rate attainable for the one bed plant is 17 head per hour, 35 head per hour for

Table 30. Synthesized Crews for Two Bed Type Plants and Corresponding Wage Brackets.

Operation	Wage bracket	Number of men reqd. Plant A	Number of men reqd. Plant B
Kill, remove head, stick, face, head, wash head:			
Knock, shackle, stick, face, head, wash head	4	1.0	
Knock, shackle, stick	4	a/	1.0
Face, remove head, wash head	11		1.0 b/
Knock, shackle	4		
Stick, head, face	11		
Remove hide, eviscerate, split and scribe:			
Side, leg	5	1.5	3.0
Rump, back, gut	17	1.5	
Rump, back	17		2.0
Gut, truck, hang offal	8		
Hide, drop, split, scribe	22	1.0	
Hide drop	10		1.0 c/
Split	22		.5
Scribe	4		.5
Gut	8		1.0
Carcass finishing:			
Wash, scale, shroud	2	1.0	
Wash, high and low	1		1.0
Scale and shroud	2		
Scale	1		1.0
Shroud, high and low	2		1.0
Other:			
Head work-up	11	.5	1.0
Truck guts	8	.5	d/
Tripe work-up	2	.5	2.0
Offal work-up	11	.5	1.0
Total		8.0	17.0

Continued

Table 30. Synthesized Crews for Two Bed Type Plants and Corresponding Wage Brackets--Continued.

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a/ Blank spaces indicate the position is not utilized as specified for the particular output level in question.

b/ Facer also helps stick the live animals.

c/ Hide dropper helps in rumping and backing operations.

d/ Gutter also trucks guts.

SOURCE: Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Research Report No. 260)
Amalgamated Meat Cutters and Butcher Workmen of North America. 1960. AFL-CIO. Local Number 656. Labor agreement. Portland, Oregon.

Table 31. Synthesized Crews for Two Intermittent On Rail Plants and Corresponding Wage Brackets.

Operation	Wage brackets	No. of men reqd. Plant C	Plant D
Kill, remove head, and wash head:			
Drive, pen, knock	4	.67	1.00
Shackle, hoist, stick, scalp, head	11	.67	2.00
Tag, cut off head, dehorn, wash head	5	.67	1.00
Remove hide, eviscerate, split, and scribe:			
Skin leg, punch gam, saw off, skin gam and punch, rip and point tail	5	.50	1.00
Transfer from bleeding to skinning rail, remove udder, or pizzle, mark aitch bone	5	.50	1.00
Skin leg and saw off, split aitch bone	5	.50	.50
Drop bung	8	.50	.50
Turn round and flank both sides to navel	17	.50	1.00
Skin fell, rump and pull tail	16	.50	1.00
Skin and remove front feet, raise and tie weasand, clean neck both sides	4	.50	1.00
Mark and saw brisket, rim over right and left brisket	16	.50	1.00
Turn shank, clear rosette, neck and drop hide	10	1.00	2.00
Skin sides, high and low back	17	1.00	3.00
Transfer to flat rail	4	.50	.25

Continued

Table 31. Synthesized Crews for Two Intermittent On Rail Plants and Corresponding Wage Brackets--Continued.

Operation	Wage brackets	No. of men reqd. Plant C	Plant D
Eviscerate (paunch truck)	8	1.00	1.00
Split	22	.50	.75
Trim bruises	0	.50	1.00
Remove passed viscera	0	1.00	1.00
Scribe and trim neck	4	.50	1.00
Carcass finishing:			
Scale	2	.50	1.00
High and low wash	1	1.00	2.00
High and low shroud	2	.50	2.00
Other:			
Utility and relief	22	1.00	1.00
Tripe work-up	2	1.00	2.00
Offal work-up	11	.50	1.00
Head work-up	5	.50	2.00
Total		17.00	32.00

SOURCE: Logan, Samuel H., and Gordan H. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260) Amalgamated Meat Cutters and Butcher Workmen of North America. 1969. AFL-CIO. Local Number 656. Labor agreement. Portland, Oregon.

the two bed plant, and 40 head per hour for the on rail plant, without requiring additional facilities and equipment. It should be pointed out, however, that the plants were designed with cooler capacity for the kill rates specified. Therefore, if the plants were to operate at higher rates than those specified, additional cooler

space would be required or carcasses would have to be shipped out after a shorter chill period.

To calculate the cost of the laborers working on the kill floor, the wage rates used in some of the existing Portland meat packing plants (located in or near Portland) were applied. These rates were taken from Amalgamated Meat Cutters (1969). These rates, which were in effect as of September 1, 1969, are shown in Table 32. Also, the wage bracket for each wage rate is shown. These brackets correspond to the wage brackets shown with the descriptions of the functions in Table 30 and 31.

The labor requirements for the functions involving cooler, dock, maintenance, yard and clean-up work were also taken from the Logan and King study. Synthesized crews for these jobs are given in Table 33. The wage brackets into which these workers were placed are also shown in this table. No differentiation was made according to technology of plant for these jobs, since they take place separately from the killing and dressing operation, and thus are not affected by the technology employed on the kill floor.

In addition to slaughtering and producing dressed carcasses, it was assumed that the packing plant would break and bone 20% of the steer and cow carcasses. Since the Logan and King study did not include these functions, it was necessary to obtain labor requirements for these operations from existing Oregon packers.

Table 32. Wage Brackets and Wage Rates for Union Laborers of Synthesized Plants, 1969.

Bracket	Rate	Bracket	Rate
	(dollars)		(dollars)
0	3.58		
1	3.63	12	4.18
2	3.68	13	4.23
3	3.75	14	4.28
4	3.78	15	4.33
5	3.83	16	4.38
6	3.88	17	4.43
8	3.98	18	4.48
9	4.03	20	4.58
10	4.08	22	4.68
11	4.13		

SOURCE: Amalgamated Meat Cutters and Butcher Workmen of North America. 1969. AFL-CIO. Local Number 656. Labor agreement. Portland, Oregon.

This was done as part of the interviews with the management personnel of these packing plants. From information obtained in these interviews it was determined that the number of breakers necessary for Plants A, B, C, and D would be 2, 4, 4, and 6, respectively, and the number of boners necessary would be 4, 8, 8, and 12, respectively. The breakers were assigned a wage bracket of 11, and the boners are in the wage bracket 12.

It should be noted that many of the functions do not require an entire man. Thus, the man performing that function may perform one or more other functions as well. Where this occurs, the man is assigned the wage rate which applies to the highest bracket,

Table 33. Synthesized Crews for Cooler, Dock, Maintenance, Yard, and Clean-up Work for Four Model Plants and Corresponding Wage Brackets.

Operation	Wage bracket	Number of employees required			
		Plant A	Plant B	Plant C	Plant D
Cooler:	9	3	4	4	5
Dock:					
Foreman	22	1[a]	1	1	1
Order clerk	9	[b]		1	2
Checkers	9				1
Total		1	1	2	4
Maintenance:					
Foreman	20				1
Gang leader	20		1	1	
Workers	13/0[c]	1	1	1	4
Total		1	2	2	5
Yardmen:	4	1	1	1	2
Clean-up:	4	1	2	2	2
Total		9	13	15	27

[a] Foreman in these instances is included in the cooler crew.

[b] Blank spaces indicate this position is not utilized for the particular plant.

[c] For Plant D, half are considered helpers and half 3rd men for wage bracket determinations.

SOURCE: Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260) Amalgamated Meat Cutters and Butcher Workmen of North America. 1969. AFL-CIO. Local Number 656. Labor agreement. Portland, Oregon.

or highest paying function which he performs. Also, it should be mentioned that the function descriptions corresponding to the wage rates are different from those listed in the labor requirement tables. Where obvious matches were not evident, assistance in matching the descriptions was obtained from Dr. Walt Kennick, Assistant Professor of Animal Science, Oregon State University.

In addition to the wage rates, the fringe benefits which must be provided to the employee by the employer were determined from the contract, and the cost calculations for the workers under the contract were made. The requirements which were specified in the contract were holidays and vacations, sick leave, health and welfare and dental plans, pension plan, and clothing allowance. In addition to these benefits, employer contributions for social security , unemployment insurance and accident insurance were estimated. The rates for these contributions were: social security, 4.8% on wages up to $7,800, unemployment insurance, 3.1% on wages up to $3,000 (Department of the Treasury, 1969), and accident insurance, $6.47 per $100 payroll (McElwain, 1969). The itemized costs and total costs for union labor are given in Table 34.

Salaried Personnel Costs

Requirements for salaried personnel were also taken from the

Table 34. Union Labor Costs for Synthesized Plants in Central Oregon.

Item	Plant			
	A	B	C	D
Annual wages	$180,431	$336,753	$323,927	$528,576
Benefits and taxes				
Leave allowance	9,173	16,876	16,254	24,735
Health and welfare	17,986	31,280	29,716	47,702
Clothing allowance	1,092	2,080	1,976	3,224
Social security	7,832	14,850	14,133	23,050
State accident insurance	12,267	22,858	22,011	37,799
Unemployment insurance	1,953	3,720	3,534	5,766
Total benefits and taxes	50,503	91,664	87,624	140,276
Total union labor cost	230,734	428,417	411,551	668,852

SOURCE: Information compiled from Tables 30, 31, 32, 33. McElwain, John M. 1969. Zone Manager, Policyholder Services Division, State Accident Insurance Fund. Personal communication. Salem, Oregon. Department of the Treasury. 1969. Internal Revenue Service. Employer's annual federal unemployment tax return. Portland, Oregon (Form 940).

Logan and King study. Salaried personnel include office workers who do general bookkeeping and answer the telephones. Salaried personnel also include the plant management personnel, buyers and sellers. The salaries which were applied to the office workers were taken from the area wage survey for the Portland, Oregon-Washington Metropolitan Area (U.S.D.L., B.L.S., 1969c) and

applied to the synthesized personnel requirements according to job descriptions given in the area wage survey.

Salaries for buyers and sellers were based on the salaries reported by Logan and King. These salaries were confirmed as being approximately those still in use by meat packers in Oregon, according to conversations with a buyer in an Oregon plant.

Salaries for the general manager, senior buyer, sales manager and plant superintendent were also taken from the Logan and King study.

The synthesized salaried personnel requirements for the model plants and the salaries applied to each of the positions are shown in Table 35. In addition to salaries, the salaried personnel were credited with the same fringe benefits as the union labor personnel except for the clothing allowance. In addition, the buyers, sellers, and management personnel were not given a leave allowance, as generally their responsibilities are assumed by another member of the organization when they take leave. The total wages and salaries and fringe benefits paid to salaried personnel in the synthesized plants are shown in Table 36.

Investment in Plant and Facilities

Investment in plant and facilities includes the cost of the building, equipment, corrals or holding pens, sewage facilities,

Table 35. Salaried Personnel Requirements for Synthesized Plants.

Operation	Annual salary per person	Salaried employees required			
		Plant			
		A	B	C	D
Office:					
Switchboard	$4,836	a/			1
Payroll and accounts payable	5,876		1	1	1
Credit manager and livestock payable	6,630				1
Phone, billing, posting, invoicing	4,914	1	1	1	
General ledger credit and accounts payable	7,930	1	1	1	
General and office manager	7,930				1
Total office:		2	3	3	5
Buyers:	9,600	1	1	1	2
Sellers:	9,600	2	2	2	3
Management:					
General manager	12,000-17,000 b/	1	1	1	1
Senior buyer	12,000				1
Sales manager	12,000				1
Plant superintendent	12,000				1

a/ Blank spaces indicate this position is not utilized by the given plant.

b/ Salaries assumed were $12,000 for Plant A, $15,000 for Plant B and Plant C, and $17,000 for Plant D.

SOURCE: Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260)
U.S. Dept. of Labor, Bureau of Labor Statistics. 1969. Area wage survey. Portland, Ore.-Washington metropolitan area. Washington, D.C. May, 1969.

Table 36. Salaried Personnel Costs for Synthesized Plants.

Item	Plant			
	A	B	C	D
Salaries	$48, 172	$62, 000	$62, 000	$134, 202
Leave allowance	422	700	700	1, 257
Health and welfare	4, 692	5, 474	5, 474	10, 948
Social security	2, 023	2, 363	2, 363	4, 947
State accident insurance	3, 144	4, 057	4, 057	8, 769
Unemployment insurance	558	651	651	1, 302
Total benefits and taxes	$10, 839	$13, 245	$13, 245	$ 27, 223
Total salaried personnel cost	$59, 011	$75, 245	$75, 245	$161, 425

SOURCE: Table 34.
McElwain, John M. 1969. Zone Manager, Policyholder Services Division, State Accident Insurance Fund. January. Personal communication. Salem, Oregon.
Department of the Treasury. 1969. Internal Revenue Service. Employer's annual federal unemployment tax return. Portland, Oregon. (Form 940)

office equipment and furnishings, and land.

The cost estimates for the building and equipment were calculated from guidelines given by Engineering for Food Company (1969). The figures given are considered to be basic cost data to be used "for preliminary estimating only", and not as direct quotations. These costs of equipment and construction were derived from costs which exist in the Portland area, but are considered to be applicable to the Central Oregon area as well.

Kill Floor

The estimates would provide for a "basic structure" consisting of a building 2, 500 square feet in size for Plants A, B, and C, and a building of 3, 750 square feet in size for Plant D. The equipment would consist of a single bed with a single rail for Plant A, two beds with a single rail for Plant B, an on rail gravity system for Plant C, and a powered on rail system for Plant D. The equipment in Plant D would also include a hide puller and moving top viscera table.

Chill Cooler

The chill cooler is the first cooler into which the freshly slaughtered carcasses are placed to draw out the body heat. Since the carcasses are generally removed from the chill cooler within one day after they are put in, the chill cooler capacity requirements are considered to be one day's kill. Data for the cost of the chill cooler for various sizes of plants are given on a basis of a fixed amount per head of cattle slaughtered per day. Therefore, the costs were calculated by taking the daily kill times the cost.

Holding Cooler

The chilled carcasses are placed in the holding cooler while they await shipment from the plant. Since the carcasses are not always sold immediately after they are produced, the chill cooler should have enough capacity to hold the unsold carcasses. Generally, plants in Oregon have at least enough holding cooler capacity for three days kill. The cost data for the holding cooler were also given on a basis of a fixed amount per carcass. The cost figures were then calculated as three times the daily capacity times the per carcass amount.

Offal Work Room

This room provides a place to gather the offal and cook tripe and clean casings. Estimates for this room cover the cost of the building space requirements and the equipment involved. The cost estimates were given in terms of a fixed amount for a plant killing up to 100 head of cattle per day and another fixed amount for a plant killing up to 500 head of cattle per day.

Offal Cooler or Freezer

The cost data for this section of the plant are expressed in terms of a fixed amount per square foot of area required. The

requirements for the size of this section were estimated from the floor plans of existing or proposed plants. The size requirements were then applied to the cost per square foot.

Breaking Room

The breaking room is considered to consist of enough space to provide for the requirements for "breaking, boning, cryovacing, and boxing". It is estimated that an area of 3, 500 square feet provides enough space to perform these functions on up to 500 carcasses per day.

Two methods of calculating the cost of this section were given by Engineering for Food Company. The method used was one which gives the cost in terms of a fixed amount per head processed up to 200 head per day and a lower fixed amount per head processed from 250 to 500 head per day. The costs are intended to include the cost of the building space and equipment used to process, as well as the cooling system. The total costs were calculated on the basis of the cost per head times the daily kill. This would provide the plant with adequate space and facilities for breaking, boning and cryovacing its total output.

Dry Storage Room

Engineering for Food Company provided an estimate of cost per square foot of space required. The space requirements were taken from Logan and King.

Shipping Room

This is a temperature-controlled room in which carcasses are placed for transfer into the trucks. The cost figures provide for the refrigeration of the room as well as for "Cushion Pads or Air Door systems" and are also given by Engineering for Food Company in terms of cost per square foot. The space requirements were taken from Logan and King.

Trolley Wash and Equipment Clean-up

This room provides space and facilities for cleaning equipment and doing some maintenance work. It was assumed that the cost of the space and equipment for this room would be equal per square foot to the cost of the space and equipment for the welfare room. The space requirements were taken from Logan and King.

Welfare Room

This room provides space for "Inspectors Office and Rest

Room Facilities, Employees Lunch Room, Locker Rooms, Rest Rooms and Lockers". The space requirements are given on a basis of 45 square feet per person for 10 to 39 employees, 30 square feet per person for 40 to 69 employees, and 25 square feet per person for 70 to 100 employees.

Offices

The cost figures for the offices provide for heating and air conditioning, but do not provide for office furniture or office machines. The figures also were given in terms of cost per square foot, and the size requirements were estimated from an equation given by Logan and King.

Hide Room

This room provides space for the storage and dry curing of the hides. The size requirements were estimated from the floor plans of existing packing plants, and the cost per square foot was assumed to be the same as that for the welfare room.

Boiler Room

This room provides space for the boiler. The space requirements were taken from Logan and King and the cost per square foot was considered equal to the cost per square foot of the welfare room.

Refrigeration Room

The type of cooling system for each plant is not specified, so space was allowed in accordance with space requirements derived by Logan and King. The cost per square foot was considered to be equal to the cost per square foot of the welfare room.

Freezer

The size of the freezer required would of course depend upon the volume of frozen product the plant wished to produce. Some packing plants freeze little, if any, meat at the present time; however, it is necessary to freeze certain offal parts from time to time. Nevertheless, it is considered important for a new plant to have freezer facilities.

The plant and equipment costs given by Engineering for Food Company were based upon prices for equipment and building costs as of September 15, 1969. Because construction costs are increasing at a rapid rate, the cost data were increased by 10% to allow for differences in costs which have occurred since September, 1969. This also allows for contingency factors which could arise during construction of the facility which could not be anticipated at the time of planning. The cost figures and calculations are given in Table 37.

Table 37. Costs of Construction of Synthesized Plants in Central Oregon.

Item	Plant			
	A	B	C	D
Kill floor:				
Building 2,500 sq. ft. @ $20/sq. ft.	$50,000	$50,000	$50,000	
Building 3,750 sq. ft. @ $20/sq. ft.				75,000
Equipment	18,150	25,000	50,000	75,000
Chill cooler:				
Daily cap. x $250	18,750	47,000	37,500	75,000
Holding cooler:				
3 x daily cap. x $225	50,625	126,900	101,250	202,500
Offal work room:	8,000	16,000	16,000	16,000
Offal cooler (sq. ft.)	(300)	(480)	(480)	(840)
Est. sq. ft. x $20	6,000	9,600	9,600	16,800
Breaking room:				
Daily kill x $300	22,500	56,400	45,000	
Daily kill x $200				60,000
Dry storage room (sq. ft.)	(552)	(200)	(150)	(229)
Sq. ft. x $8	4,416	1,600	1,200	1,832
Shipping room (sq. ft.)	(1,887)	(3,363)	(2,147)	(4,092)
Sq. ft. x $15	28,305	50,445	32,205	61,380
Trolley wash and equip. clean-up:	(224)	(224)	(224)	(224)
Sq. ft. x $15	3,360	3,360	3,360	3,360
Welfare room:				
45 sq. ft./person @ $15/sq. ft.	16,875	28,350	27,675	
30 sq. ft./person @ $15/sq. ft.				31,500

Continued

Table 37. Costs of Construction of Synthesized Plants in Central Oregon--Continued.

Item	Plant			
	A	B	C	D
Office facilities (excludes furniture) (sq. ft.):	(1,020)	(1,157)	(1,158)	(2,260)
Sq. ft. x $17.50	$17,850	$20,248	$20,265	$39,550
Hide room (sq. ft.):	(400)	(1,600)	(1,600)	(2,500)
Sq. ft. x $15	6,000	24,000	24,000	37,500
Boiler room (sq. ft.)	(500)	(240)	(200)	(372)
Sq. ft. x $15	7,500	3,600	3,000	5,580
Refrigeration room (sq. ft.):		(304)	(240)	(240)
Sq. ft. x $15		4,560	3,600	3,600
Freezer (sq. ft.)	(300)	(500)	(500)	(760)
Cost - sq. ft. x $22.50	6,750	11,250	11,250	17,100
Total estimated cost	$265,081	$478,313	$435,805	$721,702
10% contingency factor	26,508	47,831	43,581	72,170
Adjusted total cost	$291,589	$526,144	$479,386	$793,872

SOURCE: Engineering for Food Company, 1969. Beef slaughtering operations-basic cost data. Unpublished guidelines for preliminary estimating of costs. Portland, Oregon. September 15, 1969.
Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260)

Investment in Holding Pens

The holding pens provide a place to keep the cattle prior to slaughter. It is necessary that the pens have capacity for at least one day's kill. However, most of the plants surveyed had holding pens large enough for two or three days' kill. Therefore, the size requirements for the synthesized plants were estimated on a basis of having three days' kill holding capacity. They are specified to have concrete floors and a roof. They would also conform to other specifications necessary to meet Federal standards. The space requirements were derived from an equation given by Logan and King. From the area requirements, the cost of concrete was derived on the basis of $2.75 per square foot as given by Logan and King. The linear footage of fencing required was also derived from an equation given by Logan and King. The cost of $2.25 per linear foot was applied to the figures derived for fencing.

The above equations were estimated on the basis of 11 head per pen, with alleys 10 feet wide. Two end pens were considered to be the size of three regular pens, and the number of gates required was one less than the number of regular size pens. The cost of gates was set at $45.00 per unit.

The total costs for the holding pens were calculated, and these costs were verified by a Portland consulting engineer as

being a close estimate, given present costs in the Central Oregon area. The costs of the holding pens are shown in Table 38.

Sewage Facilities

The sewage facilities requirements were estimated by an industrial processes engineer (Pailthorp, 1970) on a basis of the volume of water required for washing and cleaning of carcasses, building and equipment. The sewage facilities were also estimated on the basis of sewage facilities used by an existing packing plant which carried on an operation comparable to that which the Central Oregon plant would undertake. The sewage facility used by this existing plant was designed by the same firm from which the estimates for the synthesized plants were obtained.

The sewage facilities estimated contain the following components:

1. Fat trap - This catches the fats and other solid materials which can be saved and sold to a renderer.

2. Anaerobic pond - This is a pond in which 70-80% removal of organic material is obtained. In this pond a layer of grease and other solid material accumulates on the top of the water. This layer of material oxidizes the sulfide gases produced by the anaerobic organisms, which break down the organic material. Therefore, very little odor escapes from the pond.

Table 38. Cost of Holding Pens, Sewage Facilities, Land, Office Equipment and Miscellaneous Equipment for Synthesized Plants.

Item	Plant			
	A	B	C	D
Number of pens	(20)	(51)	(41)	(82)
Area required (sq. ft.)	(5, 867)	(13, 563)	(10, 975)	(21, 191)
Cost	$16, 134	$37, 298	$30, 181	$58, 275
Length of fencing (ft.)	(731)	(1, 573)	(1, 290)	(2, 408)
Cost	$164, 475	$353, 925	$290, 250	$541, 800
Cost of gates (pens-1) x $45	$855	$2, 250	$1, 800	$3, 645
Total	$18, 634	$43, 087	$34, 884	$67, 338
10% contingency factor	$1, 863	$4, 309	$3, 488	$6, 734
Total	$20, 497	$47, 396	$38, 372	$74, 072
Cost of sewage facilities	$14, 500	$27, 500	$22, 500	$42, 500
Office equipment	$6, 123	$11, 000	$10, 067	$15, 000
Miscellaneous equipment	$30, 000	$55, 000	$50, 000	$75, 000
Cost of land	$2, 000	$3, 000	$3, 000	$4, 000

SOURCE: Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260)
Pailthorp, Robert E. 1970. Projects Manager, Cornell Howland, Hayes and Merryfield. Industrial Processes. Personal communication. Corvallis, Oregon. February.
Carlson, Waldo E. 1970. Tax Economist, Oregon State Department of Revenue. Personal communication. Salem, Oregon. January 30, 1970.

It is recommended that the pond be fenced, and allowance for fencing is included in the cost estimate.

3. Aerobic pond - This is a shallow pond open to sunlight which contains a high algae population. Generally, there is no odor problem from this pond. However, the organisms working in the pond require oxygen. Therefore, if the pond freezes in the winter, the oxygen supply is cut off and the anaerobic organisms become dominant inside the pond. These organisms do produce a foul odor which is released from the pond when the ice melts. In this event there may be a short-term odor problem for a time during the spring, although it is not severe enough to be noticeable from a distance of 1,000 feet.

4. Spray irrigation - This is recommended as a means of disposing of the treated water from the aerobic pond. The water could be released through gravity flow irrigation; however, there is a tendency for slime growths to build up in ditches which carry this water. The estimates of costs are considered to include the cost of a small pump and sufficient pipe to handle the treated water. The total cost estimates of the sewage facilities for the synthesized plants are given in Table 38.

Land

The definite land requirements were not determined from the interviews, nor were they given in the Logan and King study. Therefore, general estimates for land space requirements were made which would provide adequate land for the plant, holding pens and sewage facilities. Areas of 10 acres, 15 acres, 15 acres, and 20 acres were allotted to Plants, A, B, C, and D, respectively.

The price for the land was based on estimates given by a cattleman and county agent in Central Oregon. These estimates are based on current prices for nonirrigated farm land and are calculated at $200 per acre. The total values of the land for the synthesized plants are given in Table 38.

Office Equipment and Furniture

The cost of the office equipment varies according to the type of furniture and equipment used. As a general rule, the office equipment and furniture costs equal about 2% of the cost of the building and equipment (Carlson, 1970). The office equipment and furniture costs were thus estimated at 2% of the cost of the building and equipment, and are shown in Table 38.

Miscellaneous Equipment

The miscellaneous equipment includes the trolleys, gut trucks and other equipment not fixed to the building. The estimates for this equipment were also given by Carlson (1970) on the basis of costs incurred for similar equipment used by similar facilities. These estimates are shown in Table 38 for the synthesized plants.

Annual Cost of Investment

Four items are considered to make up the annual costs of investment to the firm: (1) depreciation on plant and equipment, (2) insurance, (3) interest charges, and (4) property taxes.

Depreciation

A "straight line method" of estimating the costs of depreciation of the synthesized plants was used. The depreciable property was placed into two categories for the estimation of depreciation. The first category consisted of the building and fixed equipment, the holding pens, and the sewage facilities. The total cost of these items was calculated; then from this figure was deducted 10%, which was considered to be the salvage value of the items. The estimated useful life for the items was 25 years. The amount remaining after the salvage value was deducted was divided by 25 to obtain the average annual depreciation cost for these items.

The second category consisted of office equipment and miscellaneous equipment. The total cost of these items was calculated and 10% was deducted for salvage value to obtain the depreciable balance. The estimated useful life for these items was ten years. The depreciable balance was divided by ten to obtain the annual depreciation costs to the synthesized plants for these items.

The figures showing the annual costs of depreciation are shown in Table 39.

Insurance

Insurance rates which would provide coverage on numerous items in the plant were obtained from an insurance company which has carried policies for meat packing plants and similar business enterprises. The items to be covered are:

1. Liability insurance on the premises and any plant-owned vehicles.
2. Fire insurance on the plant, cattle awaiting slaughter and carcasses being processed or stored, and equipment.
3. Insurance for damage or injury caused by equipment operating under pressure, such as boilers or air compressors.
4. Consequential insurance to cover such losses as meat spoilage due to a power failure, or other similar circumstances.

The rates quoted are average estimates for the coverages listed above. The rates or annual costs to the plants for insurance are shown in Table 39.

Interest

Interest charges could be a very important cost item if the firm borrows money to build and operate the plant. An interest

Table 39. Annual Costs of Depreciation and Insurance, Synthesized Plants.

Item	Plant			
	A	B	C	D
Annual Costs of Depreciation				
Fixed facilities				
Buildings and fixed equipment	$306,168	$552,451	$503,355	$833,566
Corrals	21,522	49,766	40,291	77,776
Sewage facilities	14,500	27,500	22,500	42,500
Total	342,190	629,717	566,146	953,842
Less salvage value	34,219	62,972	56,615	95,384
Depreciable balance	307,971	566,745	509,531	858,458
Annual depreciation	12,319	22,670	20,381	34,338
Nonfixed facilities				
Office equipment	6,123	11,000	10,067	15,000
Miscellaneous equipment	30,000	55,000	50,000	75,000
Total	36,123	66,000	60,067	90,000
Less salvage value	3,612	6,600	6,007	9,000
Depreciable balance	32,511	59,400	54,060	81,000
Annual depreciation	3,251	5,940	5,406	8,100
Total costs of depreciation	15,570	28,610	24,887	42,438
Annual Costs of Insurance				
Annual rate	4,000	5,000	5,000	6,000

SOURCE: Compiled from Tables 37 and 38. See text for rates.

charge of 9% was applied to the value of the investment for estimating the synthesized plant's costs. Included in the investment were the estimated costs of land, buildings and equipment, sewer facilities, holding pens, miscellaneous plant and office equipment, and the costs of the number of cattle equal to four days' kill. This latter item is considered to be the number of cattle the firm will have on inventory at a given time, considering cattle in the holding pens, carcasses in the coolers and carcasses enroute to the delivery points. The interest expenses of the synthesized plants are shown in Table 40.

Property Taxes

The property taxes were computed with the assistance of Carlson (1970). For this study, the assessed valuation was considered to be the total purchase value of the land and equipment and the cost of construction of the building and facilities. To this valuation a tax rate of $16.22 per $1,000 of valuation was applied, and this result was considered to be the property tax. The rate used was for the tax district which comprises the area from the southeast of Madras to the northwest of Madras. The total investment costs for the synthesized plants as well as the property tax calculations are shown in Table 40.

Table 40. Annual Interest Expense, Property Taxes, and Total Costs of Investment for Synthesized Plants.

Item	Plant			
	A	B	C	D
Interest Expense:				
Land	$ 2,000	$ 3,000	$ 3,000	$ 4,000
Buildings, equipment, sewer, and corrals	342,190	627,717	566,147	953,841
Cattle inventory	69,730	174,728	139,441	278,821
Miscellaneous equipment	30,000	55,000	50,000	75,000
Office equipment	6,000	11,000	10,000	15,000
Total investment	449,920	871,445	768,588	1,326,662
Interest at 9%	40,493	78,430	69,173	119,399
Property Taxes:				
Land	2,000	3,000	3,000	4,000
Buildings and fixed equipment	306,000	552,000	503,000	874,000
Miscellaneous equipment	30,000	55,000	50,000	75,000
Office equipment	6,123	11,000	10,067	15,000
Total assessed valuation	344,000	621,000	566,000	928,000
Property taxes at $16.22 per $1,000 valuation	5,579	10,073	9,181	15,052
Total Costs of Investment:				
Depreciation	15,570	28,610	24,887	42,438
Insurance	4,000	5,000	5,000	6,000
Interest	40,493	78,430	69,173	119,399
Property taxes	5,579	10,073	9,181	15,052
Total costs of investment	65,642	122,113	108,241	182,889

SOURCE: Compiled from Tables 38 and 39. See text for rates.

Cost of Delivery of Fresh Beef

The cost of delivery of fresh beef is one of the major cost items for meat packing plants. The costs of operating trucks hauling 40, 000 pound loads were obtained from one of the interstate trucking firms. These costs were given as the out-of-pocket costs for I. C. C. carriers and were adjusted to provide for the costs of refrigeration and to reflect the cost of hauling 18, 000 pound loads. From these calculations the cost per hundredweight of meat was obtained for the various destinations to which the meat would be shipped. The destinations and cost per hundredweight are:

Portland	54. 2 cents
Eugene	61. 2 cents
Red Bluff, Calif.	92. 9 cents
Seattle, Wash.	89. 6 cents
Klamath Falls	66. 7 cents
Local area	34. 3 cents

To derive the cost of hauling the meat to a given destination for the year, the total amount of meat hauled to a destination was determined by applying the percentage of meat to be marketed in that area, as given in Chapter III. The above costs per hundredweight were then applied to the resulting figures. The total cost of transportation of meat going to each destination and the total cost of delivery are given in Table 41.

Table 41. Annual Cost of Delivery of Meat from Synthesized Meat Packing Plants in Central Oregon to Relevant Markets.

Destination	Plant			
	A	B	C	D
Portland	$18,843	$64,604	$50,824	$101,655
Eugene	11,018	22,529	17,723	35,266
Red Bluff	35,231	49,366	38,838	82,452
Seattle	4,429	21,293	16,750	48,610
Klamath Falls	3,296	15,228	11,978	12,225
Local	678	1,790	1,408	1,408
Total	$73,495	$174,810	$137,521	$281,616

SOURCE: Table 29. See text for rates.

Cost of Utilities

The utilities considered in this study were water, electricity, natural gas and telephone. For each of the utilities, the physical requirements were estimated from equations given by Logan and King (1962).

The rates for the cost of water were obtained from the Deschutes Valley Water District (1970). It should be noted that the water expense does not include the cost of extension of the water lines to the plant site, if that is necessary.

The rates for the electricity were given by Pacific Power and Light Company (1963). The billing demand was computed following a method in which the billing demand is assumed to be "four

kilowatts for every 1, 000 kilowatt-hours consumed" (Logan and King, 1962, p. 81). It should be pointed out that lower rates than the estimates used could be obtained through the Central Electric Cooperative, Inc.

Natural gas was considered to be the fuel used to heat the boilers. The amount of fuel consumed by a boiler is dependent upon the horsepower of the boiler. The boiler horsepower and gas consumption per horsepower were calculated following the method used by Logan and King. The hourly gas consumption rates per horsepower turned out to be 54. 9, 53. 0, 53. 6, and 51. 1 cubic feet for Plants A, B, C, and D, respectively. These results were then converted to therms by multiplying them by 1, 070, the estimated average number of therms in a cubic foot of gas (Griffin, 1970). The rates applied were taken from Cascade Natural Gas Corporation (1964).

The cost of telephone service was calculated using an equation given by Logan and King. For verification of these costs an inquiry was made to a local Pacific Northwest Bell office as to the types of service available and the cost of the service. The information obtained verified that the costs for adequate long distance service, local service and in-plant communication equipment necessary for the synthesized plants were closely comparable to the results obtained from using the Logan and King equation.

The rates for electricity, water and gas are given in Table 42,

Table 42. Rates for Utilities in Central Oregon, 1969.

Water		
Minimum	700 cu. ft.	$5.00
Next	20,000 cu. ft.	@ 25¢ per 100 cu. ft.
Next	30,000 cu. ft.	@ 20¢ per 100 cu. ft.
Next	30,000 cu. ft.	@ 17¢ per 100 cu. ft.
Next	60,000 cu. ft.	@ 15¢ per 100 cu. ft.
Balance		@ 13¢ per 100 cu. ft.
Electricity		
Net monthly rate		
Demand charge:	$145.00 for the first 100 KW of demand, or less $1.10 per KW for all additional KW of demand.	
Energy charge:	1.20¢ per Kwh for the first 50 Kwh per KW of demand.	
	1.10¢ per Kwh for the next 17,500 Kwh	
	0.65¢ per Kwh for the next 17,500 Kwh	
	0.31¢ per Kwh for all additional Kwh.	
Natural gas		
Rate per month:		
First	1,000 therms	@ .09 per therm
Next	3,000 therms	@ .07 per therm
Next	6,000 therms	@ .065 per therm
Next	10,000 therms	@ .0625 per therm
Next	80,000 therms	@ .06 per therm

SOURCE: Pacific Power and Light Company. 1963. Schedule 37. Large general service. 100 kw and over. Portland, Oregon. February 19. Cascade Natural Gas Corporation. 1970. Schedule No. 311.
Deschutes Valley Water District. 1970. Xeroxed rate schedule. Madras, Oregon. January 22.

and the total costs of all utilities are given in Table 43.

Miscellaneous Supplies and Services

The items considered miscellaneous supplies and services are cattle procurement costs, repair and maintenance, killing supply costs, office costs, and delivery and selling costs. All the miscellaneous supplies and services costs are shown in Table 44.

Cattle Procurement Costs

Expenses involved in purchasing cattle for the packing plant are assumed to be five cents per head. This figure will vary depending on the procurement patterns a plant follows. Should most cattle be purchased locally or on a contract basis, procurement costs may be lower than if cattle are assembled from a larger supply area.

Repair and Maintenance

The costs of repair and maintenance were estimated by determining a value from an equation given by Logan and King and then increasing this result by the percentage increase in the price index for "Services Less Rent" since 1962. This increase was 37.3% (U.S.D.L., B.L.S., 1962a and U.S.D.L., B.L.S., 1969a).

Table 43. Utility Requirements and Annual Costs for Synthesized Plants in Central Oregon.

Plant	Electricity					Water		
	Monthly energy usage	Monthly energy charge	Monthly demand	Monthly demand charge	Total annual cost	Daily usage	Annual usage (100)	Total annual cost
	(kwh)	(dols.)	(kw)	(dols.)	(dols.)	(gal.)	(cu.ft.)	(dols.)
A	449,150	363	150	200	6,759	20,371	6,841	992
B	885,155	557	295	359	9,802	50,770	17,058	2,320
C	741,118	499	247	306	9,669	40,725	13,683	1,881
D	1,325,052	736	442	521	15,095	81,450	27,367	3,660

Plant	Natural gas			Telephone	
	Monthly usage	Monthly cost	Total annual cost	Annual cost	Total utilities
	(cu.ft.)	(dols.)	(dols.)	(dols.)	(dols.)
A	134,998	138	1,667	6,210	15,631
B	232,937	222	2,673	13,802	28,599
C	200,644	195	2,341	11,294	25,189
D	3,229,918	299	3,597	21,462	43,817

SOURCE: Logan, Samuel H., and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260) Table 42.

Table 44. Annual Miscellaneous Supplies and Services Costs for Synthesized Plants in Central Oregon.

Plant	Repair and maintenance			Killing supply			Office		
	Estimated cost	Estimated increase	Present cost	Estimated cost	Estimated increase	Present cost	Estimated cost	Estimated increase	Present cost
	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)
A	6,407	2,389	8,796	9,165	669	9,834	4,488	170	4,658
B	15,975	5,958	21,933	12,389	904	13,294	5,871	223	6,094
C	12,814	4,779	17,593	11,319	826	12,146	5,414	205	5,619
D	25,628	9,559	35,187	15,628	1,140	16,769	7,266	276	7,542

Plant	Delivery and selling			Cattle procurement	Total miscellaneous
	Estimated cost	Estimated increase	Present cost	Estimated cost	Costs
	(dols.)	(dols.)	(dols.)	(dols.)	(dols.)
A	8,958	1,451	10,410	945	33,645
B	10,341	1,675	12,017	2,356	55,695
C	9,885	1,601	11,486	1,890	48,736
D	11,737	1,901	13,638	3,780	76,919

Continued

Table 44. Annual Miscellaneous Supplies and Services Costs for Synthesized Plants in Central Oregon--Continued.

SOURCE: Logan, Samuel H. and Gordon A. King. 1962. Economies of scale in beef slaughter plants. Davis. 131 p. (California. Agricultural Experiment Station. Giannini Foundation of Agricultural Economics. Giannini Foundation Research Report No. 260)
U. S. Dept. of Labor. Bureau of Labor Statistics. 1962a. Consumer price index. Washington, D. C. September.
U. S. Dept. of Labor. Bureau of Labor Statistics. 1962b. Wholesale prices and price indexes. Washington, D. C. November.
U. S. Dept. of Labor. Bureau of Labor Statistics. 1969a. Consumer price index. Washington, D. C. September.
U. S. Dept. of Labor. Bureau of Labor Statistics. 1969b. Wholesale prices and price indexes. Washington, D. C. November.

Killing Supply Costs

The killing supply costs include shrouds, soap, laundry and other costs associated with the killing operation and were estimated by use of an equation given by Logan and King. Since soap is one of the major items in this cost category, the percent increase in the whole price index for soap from 1962 to 1969, 9.7%, (U. S. D. L., B. L. S., 1962b and U. S. D. L., B. L. S., 1969b) was applied to the results obtained from the equation.

Office Costs

Office costs include the costs of office supplies, subscriptions, services to office machines and other miscellaneous costs associated with the office work. An estimating equation was provided by Logan and King and the results were increased by 3.8%, the increase in the wholesale price index for office supplies and accessories from 1962 to 1969.

Delivery and Selling Costs

The delivery and selling costs include costs of butcher paper for lining the floors of the trucks, laundry for the drivers' coats, twine, and other items associated with the delivery of the product. An estimating equation by Logan and King was used to derive these

costs. The results of the equation were increased by 16.2%, which is the increase in the wholesale price index for butcher paper from 1962 to 1969.

Income Taxes

Due to the complexities involved in determining the possible deductions and tax credits which could be used in calculating income taxes, it was decided that a realistic estimate could be obtained by applying to estimated net income a tax rate of 6% to allow for Oregon state income taxes and a tax rate of 46% to allow for Federal income taxes. The calculations involved in computing the estimated income taxes for the synthesized plants are shown in Table 45.

Cost of Slaughter Cattle

To derive the cost of the slaughter cattle, it was assumed that the cattle mix would be 75% fed cattle and 25% nonfed cattle. Of the fed cattle, 75% would be choice grade steers and 25% would be choice grade heifers. The nonfed cattle were considered to be cows grading utility.

The prices for the slaugher cattle were determined by averaging the average monthly price quotations from the North Portland market and direct feedlot and range sales (U.S.D.A.,

Table 45. Income Tax Calculations for Synthesized Plants.

Item	Plant			
	A	B	C	D
	(dols.)	(dols.)	(dols.)	(dols.)
Gross income	5,030,059	12,490,773	10,018,738	20,120,317
Total expenses	4,923,466	11,931,237	9,660,322	19,177,132
Net income	106,593	559,536	358,416	943,185
State income taxes a/	6,396	33,572	21,505	56,591
Federal income taxes b/	49,033	257,382	164,871	433,865
Total income taxes	55,429	290,959	186,376	490,556

a/ 6% of net income.

b/ 46% of net income.

SOURCE: Information taken from Table 51.

C. M. S., L. D., 1967-1962a). The average prices were $27.55 per hundredweight for steers, $26.81 per hundredweight for heifers and $17.49 per hundredweight for cows. Steers were assumed to weigh 1,000 pounds, heifers 800 pounds, and cows 850 pounds. The figures showing the calculations and total costs per year for slaughter cattle are given in Table 46.

Costs of Shipping Live Cattle

Information obtained from interviews with packing plant personnel indicates that generally the cost of transporting the live

Table 46. Annual Cost of Slaughter Cattle Purchased by Synthesized Plants in Central Oregon.

Type	Plant			
	A	B	C	D
		Number of head [a]		
Steers	10,631	26,507	21,263	42,525
Heifers	3,544	8,836	7,087	14,175
Total fed	14,175	35,343	28,350	56,700
Cows	4,725	11,781	9,450	18,900
Total	18,900	47,124	37,800	75,600
		Hundredweight [b]		
Steers	106,310	265,070	212,630	425,250
Heifers	28,352	70,688	56,696	113,400
Cows	40,163	100,139	80,325	160,650
		Cost [c]		
Steers	$2,928,840	$7,302,679	$5,857,957	$11,715,638
Heifers	760,117	1,895,145	1,520,020	3,040,254
Cows	702,451	1,751,431	1,404,884	2,809,769
Total	$4,391,409	$10,949,255	$8,782,861	$17,565,661

[a] 75% of total are fed, 75% of fed are steers.

[b] Assumed weights are: steers, 1,000 pounds; heifers, 800 pounds; cows, 850 pounds.

[c] Prices per hundredweight are: steers, $27.55; heifers, $26.81; cows, $17.49.

Source: See text for plant volumes.

slaughter cattle from the point of purchase to the packing plant is borne by the packing firm. This cost may be shifted back to the seller in cases where the packer has greater bargaining ability than the seller. However, to obtain conservative estimates of the net returns to the synthesized plants, the costs of shipping live cattle were allocated entirely to the plants.

A shipping point from which the cattle were assumed to be transported was chosen for each of the zones described in Chapter II. The shipping points were necessary for points of reference to determine shipping rates to the proposed packing plant.

The rates used were taken from the Willamette Tariff Bureau (1966) and are given for 40, 000 pound minimum loads. The zone shipping points and shipping rates are given in Table 47.

The hundredweight shipped from each point was calculated using the number of cattle estimated to be taken from each zone in Table 21, with the fed cattle estimated as 75% steers and 25% heifers. The hundredweight shipped and the costs of shipment by zone are given in Table 48. The total costs for shipment of cattle for the synthesized plants are also shown, as are the average costs per head.

Table 47. Zones, Shipping Points and Rates for Hauling Live Cattle to a Central Oregon Beef Packing Plant.

Zone	Shipping point	Rate
		(Dol. per cwt.)
I	John Day	.47
II	Condon	.31
III	Princeton	.59
IV	Silver Lake	.41
V	Bend	.21
VI	Hermiston	.47
VII	Ontario	.61
VIII	Local area[a/]	.15

a/ No shipping point was designated for cattle in the local area. It was assumed that they were shipped an average of 20 miles.

SOURCE: Willamette Tariff Bureau, Agent. 1966. Tariff No. 16-A. Portland, Oregon. May 10. (P. U. C. O. No. 29)

Returns from Sales of Fresh Meat

As stated earlier, 20% of the steer carcasses and 20% of the cow carcasses are assumed to be broken and boned. Since the prices for the primal cuts are different from the prices for carcasses, the number of carcasses broken and boned were separated from those not broken and boned. The prices for the whole carcasses are the average weekly prices for 1967-1969 for the various types of carcasses as quoted from the Portland market (U. S. Dept of Agriculture . . . 1967-1969). The prices used were for carlot shipments of carcasses, assuming that each load of

Table 48. Weight of Cattle and Shipping Cost of Cattle for Synthesized Beef Packing Plants in Central Oregon by Zone.

Zone	Plant			
	A	B	C	D
	(100 pounds)			
Weight				
Zone I	2,737	15,338	7,914	31,527
Zone II	3,749	40,249	10,823	95,613
Zone III	5,848	22,406	16,932	39,100
Zone IV	6,290	24,106	18,224	42,075
Zone V	2,567	44,920	7,421	112,913
Zone VI				39,426
Zone VII				39,426
Zone VIII	299,222	299,222	299,222	299,222
Total	320,049	446,241	360,536	699,302
Cost		(Dollars)		
Zone I	1,286	7,209	3,720	14,818
Zone II	1,162	12,475	3,355	29,690
Zone III	3,450	13,219	9,990	23,069
Zone IV	2,579	9,883	7,472	17,251
Zone V	539	9,433	1,558	23,712
Zone VI				18,426
Zone VII				24,050
Zone VIII	44,883	44,883	44,883	44,883
Total	53,899	97,102	70,978	195,953
Average cost per head	2.85	2.06	1.87	2.59

SOURCE: Tables 21 and 47.

carcasses would be unloaded at a single destination, rather than being distributed to numerous firms. The average prices were $43.99 per hundredweight for choice steer carcasses, $44.20 per hundredweight for choice heifer carcasses and $37.38 per hundredweight for utility cow carcasses. The steer carcasses were assumed to weigh 650 pounds, the heifer carcasses 500 pounds and the cow carcasses 400 pounds.

To estimate the returns from the boned beef, the average weekly wholesale prices for primal cuts at Portland were used for the years 1967 to 1969 (U.S. Dept. of Agriculture . . . 1967-1969). These prices also were for carlot shipments. The prices were then multiplied by the average weight of the primal cut and the results were totaled. This total was divided by the average weight of the boned meat from the carcass to obtain the average price per hundredweight of boned meat. The average weight of primal cuts was estimated to be 549 pounds per carcass for steer meat, and the average weight of boned cow meat was estimated to be 300 pounds per carcass. The prices for the primal cuts were $55.17 per hundredweight for the steer meat and $52.38 for the cow meat. A boning cost of $3.00 per hundredweight was added for the steer meat, resulting in the price of $58.17. The calculations for the determination of the returns from fresh meat are given in Table 49.

Table 49. Value of Fresh Meat Sold by Synthesized Packing Plants in Central Oregon. a/

Type	Whole carcasses	Weight of whole carcasses	Value	Boned carcasses	Weight of boned carcasses	Value	Total value
	(Number)	(100 pound)	(Dol.)	(Number)	(100 pound)	(Dol.)	(Dol.)
Plant A							
Steers	8,505	55,283	2,431,899	2,126	11,671	678,902	3,110,801
Heifers	3,544	17,720	783,224				783,224
Cows	3,980	15,120	565,186	945	2,835	148,497	713,683
Total							4,607,708
Plant B							
Steers	21,206	137,839	6,063,538	5,301	29,102	1,692,863	7,756,401
Heifers	8,836	49,180	1,952,756				1,952,756
Cows	9,425	37,700	1,409,226	2,356	7,068	370,222	1,779,448
Total							11,488,605
Plant C							
Steers	17,008	110,556	4,863,183	4,252	23,343	1,357,862	6,221,045
Heifers	7,088	35,440	1,566,448				1,566,448
Cows	7,960	30,240	1,130,371	1,890	5,670	296,995	1,427,366
Total							9,214,859
Plant D							
Steers	34,020	221,130	9,727,509	8,505	46,692	2,716,074	12,443,583
Heifers	14,175	70,875	3,132,675				3,132,675
Cows	15,120	60,480	2,260,742	3,780	11,340	593,989	2,854,731
Total							18,430,989

a/ See text for derivations.

Returns from By-products

In calculating the returns from by-products, it was assumed that the edible by-products would be sold through the same marketing channels as fresh meat. The inedible by-products are assumed to be saved to the maximum extent possible and sold to a renderer or pet food manufacturer. Prices for the by-products were taken from weekly quotations in the West Coast states (U. S. D. A., C. M. S., L. D. 1967-1969b). The weekly prices were averaged for the past three years and applied to the estimated weights of the specific by-products. The results of these calculations were then totaled.

It should be noted that the totals make an allowance for condemned livers at the rate of 10% of all livers. The condemned livers were assumed to be sold to a pet food manufacturer for one cent per pound. Also, the value of the bones from 20% of the steers and 20% of the cows were included in the total. The total value of the by-products and the average per head for the synthesized plants are given in Table 50.

Operating Statement and Financial Summary

The operating statement given in Table 51 shows the estimated financial results from one year's operation of the four

Table 50. Value of By-products of Synthesized Plants.

Item	Price per pound	Weight	Value per animal	Value of by-products[a]			
				Plant			
				A	B	C	D
	(Dol.)	(Pound)	(Dol.)	(Dol.)	(Dol.)	(Dol.)	(Dol.)
Heart	.29	3.0	.87	16,443	40,998	32,886	65,772
Liver[b]	.28	11.0	3.08	52,391	130,629	104,782	209,563
Oxtail	.17	2.0	.34	6,426	16,022	12,852	25,704
Tongue	.36	3.0	1.08	20,412	50,899	40,824	81,648
Cheek meat	.42	4.0	1.68	31,752	79,168	63,504	127,008
Kidney	.19	2.0	.38	7,182	17,907	14,364	28,728
Hide	.977	52.0	5.08	96,012	188,496	151,200	384,048
Lips	.14	1.0	.14	2,646	6,597	5,292	10,584
Lungs	.11	4.5	.50	9,450	23,562	18,900	37,800
Melts	.07	1.5	.11	2,079	5,184	4,158	8,316
Tripe	.11	20.0	2.20	41,580	103,673	83,160	166,320
Inedible tallows	.06	4.5	.27	5,103	12,723	10,206	20,412
Edible tallows	.08	7.5	.60	11,340	28,274	22,680	45,360
Meat and bone scraps	.93	5.0	4.65	87,885	219,127	175,770	351,540
Condemned livers[b]	.01	11.0	.11	208	518	416	832
Bones[c]	.01	--	--	3,092	7,710	6,185	12,370
Other inedibles	--	--	1.50	28,350	70,686	56,700	113,400
Total				422,351	1,002,168	803,879	1,689,355
Average value				22.34	21.26	21.27	22.30

Continued

Table 50. Value of By-products of Synthesized Plants--Continued.

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a/ Values (except for value of liver and bones) calculated by multiplying value per animal by annual plant output.

b/ Assumes 10% of livers are condemned.

c/ Assumes 20% of steers and cows are boned and allows 101 pounds per steer and 100 pounds per cow.

SOURCE: U.S. Dept. of Agriculture, Consumer and Marketing Service. 1967-1969. Livestock Division. Livestock meat wool market news. Washington, D.C., Feb. 17, 1967-Dec. 30, 1969.

Table 51. Operating Statement and Financial Summary for Synthesized Plants in Central Oregon.

Item	Plant							
	A		B		C		D	
	(Dol.)		(Dol.)		(Dol.)		(Dol.)	
Operating statement:	18,900		42,111		32,806		77,600	
Sales of fresh meat	4,607,708		11,488,605		9,214,859		18,430,989	
Sales of by-products	422,351		1,002,168		803,879		1,689,335	
Total sales	5,030,059		12,490,773		10,018,738		20,120,324	
Cost of cattle	4,391,409		10,949,255		8,782,861		17,565,661	
Cost of shipping cattle	53,899	2.85	97,102	2.06	70,978	1.89	195,953	2.57
Cost of delivery of meat	73,495	3.57	174,811	3.71	137,521	3.64	281,616	3.73
Cost of utilities	15,631		28,599		25,189		43,817	
Cost of investment	65,642		122,113		108,241		182,889	
Cost of miscellaneous supplies and services	33,645		55,695		48,736		76,919	
Cost of labor	289,745	15.33	493,042	10.46	486,796	12.88	830,277	10.98
Total costs	4,923,466		11,931,237		9,660,322		19,177,132	
Net income before taxes	106,593		559,536		358,416		943,192	
Total income taxes	55,429		290,959		186,376		490,865	
Net profit	51,164		268,577		172,040		452,327	
Financial summary:								
Cost per animal	26.05		25.31		25.55		25.36	
Return on sales	1.0%		2.2%		1.7%		2.2%	
Return on investment	11.4%		30.8%		22.4%		35.1%	

SOURCE: Above figures taken from tables in this chapter.

synthesized plants. Rather large profits were obtained, as can be seen from the figures in this table.

The financial summary shown in the same table shows a return on sales of 2. 2% for Plant D. This result was quoted to the manager of one of the larger packing plants in Oregon for his reaction. He stated that a plant netting that high a return on sales would be "the best plant in this area". The average cost figures in Table 51 were also quoted to this plant manager. His opinion was that these costs were comparable to those experienced by existing plants, given the functions that the synthesized plants were assumed to perform.

The high returns on sales derived from the synthesized plants probably result from the failure of the analysis to account for higher costs and lower returns due to the seasonablity of the slaughtering operation. Since the number of cattle available for slaughter varies from month to month, as shown in Chapter II, the plant would probably be unable to operate at full capacity the year around. Therefore, because of excess plant capacity and possibly excess labor, the average cost per animal slaughtered would increase, and returns from the lower volume of cattle processed would be smaller, thus decreasing the profit.

Also, the use of average prices in the analysis eliminates the situation in which short-term supply and demand for meat

causes prices for slaughter cattle and prices for meat to occur such that it is impossible to slaughter cattle profitably. On the other hand, prices could occur such that large, unexpected profits would be obtained. The net outcome of these situations is reported by managers of existing plants to be dependent upon the skill of the buyers and sellers employed and the ability of the manager to predict these situations in advance.

Comparison of Kill Floor Technology

The type of technology used on the kill floor has a significant influence on the costs of operation. To develop a comparison of the average total costs between the conventional bed type operation and the on rail type operation, the kill rates for Plant B (a two bed plant) and Plant C (an on rail plant) were varied. The results show that by decreasing the rate at which Plant B operates to 20 head per hour (from 25 head per hour), total costs per animal increased to $25.46. This compares with $25.55 per head for Plant C operating at the same rate, even though Plant B would have a higher cost of investment because of excess cooler capacity, which means that if Plant B were constructed for a capacity of 20 head per hour, its costs would be lower still.

By increasing the rate for Plant C to 25 head per hour (from 20 head per hour), the total costs per head decreased to $25.31,

which is equal to the total cost per head for Plant B at that rate. Plant C, however, would be operating at greater than capacity, since its cooler space was designed for a rate of 20 head per hour. If the plant had cooler space for a rate of 25 head per hour, its investment cost and thus total cost would be slightly higher.

Since the average total costs are closely comparable at these rates of output, other information was sought concerning the two types of operations. According to Hoffmann (1970), the rail type technology is not well suited to operations slaughtering at less than 20 head per hour. This type of technology uses very specialized labor, and the laborers generally perform only one function. Therefore, at low rates of output, many of the laborers will be idle while waiting for other functions to be performed which require more time. When this happens, labor costs per unit of output increase substantially.

The bed type facility is more adaptable to lower rates of output, in that the laborers can be utilized in more than one function. Therefore, the plant can operate with fewer workers at low rates of output, which keeps labor costs down. Generally, according to Hoffmann, the point at which an on rail facility becomes more efficient than a bed type is at rates of 25-30 head per hour.

Economic Impact of a Beef Packing Plant

A brief analysis was made to estimate the economic impact of a new beef packing plant upon the area in which it was established. Using a method outlined by Carlson (1970), the estimated increase in property taxes was determined which would result from the plant being located near Madras and the plant workers' homes being located in Madras. Also, estimates of the additional state income taxes that would be paid by the individuals working in the plants were determined. These apparent tax revenue increases are given in Table 52.

The costs which would be incurred by the school district and other public service organizations in Madras were also estimated. These costs are given in Table 53. From the costs of educating the additional children, deductions from the added revenues were made on the basis of 26% coming from state income taxes and 74% coming from property tax revenue. The total of other services, which include police protection, fire protection and other services performed by the city were covered by revenue from property taxes. As shown in Table 53, the net increases in revenue from property taxes are $2,884, $6,527, $5,189 and $6,112 for Plants A, B, C, and D, respectively.

Table 52. Estimated Income Added Through Personal Income Taxes and Property Taxes from Synthesized Packing Plants in Central Oregon.

Item	Plant			
	A	B	C	D
Property tax yields				
Value of plant	$344,000	$621,000	$566,000	$928,000
Number of added workers	25	43	45	70
Number of female workers	2	3	3	5
Additional homes	23	40	42	65
Number of homes owner owned	16	28	29	45
Value at $16,000	$256,000	$448,000	$464,000	$720,000
Number of homes rented	7	12	12	19
Value at $9,500	$66,500	$114,000	$114,000	$180,500
Taxable base increase	$666,500	$1,183,000	$1,144,000	$1,828,500
Average taxable rate $20/$1,000 (apparent property tax)	$13,330	$23,660	$22,880	$36,570
Personal income tax yields				
Average income per worker	$9,500	$9,500	$9,500	$9,500
Average net income per worker	$7,600	$7,600	$7,600	$7,600
Average tax @ 5.7%	$433.20	$433.20	$433.20	$433.20
x number of workers (apparent income tax)	$10,830	$18,194	$17,612	$30,320

SOURCE: Carlson, Waldo E. 1970. Tax Economist, Oregon State Dept. of Revenue. Personal communication, Salem, Oregon. January 30.

Table 53. Estimated Costs Added and Net Increase in Revenue from Synthesized Packing Plants in Central Oregon.

Item	Plant			
	A	B	C	D
Secondary and Primary Education				
No. added male workers	23	39	42	65
No. married (70%)	16	27	29	45
No. school children (.9/family)	14	24	26	41
Cost @ $919.51/ child	$12,873	$22,068	$23,907	$37,700
Allocations from state income tax	$3,347	$6,455	$6,216	$9,802
Allocations from property tax	$9,526	$15,613	$17,691	$27,898
Other services				
No. added families	23	38	41	64
Cost @ $40/family	$920	$1,520	$1,640	$2,560
Total property tax allocations	$10,446	$17,133	$19,331	$30,458
Net increase in revenue from property tax additions	$2,884	$6,527	$5,189	$6,112

SOURCE: Carlson, Waldo E. 1970. Tax Economist, Oregon State Dept. of Revenue. Personal communication. Salem, Oregon. January 30.

The results obtained consider only the impact the plant itself would have on the area. It is known, however, that a multiplier effect would occur which would cause the increase of the economic activity in the area to be much greater than that indicated by the plant alone.

A final point which is of great economic importance to the cattle producer is the gains that are possible because of reduced tissue shrink in slaughter cattle resulting from shorter hauls. Researchers have not determined exactly how much tissue shrink occurs for hauls of given distances. However, estimates for fed steers go as high as 1.5% for a haul of 120 miles. This is the minimum distance most of the slaughter cattle produced in Central Oregon must be hauled if they are shipped to Portland for slaughter. If this shrink were eliminated entirely, which might be possible if the cattle were slaughtered in a plant located near the feedlot instead of in Portland slaughtering plants, the cattleman would realize an increase of $7.25 per fed steer weighing 1,000 pounds. Even if only one-third of this tissue shrink were eliminated, the increase in returns would be $2.88. The establishment of a beef packing plant in Central Oregon, therefore, could result in very significant economic gains to cattle producers in the area, assuming they receive the savings from lower tissue shrink.

V. SUMMARY AND CONCLUSIONS AND RECOMMENDATIONS

Summary and Conclusions

This study was undertaken to provide information upon which to determine the feasibility of establishing a beef packing plant in Central Oregon. The major items considered and the findings are as follows:

Supply of Cattle Available to the Proposed Plant

The maximum estimate of slaughter cattle, both fed and nonfed, marketed in the relevant procurement area was 112, 775 head in 1968. The 1968 monthly marketing patterns show rates which varied from 6, 456 head in June to 11, 354 head in August. It is estimated by management representatives of national meat packing firms that a plant could procure from one-fourth to two-thirds of the cattle available in the area from which it draws its supply. This means that the possible monthly volume could vary between 1, 614 head in June to 7, 562 head in August. The hourly volume could vary from 10 head to 48 head. It is estimated that fed cattle production in the area will increase by 30 percent in the next five years.

Marketability of the Product

The general trend in the demand for beef in the Pacific Coast states is increasing steadily, and this increase is expected to continue through the foreseeable future. Two of the four major retailing firms in Oregon expressed an interest in purchasing carcass beef from a packing plant located in Central Oregon. A meat packing and wholesaling firm in northern California expressed an interest in obtaining carcass beef from a Central Oregon plant in the amount of approximately 10, 000 carcasses per year. Finally, a purveying firm which presently processes over 50, 000 carcasses per year in Eugene expressed an interest in obtaining carcasses from the proposed plant.

Cost and Return Analysis

Four model beef slaughtering plants were synthesized to estimate the costs and returns for plants having various annual volumes and utilizing two types of kill floor technology. The annual volume range for the four plants was from 18, 900 head to 75, 600 head, based on 40 hours per week. The results show that if the plants are assumed to operate at full stated capacity, given average prices for cattle, meat and by-products, the cost per animal slaughtered would vary from $26. 05 for the smallest

plant (Plant A) to $25.29 for the second largest plant (Plant B), which was the largest plant utilizing a bed-type slaughtering facility. The smallest on-rail plant (Plant C) was synthesized at a production rate of 20 head per hour. When Plant B's output was decreased to 25 head per hour, its total cost per animal remained below that of Plant C at that output. When Plant C's output was increased to 25 head per hour, its total cost per animal was equal to that of Plant B at that output. The costs of operation appear to be comparable at these rates of output for the two types of technology. The point at which the on-rail type plant becomes more efficient is estimated generally at rates of 25-30 head per hour, but the bed type plant is considered to be more efficient at rates of less than 20 head per hour.

The return on sales and return on investment varied inversely to the average costs. Plant A had the lowest returns and Plant B had the highest returns on sales and investment.

Recommendations

Accurate recommendations can be made only if full knowledge is available. Since the meat packing industry is presently in a state of change, what is true today may not be so one or two years from now. In this regard, the establishment of a new large slaughtering facility in southeastern Washington which is

presently underway could significantly alter the conditions in the relevant markets of the beef industry as they were determined to exist in this study. Therefore, an implied recommendation is that those responsible for the decision to establish a beef packing plant in Central Oregon proceed cautiously until the plant in southeastern Washington is in operation (early in 1971) and the effects it will have on the relevant markets are known.

Assuming that the relevant markets are not significantly altered in the near future, the following recommendations are proposed, based on the information developed in this study:

Recommendation I: That a beef packing plant be established and located in Central Oregon.

Recommendation II: That the plant be constructed to provide for a production rate in the range of 25, 000 head to 50, 000 head annually.

Recommendation III: That the choice of technology to be used on the kill floor be made in consideration of the rate of kill that is expected to prevail. If the rate is expected to be less than 20 head per hour and is not expected to go above that in the future, a bed type facility should be used. If the rate is likely to be predominantly 30 head per hour or more, an on rail facility should be

used. If the rate is expected to range between 20 head and 30 head, the decision should be based upon how rapidly production is expected to be increased to and sustained at rates above 25 head per hour.

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