

The feasibility of beef feeding cooperatives in Montana
by Ronald L Tinnermeier

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Economics
Montana State University
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Abstract:
The purpose of this study is: (1) to demonstrate the budgeting method which individuals and groups can use to determine expected costs and revenues for a given beef cattle enterprise, (2) to descripe and list the fixed investement and variable cost of four different size feedlots, (3) to determine relationships between the various size units in terms of per animal cost and revenues connected with alternative price margins, and (4) to relate this analysis to the feasibility of livestock cooperatives in Montana.

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September 1961

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ACKNOWLEDGMENTS

The writing of this thesis involved more people than myself, thus it is fitting that I should thank all those who helped with the writing and preparation.

I am especially grateful to my major advisor, Dr. Edward H. Ward, for his assistance and to Dr. Clive R. Harston for his help during the absence of Dr. Ward.

I wish to express thanks to my examining committee of Dr. John L. Fischer, Dr. Clarence W. Jensen, and Mr. E. Dean Vaughan for their constructive criticism and guidance.

The secretaries of the Department of Agricultural Economics were very patient during the typing of the first draft, especially Jeanne Gillie. The final typing and printing of the thesis was done by the International Cooperation Center. I appreciate the extra work done by the Center due to my absence.

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CHAPTER I

INTRODUCTION

The Problem Situation

Agricultural producers everywhere are faced with continual change in the agricultural economy. Certainly today's producer has not escaped the major problems existing related to the growth and change in the agricultural and general economy.

Many changes have occurred in recent years in the techniques of producing and marketing grains and livestock. These changes affect present operations and often stimulate the development of new interests and enterprises.

There is a growing interest in livestock feeding in Montana now resulting from: (1) the increased substitution of feed grains, especially barley, for wheat, (2) the production of about one million feeder calves annually,[1] and (3) the growing market for meat on the Pacific Coast resulting from the rise in population.[2] This population growth has been characterized by a general westward movement of the center of population. Assuming that this trend will continue, it appears that western beef producing areas will become closer to the major consuming centers of the

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[1] C. A. Infanger, M. E. Quenemoen, and E. D. Vaughan, Beef Cattle Feedlots in Montana, unpublished report, Montana Agricultural Extension Service, Bozeman, Montana, 1961.

[2] Donald J. Bogue, The Population of the United States, The Free Press of Glencoe, Illinois, 1959.

nation in the future.

When a farmer needs to change or wants to change his operation, he must look at the possible alternative enterprises which he might enter. Once the alternative avenues are listed, a decision must be made as to which one is most economical. It is realized that other factors besides economics enters the picture but the economist is concerned mainly with the economics of the change.

The Research Problem

Montana wheat growers are among the agricultural producers facing the problem of alternative enterprises. Governmental and supply and demand forces have necessitated the search for possible alternative lines of production that may be substituted for those enterprises which have been forced to reduce production. The restriction on wheat acreage in Montana has resulted in the substituting of feed grains for wheat. Barley is now second to wheat in cash receipts to producers in Montana, with the 1959 barley production at approximately 50 million bushels.[3/]

With excess feed grains, especially barley, Montana farmers are interested in marketing this grain through livestock.

The agricultural producer considering livestock feeding as a new enterprise can choose many alternative means to this end. Possible choices are: (1) to operate independently, (2) to integrate with other organiza-

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3/A. F. Shaw, "Barley Possibilities - Income Now Second to Wheat," Challenges, Montana Extension Service, Bozeman, Montana, Vol. 1, No. 3, January-February, 1960.

tions, (3) to join in partnerships or corporations, or (4) to form a cooperative feedlot with others.

Since not all of the four alternative types of livestock feeding can be covered in this study, the fourth alternative has been selected. This is primarily because this study is a contributing paper to a regional project on cooperatives.[4]

The above reason is not sufficient by itself, however, to warrant making this study. Producers in Montana are interested in cooperatives for a number of reasons: (1) a cooperative provides a way of accumulating capital for building a larger and more efficient feeding operation than an individual could build; (2) there are some marketing advantages connected with cooperatives - through joining together the feedlot is larger, savings result from cheaper transportation rates, lower buying and selling costs, and quality control; and (3) the Montana wheat producer can invest in a cooperative feedlot without interrupting the labor requirements on his own farm. If he invests in a farm feedlot, he would have to use some of his own labor which might adversely affect his grain operation.

> A cooperative association is a voluntary organization of persons with a common interest, formed and operated along democratic lines for the purpose of supplying services at cost to its members who contribute both capital and business.[5]

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[4] Refer to the cooperative western regional research project, WM-38, which began on July 1, 1958, and will terminate in 1962.

[5] H. E. Erdman and J. M. Tinley, The Principles of Cooperation, California Agricultural Experiment Station, University of California, Bulletin 758, February, 1957.

It is an organization where people have joined of their own free will and the members have a common interest as users of the goods and services which the association provides or sells. It operates on the one-man-one-vote basis, although additional votes are often relative to patronage. The association performs services at cost with any underpayment or overcharge distributed on the basis of patronage, and the members contribute both capital and business.

Beef cattle feeding is a secondary and relatively minor enterprise for most Montana farmers. The establishment of large feeding operations requires a high capital investment. One way of getting this capital is to form a cooperative where members pool their capital to accumulate sufficient capital for a larger, more efficient feeding operation.

Economic feasibility is one of the major considerations facing the producer in the selection of alternative enterprises whether as an individual or as a member of a cooperative.

Literature available on beef cattle cooperative organization is virtually non-existant. Considerable research has been done in the area of beef feeding and management but there is little research data concerning economics of scale and non-feed costs. Some research has been carried on in the Midwest[6/] and in California,[7/] but this data must be adapted con-

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6/ R. C. Suter and S. H. Washburn, Feeder Cattle Systems of Management, Preliminary Manuscript, 1959, Purdue University, 1959. Suggested Costs and Returns for Use with Budgeting Procedure, Cooperative Extension Service, Iowa State University, FM-1186, September, 1960. Rex Helfenstine, Equipment Costs of Different Size Cattle Feed Lots, Cooperative Extension Service, South Dakota State College, FS-59, 1960.

7/ John A. Hopkin, Cattle Feeding in California, Bank of America, San Francisco, California, February, 1957.

siderably to adjust to the different climatic and agricultural situations in Montana. Pius Weisgerber[8] made a study of farm feedlots for one area of Montana. This study is concerned with the economic implications and relationships between alternative sizes of cooperative beef cattle feedlots. It is a study of budgeted costs of the various size units and of the impact these costs have on per animal profit.

Objectives

The purpose of this study is: (1) to demonstrate the budgeting method which individuals or groups can use to determine expected costs and revenues for a given beef cattle enterprise, (2) to describe and list the fixed investment and variable costs of four different size feedlots, (3) to determine relationships between the various size units in terms of per animal costs and revenues connected with alternative price margins, and (4) to relate this analysis to the feasibility of livestock cooperatives in Montana.

Hypothesis

Assuming that a 100 head capacity feedlot is all that a small wheat farmer can build, due to no opportunity costs for already existing farm machinery, and a limited amount of available labor and capital, a producer is better off, economically, building a 100 head farm feedlot rather than joining a larger cooperative feeding operation.

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[8] Pius Weisgerber, Organization and Costs of Cattle Feeding in the Yellowstone Valley, Montana Agricultural Experiment Station, Research Report No. 11, Bozeman, Montana, September, 1959.

Procedure

This study is based on the case study method whereby observations are made to serve as a basis for budgeting investment costs, annual operating costs, and total returns per animal. This type of study can lead only to a partial proof or disproof of the hypothesis. The observations made cannot be complete nor include all the relevant factors concerning livestock feeding operations.

This study will be concerned mainly with the production considerations of beef feeding yards. The marketing aspects are important of course, but they cannot be dealt with in this study. Thus, feeder and slaughter prices will be standardized, and marketing practices and costs will be assumed to be the same for the four alternative feedlots.

Three livestock feeding cooperatives were visited for observation; Little Muddy Livestock Feeders Cooperative, Bainville, Montana; Pendleton Grain Growers, Pendleton, Oregon; and Edwall Swine Cooperative, Edwall, Washington. The first two are beef operations but the second is a corporation under the Pendleton Grain Growers. As shown by the name, the third is a swine cooperative. These operations were observed and available data on equipment and operating costs were gathered.

All the available members were interviewed to analyze attitudes and their extent of participation in the cooperative. It was first hoped that data could be gathered concerning the use of members' barley by the cooperative, however upon visiting the cooperatives, it was found that the feed was purchased from the local elevators. The Edwall Cooperative was the exception since members did sell their barley to the cooperative

but since it was for feeding swine this data could not be used.

Once the cost data were collected, they were used along with secondary data as a basis for budgeting materials, equipment, and costs for four alternative sized feedlots - 100-head, 45-head, 1400-head, and 5600-head capacity. The 100-head lot is considered as a farm feedlot to determine the relative costs incurred at this level as compared to the three larger cooperative feedlots.

Principles of cooperation are discussed in Chapter II in relation to observed member attitudes and management of the three cooperatives.

The budgeted investment costs, operating costs, and revenues are presented in Chapter III and an evaluation is made concerning the various size feedlots.

Chapter IV summarizes the study and presents a discussion of the hypothesis, of inferences reached, and conclusions arrived at from this study.

Limitations

It is necessary to point out several limitations when working with this study: (1) the inaccuracies of personal estimates and observations, (2) availability of directly related primary data, (3) limited secondary data, specifically for Montana, and (4) allocation of some of the operating costs is arbitrary.

CHAPTER II

COOPERATIVE ORGANIZATION AND OPERATION

Principles of Cooperatives

A considerable amount of work has been done in the area of cooperative management and membership.[9] However, it is not within the scope of this study to delve into this area to any great extent. Nevertheless, it is felt a general review of commonly accepted cooperative principles is in order. It must be kept in mind that these principles are not necessarily a means to successful operation. Rather, they are principles which have been suggested by previous authors as characteristic of a cooperative venture. Erdman (1957) presents a discussion of the seven Rochdale principles formulated from the rules, policies and practices of successful British cooperative establishments as well as four additional principles which he feels are essential for success. These principles include:

1. Open Membership - This principle has not been followed by all groups, especially in the United States where organizations have been fostered by specific groups such as the Farm Bureau, the Grange, and the Farmers Union. Other forms of closed membership are: (a) limitation of membership due to limited size of the facilities, (b) dropping members who do not patronize and (c) excluding a member who withdraws to do business elsewhere where offers are more advantageous. It appears that open mem-

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[9] McMillan, Wendall, A Bibliography of Dissertations and Theses on Cooperatives, Farmer Cooperative Service, U. S. Department of Agriculture, General Report 42, March, 1958.

bership is probably not important in most cases as a success factor,[10] possibly even the reverse is true.

2. Democratic Control - This second principle has been widely accepted by cooperatives. However, democratic control includes the one-man, one-vote control and voting according to patronage. Regardless of which practice is followed, democratic control is important to keep the control from passing into the hands of those primarily interested in dividends. It is also very important for keeping the membership active and for making the members feel a part of the organization.

3. Distribution of Savings to Patrons - Distribution of savings assumes that products are sold at prevailing prices and that the returns are distributed to the members according to patronage. This practice avoids price-cutting and guards against the cooperative underestimating important expense items.

4. Limited Returns on Capital - This principle is to avoid a cooperative from becoming a profit-making group in place of a "service at cost" group. This principle goes along with patronage dividends.

5. Political and Religious Neutrality - Neutrality is important, especially during times when there are critical political or religious issues. Some cooperatives take stands on public questions but this is as far as they become involved.

6. Cash Trading - This is not a definite requirement for success, but if credit is offered to compete with organizations, care must be taken

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[10] Erdman, op. cit., p. 4.

for controlling extensive credit. Members should be encouraged to use various credit agencies and to deal with cash through the cooperative.

7. Promotion of Education - When cooperatives first began, this principle literally meant to teach members how to read and write. Perhaps education could be substituted by the words public information or advertisement for the present day situation. Cooperatives have found that it is important to keep their names before the public. This keeps the community and the members informed about the progress of the cooperative and it is a reminder for the members as to why they joined the cooperative. The four additional principles suggested by Erdman are:

8. Suitable Corporate and Financial Structure - In order for a cooperative to run smoothly, the association should come under the law of the state and the cooperative principles should be included in a well-defined article of incorporation and by-laws. It is essential that competent legal advice, familiar with cooperatives, be used in formulating the articles.

9. Suitable Records, Accounts and Audits - Good records help insure a means for continually evaluating operation procedures in view of taking any corrective actions necessary. Records, audited by public accountants insure each member a fair dealing with the cooperative. Poor, or no records make room for suspicion, doubt and an eventual stagnation in terms of membership interest.

10. Competent Management - This principle not only includes the farm manager but also the Board of Directors and the Officers. Characteristics of a good manager are very intangible and thus make the job difficult.

However, all possible judgment should be used in selecting the manager, one of the key factors for success.

11. Dynamic Leadership - All persons involved in cooperative positions should possess some characteristics of leaders. Development of these characteristics is a problem in itself. In recognition of this problem, many cooperatives are using the services of high schools and colleges to train people in the principles of dynamic effective leadership.

Observations of Existing Livestock Cooperatives

In visiting the three previously mentioned livestock cooperatives, some tentative conclusions were made which were felt to be directly related to success. The observations all fall under the previously listed principles. If any one factor can be singled out as relates to success or failure, management is of prime importance. The manager affects almost all aspects of the cooperative venture. His management related to economic success, membership attitude, and control of the cooperative. It appears feasible that there is an increasing direct correlation between the price paid for a manager and the level of management received.

That is, when a cooperative hires a manager, it is likely that with a higher level of management desired, a higher salary must be paid. Raising the salary of a manager will not make him a better manager, but to find a suitable manager in the beginning will require a relatively higher salary.

Of just three groups visited, there was a great amount of difference

between the managers. It was observed that this affected the smooth operation of the cooperative. Management varies from a situation where a manager is respected by almost all the members interviewed in terms of experience and ability, to where members do not respect the manager. The manager might be inexperienced, indecisive, and lacking in sociability. Needless to say, the former type of manager has a higher chance for success.

The principle of insuring good management should appear evident to most people but apparently cooperatives often overlook this principle and hire the cheaper managers because they don't feel they can afford anyone demanding a higher salary. Money well spent in management probably means more to success than money spent on any other area in the operation.

Further support to this hypothesis is that the highest percentage of cooperative failures, 19.8 percent, was reportedly due to difficulties in the field of management.[11]

A second factor which also was observed important to the successful operation of a cooperative was the keeping of records and accounts.

The amount of feed fed to each member's cattle, the cost per pound of gain, and the feed conversion ratios need to be known to evaluate a cooperative feeding operation. The maintenance of accurate and up-to-date records helps insure a continuous knowledge of how the feeding operation is progressing. It also affects the attitudes of the members. Poor records breed suspicion and doubt among the members and can go as far as a

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[11] Erdman, op. cit., p. 4

member feeling that he is being cheated by the cooperative, even though this may not be so. When a manager is hired, he should have experience or knowledge in record-keeping and be aware of its importance.

Accurate and up-to-date records, with a yearly public audit, will help prevent distrust, suspicion, and poor operation from occurring. Records are and must be a vital part of any successful cooperative enterprise.

Membership attitudes play an important role in the smooth operation of a cooperative. While visiting the livestock cooperatives, the members were interviewed to determine their feelings toward the organization. The following are comments to the questions, "If you had it to do over again, would you still be a member and why?" and "Has the cooperative lived up to your expectations? - Explain."

Those members who answered by saying "yes," mentioned the following general areas: (Their statements are as close to actual comments as possible; they are not listed in order of importance nor by the number of times mentioned.) (1) It provides jobs for new families and helps keep the community going. It gives our town a place; (2) It has provided a market for our barley; (3) I believe in the cooperative movement and I would join anything which markets our surplus grains; (4) The cooperative may help me see the problems in setting up a feedlot on my own farm; (5) It was a good experiment; (6) I am a gambler; (7) We won't get hurt if we stay with it; (8) It's a step toward farmers helping themselves; and (9) If I were sick, there would be a place for me to feed out some cattle.

The following comments were connected with no answers to the questions: (1) We have had bad markets and prices; (2) Operating costs were higher than we expected; (3) It's a failure so far and I don't expect much more in the future; (4) Much of the profit goes into the wage of laborers - if you feed, you get that money; (5) I didn't get the returns expected; (6) We can't compete with the average farmer; (7) I'm not well enough informed on the setup; (8) We forget its a cooperative and act as individuals; and (9) Poor management - it's run too much by one person.

Of the 39 members interviewed, 29 answered "yes" to the first question, 5 answered "no" and 5 were uncertain. On the second question, 24 answered "yes," 11 answered "no," and 5 were uncertain. These figures indicate that about 74 percent of the members were in favor of cooperatives and thought they were a good thing but that only about 61 percent definitely felt the cooperative lived up to their expectation.

This survey was by no means extensive nor conclusive, but it does illustrate the problems encountered by the cooperatives and how this affects members' attitudes.

It was observed that for most of the members, the primary interest for being in the cooperative was for economic returns. This conclusion was also arrived at in connection with a cooperative membership study in the Midwest.[12/] Therefore, this should also be one of our concerns when studying the alternative structures of cooperatives.

The following chapters are concerned with the economic feasibility of livestock cooperatives in Montana.

12/Beal, George M., The Roots of Participation in Farmers Cooperatives, The College Bookstore, Iowa State University, Ames, Iowa, 1954.

CHAPTER III

AN ANALYSIS OF FOUR ALTERNATIVE FEEDING SYSTEMS

Investment Costs for the Alternative Feeding Systems

The costs of constructing four different sized feedlots were budgeted to serve as a means for comparing costs and revenues and also to serve as a guide to individuals or groups interested in constructing and analyzing beef cattle feeding systems.

The four lots were budgeted for 600-pound yearling steers fed for 225 days to a finishing weight of 1090 pounds (grade of choice). An estimated per day gain of 2.18 pounds was used for calculations. This feeding period allows for a yearly turnover of $1\frac{1}{2}$ times the full feedlot capacity. In other words, a 1400 head capacity feedlot could feed out 2100 head per year average, or put another way, three groups of 1400 head every two years.

The term capacity should be defined at this point so that confusion does not arise later in the chapter. Capacity will be used in this study as the maximum number of cattle which a lot can hold keeping within the requirements presented on page 16. This is for a point in time. "Capacity" also will be spoken of later as 50 percent, 100 percent, and 150 percent levels. In this case, the period of time will be for one year. A 150 percent "capacity" level for the 450 head capacity lot means that 675 head of cattle will move through the lot in one year. The capacity of the lot at any one time will still be 450 head.

One could say that there are more realistic situations for feeding cattle rather than the one budgeted in this study. Cattle might be purchased every week or month, or cattle might be fed for only certain periods of the year. This point is granted, however, attempting to budget costs on this basis would be very difficult; thus, for simplicity sake, the preceding method was used with the assumption that the prices are the average for the year, regardless of how often cattle are bought and sold.

As closely as possible, the alternative feedlots were assumed to be constructed for commercial cooperative feedlot operations with an average level of management. The construction costs were not kept as low as is possible but rather the costs were figured for adequate lots in a modern feeding system suitable for a cooperative venture.

The average level of management was specified for this study to enable the use of average costs figures from other studies. It is realized that an average level of management cannot be quantified, or at least it would be difficult to do so. However, if we assume an average level of management, then it is reasonable to assume that average cost figures from other studies would be applicable for this study, assuming of course, that the variation is not extreme from the average costs used.

The important factor that must be realized is that these lots are constructed to include certain specified facilities; if different facilities are desired, then an adjustment must be made when determining costs.

The plans and equipment specifications for the lots were based on

suggested plans in the Beef and Dairy Equipment Plans.[13] The following feedlot requirements were followed in budgeting material costs:

1. Two-hundred square feet feedlot area per animal.
2. Two feet of bunk space per head.
3. Approximately 80 head per foot of trough or automatic heated waterer.
4. Main alleys, heavy traffic - 16' wide.
5. Corral holding pen, 30 square feet per mature animal.
6. A 12 foot concrete apron in front of the feed bunks and waterers.[14]
7. A wind-break was budgeted covering all the outside fence area.
8. Except for the 100 head feedlot, fence line bunks were used. The 100 head lot was figured with a self-feeder.

The wind-break is constructed of 1x12 rough lumber with a frame of 2x8 on the bottom, two 2x4's in the center and a 2x6 on top. The posts on all fences are placed seven feet apart. The line fences between lots have four 1x8's on each side.

The investment costs were figured for the 450 head lot capacity and the larger lots were based on these figures. This procedure helped keep the facilities standardized and consistent throughout.

The lots were budgeted for construction in Gallatin County for the purpose of obtaining representative prices. Construction in another area of Montana would mean different prices on material used.

The 100 head capacity lot was budgeted as a farm feedlot. This was done to allow a comparison of the farm feedlot and the cooperative feedlots in order to determine any important implications. The total invest-

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[13] Midwest Plan Service, Beef and Dairy Equipment Plans, Iowa State University, Ames, Iowa, WMPS-1, 1959.

[14] This was an arbitrary choice by the author since research data isn't available concerning concrete. If concrete is needed, it is paid for whether one has it or not.

ment for a modern 100 head capacity feedlot was budgeted at $3,693.73. (See Table I in Appendix A.) This amounts to $36.93 per head for the feedyard facilities and equipment. It should be pointed out that some equipment, such as a tractor and truck, have not been included in the cost figures. Since this is a farm feedlot, it is assumed that the farmer already has this type of equipment. Therefore, the only costs derived are the operating costs which are budgeted later. Table I has an itemized list of materials and equipment used in the lot.

Further discussion is necessary concerning the costs for the 100 head capacity farm feedlot. As previously indicated, it is assumed that the small wheat farmer can build only a 100 head size feedlot. Carrying this analysis further, we also assume no opportunity costs for the farmer's labor and available machinery. It could be argued that there are some opportunities for using the machinery and labor. However, for the period of time during which the cattle would be fed, the opportunity costs are very low--for all practical purposes, zero. The farmer's labor is available during the slack winter season as is also the labor of all his neighbors. This also holds true for his machinery. This surplus of labor and machinery makes the opportunity costs minimal.

If the farmer expanded his feedlot above the 100 percent level, he would then begin competing with the main enterprise of the farm, wheat. At that time there would be opportunity costs for his labor and machinery. More costs would then need to be charged to the feedlot. For this reason, we will limit our budgeting of costs to the 100 head capacity feedlot.

If this feedlot can compete with the cooperative lots, then further research would be needed to compare larger sized farm feedlots with the cooperative lots. However, if the 100 head lot with its advantages of supplemental labor and machinery cannot compete with the farm joining the cooperative, then we need not be concerned about comparing the larger farm feedlots with the cooperative lot. If the farmer is in a better economic position to join the cooperative even when there are supplemental advantages for the small private feedlot, he cannot expect to improve this position by building a larger farm feedlot which would not have the advantage of the supplemental labor and machinery.

Labor costs for constructing all of the lots were figured at 50 percent of the material costs.[15] The hardware cost was included in the material cost figure for determining labor for the working corral. This was done to account for the need for more labor in building the corral per unit of material cost as compared to building the pens.

The 450 head capacity feedlot was budgeted in a similar manner to the 100 head lot with the exception that it was considered as a cooperative lot, as were the larger lots; thus, all the needed equipment had to be figured in the cost. This includes a tractor, truck and feed handling equipment not listed for the 100 head lot. The total investment was budgeted at $25,612.04 (see Table I, Appendix B) or on a per head basis, for 225 head per year, $113.83; for 450 head per year, $56.91; and for 675

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[15] Reuben Albough, C. F. Kelly and H. L. Belton, based on Beef Handling and Feeding Equipment, California Experimental Station - Extension Service Circular 414, Revised, January, 1958.

head, $37.94. As the number of head in the lot is reduced, the fixed cost per animal goes up rapidly.

The budgeted total investment costs for the 1400 head capacity feedlot was $93,191.86 which includes $38,700.00 for the feed mill. With this additional cost of the mill, the per head cost is $133.13 for 700 head per year, $66.56 for 1400 head, and $44.37 for 2100 head. The itemized figures are presented in Table I of Appendix C. Without the mill, the per head cost is $77.84, $38.92 and $25.95 respectively.

The 5600 head capacity feedlot investment totals $311,285.92 or $111.17, $55.58, and $37.05 for 2800, 5600, and 8400 head fed per year respectively. (See Table I, Appendix D.) The feed mill cost of $150,391.03 includes storage facilities for 100 to 125 tons of feed. The system will dry roll or steam roll and dry 48 tons every eight hours. This price is an actual contract bid for a similar mill built in Montana.

The size of the feedlot has a direct effect on the total investment cost per animal. Figure 1, page 20, illustrates the relative investment costs per head for the four alternate feedyards.

The first point is the 100 head farm feedlot and the per head cost is lower than any other point on the chart. This low cost is explained by the fact that not all equipment costs were included since some were assumed to be already on the farm. If the feeding operation is a small percentage of the total farm output, then it is reasonable to assume that the feedlot should be charged only the operating costs. However, when the feedlot becomes an important source of income for the farm, then more costs

must be accrued to the feeding operation and the investment cost per head would rise.

The dashed curves show the per head investment costs with the various levels of cattle fed per year for the three other alternate size feedlots. When the three larger lots operate at one-half capacity, the investment cost per head is very high.

As an example, refer to the 1400 head capacity dashed curve in Figure 1. At point A, the investment cost per head is $133.13, which is at the 50 percent level for this lot. The cost per head at point B is $66.56 for the 100 percent level, and at C, $44.37 per head for the 150 percent capacity level.

The dashed curves for the other size feedlots indicate the costs at the various levels of capacity similar to the 1400 head capacity curve.

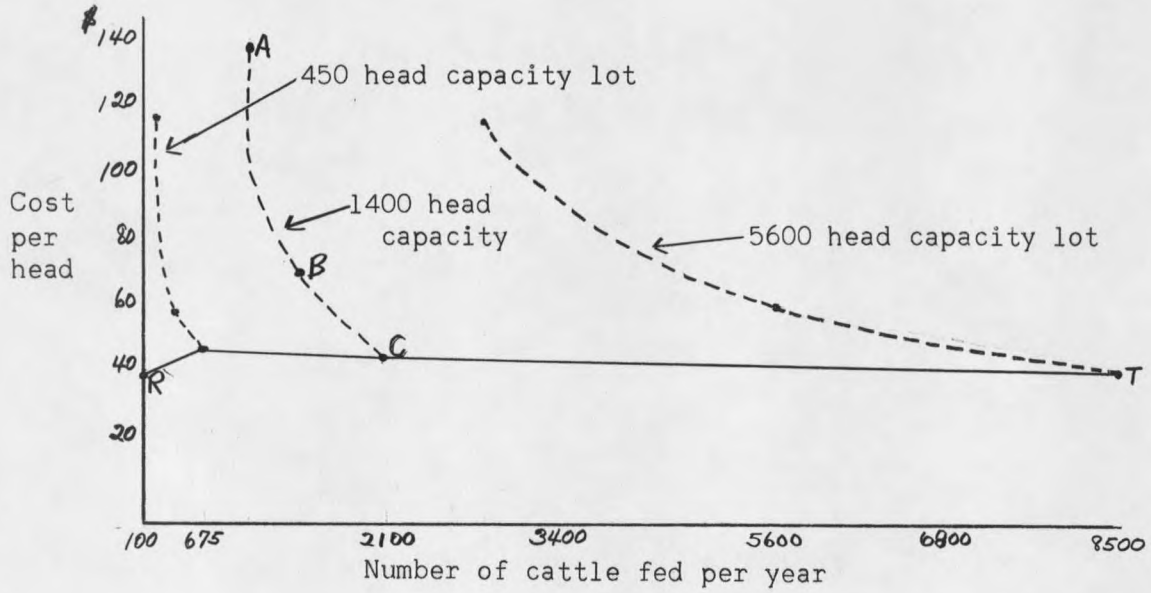

Figure 1. Investment Costs Relative to Number of Animals

It must be remembered that the levels of "capacity" is in terms of the number of cattle fed per year--the amount of turnover in the lots. As the size of the lot increases, the investment cost per head lowers with the exception of the 100 head lot. The first curve for the 450 head lot appears to contradict this statement but this is because the costs for the 450 head lot doesn't include a feed mill. If one considers just the facilities without the mill costs, this relationship holds true. Refer to Figure 2. We see that as the lot becomes larger, the per head costs decrease at a decreasing rate. The solid curve, RT, connects the points where the lots are at 150 percent capacity, illustrating again the decrease in costs relative to increase in sizes. There is a slight increase in investment cost per animal from the 100 head to the 450 head lot showing that the farmlot does have some advantage if one does not include fixed costs for pieces of equipment already on the farm. It should be

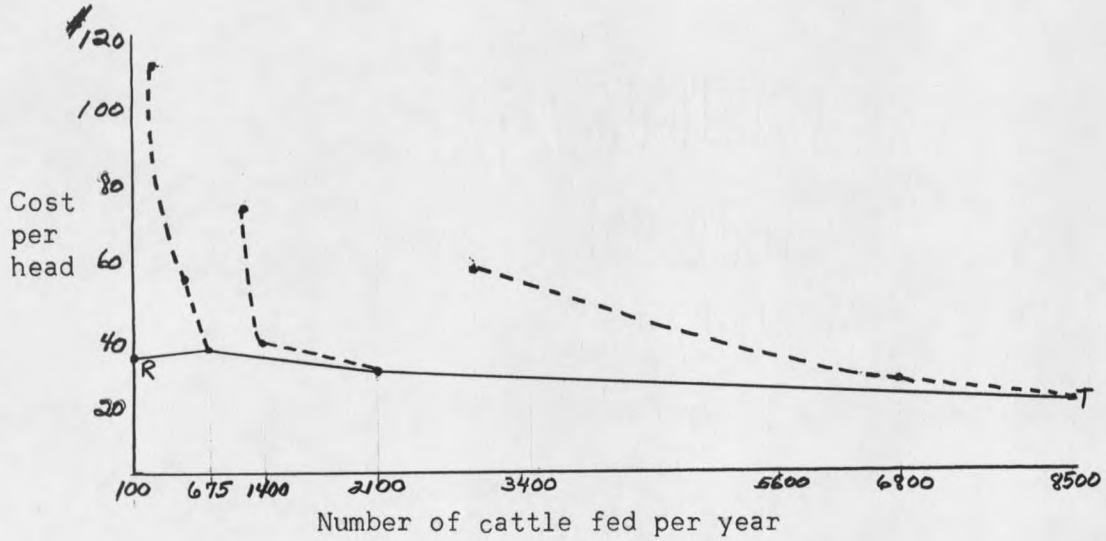

Figure 2. Investment Costs Without the Mill Cost Included

noted that the solid line connects the 100 head capacity lot at 100 percent level. This is because the solid line connects the least per head cost points for each size feedlot. As indicated previously, the 100 head lot will have increasing per head cost above the 100 percent level because the supplementary nature of labor and machinery on the farm will no longer be true at the 150 percent level and costs will increase per head.

The addition of a mill to the larger size feedlots is done under the assumption that the additional cost of the feedmill will be offset by the savings in feed cost. This relationship cannot be studied in this report, it will just be assumed. The 450 head capacity lot was not budgeted with a feedmill since it was assumed uneconomical to invest in a mill. This assumption was based on discussions with feedlot operators and with Kenneth Eubanks.

Another way of looking at investment costs is illustrated in Fig. 3, page 23. Instead of expressing costs in terms of the number of animals fed, this figure shows the cost per head at the three levels of capacity. Again the decrease in cost is directly related to increase in size and percentage of capacity.

The investment cost per head at the 50 percent level for the 100 head capacity can be found, as illustrated; however, to determine the per head cost at the 150 percent level is more difficult. An estimation will be made for this level to indicate what might happen to the costs per head.

Since the labor and machinery will no longer be supplementary imputs, a charge must be included for their use in the feedlot. A figure of one-

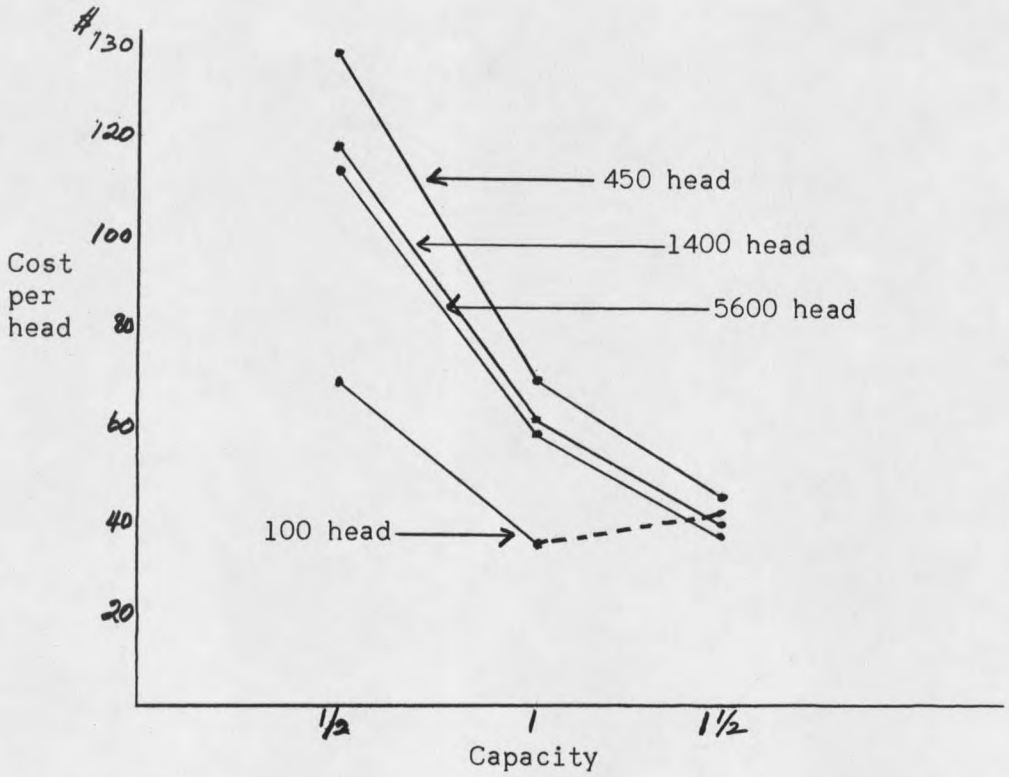

Figure 3. Investment Costs Relative to Capacity

third of the total investment cost will be accrued to the feedlot as an estimate as shown in Table 1, Appendix A. This results in a per head investment cost of $40.62. The dashed portion of the 100 head capacity curve in Figure 3 shows this increase in per head cost going from 100 percent to 150 percent level.

The decrease in investment costs per head results from economics arriving out of increase in size. Increasing the lot size from 450 head to 1400 head means an increase in the number of cattle of about three times. However, the windbreak area increased less than three times giving some economy in terms of per head cost. The same corral and equipment

used for the 450 head lot can be used for the larger lot. Again a considerable saving in investment costs. Other economics of size include the well, pump and piping system, the electrical system, the cattle handling equipment; and an important economy, machinery for feeding and manure handling.

Operating Costs for the Alternative Feeding Systems

Operating costs for the feedyards were placed into two categories: (1) set costs - feed costs, and cattle inventory, and (2) non-set costs - annual capital costs and variable costs.

The feed costs were budgeted at $77.65 per animal which includes 71 bushels of barley at $.75 per bushel, 1,400 pounds of hay at $22.00 per ton, and 200 pounds of supplement at $4.50 per hundredweight.[16/]

The value of the feeder steer was budgeted at three levels taking into account a positive and negative price spread. This will be explained later.

The annual capital cost for the 100 head capacity lot was budgeted at $1,705.32 (See Table I, page 25). This cost includes interest, taxes, depreciation, insurance, and repairs. The interest was set at six percent and was applied against the value of the land and against one-half the capital investment for improvements and equipment.[17/]

16/ Staff in Agriculture, Midwest Farm Handbook, Iowa State University, Iowa State University Press, Ames, Iowa, 5th Edition, 1960.

17/ This procedure accounts for the interest cost of the average investment over the depreciated life of the facilities.

TABLE I. BUDGETED ANNUAL CAPITAL INVESTMENT COSTS FOR 100 HEAD CAPACITY FEEDYARD.

Item		Annual Cost	
Land			
Interest	$300.00 @ 6%	$ 18.00	
Taxes	@ 1.35/A	1.35	
Total		19.35	
Improvements			
Pens	1,116.46		
Corral	638.92		
	1,755.38		
Taxes (20 yr. dep. value)		8.29	
Interest 1/2 of 1,755.38 @ 6%		52.66	
Depreciation @ 5%		87.77	
Repairs		20.00	
		168.72	
Equipment			
Self-feeder	200.00		
Portable auger	175.00		
Water	90.00		
Oiler	179.50		
Pump-pipe-ditching	390.00		
Wiring	100.00		
Manure loader	403.85		
	1,538.35		
Taxes (20 yr. dep. value)		6.46	
Interest 1/2 of 1,538.35 @ 6%		46.95	
Depreciation @ 10%		153.84	
Insurance		9.35	
Repairs		120.00	
		336.60	
Working Capital			
Interest on $20,000 @ 6%		1,200.00	
TOTAL ANNUAL CAPITAL COST			$1,705.32

The working capital includes cattle inventory plus an estimated $40.00 feed cost. The $40.00 feed cost is one-half the total budgeted feed cost per head and allows for paying interest on just half the total. See footnote 17, page 24, for the reason.

The taxes were figured on the 20-year depreciated value for the fixed facilities and on the 10-year depreciated value for the movable equipment. The depreciation was figured on a straight-line basis. The following formula was used to determine the tax on improvements listed in Table I, page 25.

$$\frac{\text{total value}}{2} - \text{annual depreciation} \times .35 = \text{assessed value}$$

$$\frac{\$1,755.38}{2} - \$87.77 \times .35 = \$276.47$$

Assessed value x .30 = taxable value

$276.47 x .30 = $82.94

Taxable value x millage = tax

$82.94 x 100 mills = $8.29

The insurance was estimated at $.85 per $1,000 value. The repair costs were estimated at .285 percent for the fixed facilities and at 3.7 percent for the movable equipment.[18]

The annual non-feed costs were broken down to include salaries, fuel and power costs, veterinary and medicine costs, death losses and total capital costs. (See Table II, page 27.)

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[18] G. E. Marousek, and H. J. Dirks, Economic and Organizational Aspects of Cooperative Feedlots, Economics Department, Agricultural Experiment Station, South Dakota State College, Brookings, S.D., Bul. 494, 1961.

The annual capital cost for the 450 head capacity lot totaled $5,900.57 for 225 head per year. For 450 head per year, $8,480.57 and for 675 head fed per year, a total of $11,060.57. For an itemized listing of the total annual capital costs, refer to Table III, page 28. It should be noted that the costs per head per day for death loss, veterinary and administrative cost for the 450 head capacity lot, and for the larger lots, are slightly lower than for the 100 head lot.

TABLE II. BUDGETED NON-FEED COSTS FOR 100 HEAD CAPACITY FEEDYARD - ANNUAL BASIS.

Item	Cost	
Labor - 675 hrs. @ $1.00[a]	$ 675.00	No labor figured
Utilities		
Fuel and Power[b]	130.00	130.00
Steam Rolling @ $3.00 per ton[c]	750.00	750.00
Veterinary and Medicine[d]	100.00	100.00
Death loss[e]	264.32	264.32
Total Annual Capital Cost	1,705.32	1,705.32
Total Non-feed Cost	$3,624.64	$2,949.64
Total Non-feed Cost Per Head	$36.24	$29.49

a/ Labor budgeted at three cents per head per day - based on Weisgerber, Pius, Organization and Costs of Cattle Feeding in the Yellowstone Valley, Montana Agr. Exper. Sta., Res. Report No. 11, Bozeman, Mont., Sept. 1959.

b/ Cost figured at eight cents per mile variable costs for two ton truck including fuel, oil, tires, repair, and maintenance. Based on Capstick, D.F., "What Does it Cost to Operate Farm Trucks?" Agr. Leaders Digest, Nov.-Dec., 1960, p. 20. This figure also includes electricity cost (.08 per head per day).

c/ Estimated cost for commercial steam rolling. Interview with Kenneth Eubanks, Res. Ass't., Dept. of Agr. Econ., Mont. State College, Bozeman, Montana, August, 1961.

d/ Veterinary and medicine estimated at $1.00 per head from Weisgerber study. (.44 cents per head per day)

e/ Based on Weisgerber's study at 1.18 cents per head per day.

TABLE III. BUDGETED ANNUAL CAPITAL INVESTMENT COSTS FOR 450 HEAD CAPACITY FEEDYARD.

Item			Number of Head Per Year 225	450	675
Land					
Interest	$1200 @ 6%		72.00	72.00	72.00
Taxes	@ $1.35		5.40	5.40	5.40
Annual Cost			77.40	77.40	77.40
Improvements					
Pens	4,205.04				
Bunks	1,963.59				
Concrete	3,959.38				
Corral	273.30				
Gravel	313.50				
Well	1,500.00				
Total	12,214.81				
Taxes (20 yr. depr. value)			57.71	57.71	57.71
Int. ½ of 12,214.81 @ 6%			366.44	366.44	366.44
Depreciation @ 5%			610.74	610.74	610.74
Repairs			50.00	50.00	50.00
Total			1,084.89	1,084.89	1,084.89
Equipment					
Tractor		1,500.00			
Manure Loader		403.85			
Truck & Unloading box		6,500.00			
Cattle Sprayer		111.00			
Cattle Oiler (6)		1,077.00			
Scales & House		2,582.00			
Misc.		14.56			
Total		12,188.41			
Taxes (10 yr. depr. value)			51.19	51.19	51.19
Int. ½ of 12,188.41 @ 6%			365.65	365.65	365.65
Depreciation @ 10%			1,218.84	1,218.84	1,218.84
Insur. ($50 deduct.)			72.60	72.60	72.60
Repairs			450.00	450.00	450.00
Total			2,158.28	2,158.28	2,158.28
Working Capital-$86,000 @ 6%			2,580.00	5,160.00	7,740.00
Total Annual Capital Cost			$5,900.57	$8,480.57	$11,060.57

Research has shown that with larger lots the costs per head per day do decrease.[19]

This can be illustrated further when one compares the per head per day cost for some non-feed costs. The veterinary and medicine costs goes from 44 cents per head per day for the 100 head lot, to 34, to 26, and to 24 cents for the 450, 1400, and 5600 head lots respectively. A similar decrease in cost per head per day will be found for labor, fuel and power, and death loss. There is one factor that has not been tested sufficiently, however, which might cause the decreasing costs to appear. It is possible that the smaller lots do not have the same level of management as the larger ones. That is, poorer management in the smaller lots might cause more death loss, veterinary and medicine expense, etc. This probably accounts more for the decreasing cost per head per day with increase in size, rather than size alone.

The total non-feed cost for the 450 head capacity lot, including total annual capital cost, is $13,906.70 or $61.81 per head where 225 head are fed per year, $19,313.57 or $42.92 for 450 head, and $24,718.95 or $36.62 for 675 head per year. (See Table IV, page 30.) This size feedlot was not budgeted to include a feed mill; therefore, the fuel and power costs include the feed hauling costs between a point 10 miles away from the feedyard. The price of the feed is held constant throughout the study, however, if one wished to compare costs for a mill for this lot against not having a mill, representative feed costs would need to be figured to determine the economic feasibility of a mill at this level of operation. Lack of

[19] J. A. Hopkin, Op. Cit., p. 4.

time and insufficient data dictated that this study not include this comparison.

The total annual capital cost for the 1400 head capacity lot is estimated at $17,811.60 for 700 head per hear, $25,791.60 for 1400 head, and $33,771.60 for 2100 head fed per year (Table V, page 31). The total

TABLE IV. BUDGETED NON-FEED COSTS FOR 450 HEAD CAPACITY FEEDYARD - ANNUAL BASIS.

Item	Cost - No Mill		
	225 Head per Year	450 Head per Year	675 Head per Year
Salaries			
Manager	5,000.00	5,000.00	5,000.00
Utilities			
Fuel and Power[a]	374.62	750.00	1,123.87
Electricity	175.00	200.00	225.00
Custom Steam Rolling @ 3.00/T[b]	1,687.50	3,375.00	5,062.50
Vet. and Med.[c]	172.13	344.25	516.38
Death Loss[d]	556.88	1,113.75	1,670.63
Admin. and Office Supplies	40.00	50.00	60.00
Total Annual Capital Costs	5,900.57	8,480.57	11,060.57
Total Non-Feed Cost	$13,906.70	$19.313.57	$24,718.95
Total Non-Feed Per Head	$61.81	$42.92	$36.62

a/ Estimated at .74 cents per head per day - based on Hopkins, John A. "Cattle Feeding in California - A Study of Feedlot Finishing," San Francisco, California, Bank of America, February, 1957.

b/ Figure estimated by Kenneth Eubanks.

c/ Estimated at .34 cents per head per day - based on Weisgerber (1959) and Hopkins (1957).

d/ Estimated at 1.1 cents per head per day - based on Weisgerber (1959).

TABLE V. BUDGETED ANNUAL CAPITAL INVESTMENT COSTS FOR 1400 HEAD CAPACITY FEEDYARD.

Item		700 Head Per Year	1400 Head Per Year	2100 Head Per Year
Land				
Interest $4500 @ 6%		270.00	270.00	270.00
Taxes		20.00	20.00	20.00
Total		290.00	290.00	290.00
Improvements				
Pens	6,623.24			
Bunks	5,891.05			
Concrete	11,878.12			
Corral	891.12			
Scales and House	2,582.00			
Gravel	907.50			
Feed Mill	38,700.00			
	67,473.03			
Taxes (20 yr. depr.)		318.81	318.81	318.81
Int. ½ of 67,473.03 @ 6%		2,024.19	2,024.19	2,024.19
Depreciation @ 5%		3,373.65	3,373.65	3,373.65
Repairs		192.29	192.29	192.29
Total		5,908.94	5,908.94	5,908.94
Equipment				
Tractor	1,500.00			
Loader	403.85			
Truck & Box	6,500.00			
Pickup	1,500.00			
Self-unload. wgn.	1,800.00			
Cattle Sprayer	111.00			
Cattle Oiler	3,231.00			
Well, pump waterers	5,958.42			
Misc. - shovel - cattle handling equipment	214.56			
	21,218.83			
Taxes (10 yr. depr.)		89.12	89.12	89.12
Int. ½ of 21,218.83 @ 6%		636.57	636.57	636.57
Depreciation @ 10%		2,121.88	2,121.88	2,121.88
Repairs		785.09	785.09	785.09
Total		3,632.66	3,632.66	3,632.66
Working Capital				
Interest @ 6% - $.40 feed/hd $150.00 per hd, inventory		7,980.00	15,960.00	23,940.00
Total Annual Capital Cost		$17,811.60	$25,791.60	$33,771.60

non-feed cost is $28,677.35 or $40.97 per head for 700 head per year, $41,873.10 or $29.91 per head for 1400 head, and $54,568.85 or $25.99 per head for 2100 head fed per year. (See Table VI, page 33.)

The 5600 head capacity feedyard has an annual capital cost of $61,829.58 for 2800 head per year, $93,749.58 for 5600 head, and $125,669.58 for 8400 head. The annual capital cost is illustrated in Table VII, page 34. The interest on the working capital includes $40.00 per head feed cost, interest being figured on half the total feed cost, $150.00 per head cattle inventory, and $25,000.00 for working capital for the feed mill. Only one half of the mill working capital is charged interest since the full amount need not be borrowed for the whole year.

The total non-feed costs for the 5600 head yard is $116,289.58 or $41.53 per head for 2800 head per year, $165,759.58 or $29.60 per head for 5600 head, and $211,229.58 or $25.46 per head for 8400 head. (See Table VIII, page 36.)

The annual capital cost for the four lots, of course, increases as the lots become larger. However, the nature of this increase isn't completely evident. Upon using an analysis of the added costs for each larger feedyard, there is no definite pattern. The additional cost per head from the 100 head lot to $1\frac{1}{2}$ times capacity in the 450 head lot is $16.27. However, when going from 675 head to 2100 head in the next larger lot, the cost per added head is $16.36. This slight rise in cost might be altered if one figured a feed mill for the 100 and 450 head feedyards. From 2100 to 8400 head the additional cost per head is $14.49, a decrease.

The total non-feed additional cost per head going from the 100 head lot to the three larger lots at $1\frac{1}{2}$ times capacity is $36.69, $21.00 and $24.77. That is, going from 100 head to 675 head the additional cost per head is $36.69, and so on for the others. It appears that the additional

TABLE VI. BUDGETED NON-FEED COSTS FOR 1400 HEAD CAPACITY FEEDYARD - ANNUAL BASIS.

Item	700 Head Per Year	1400 Head Per Year	2100 Head Per Year
Salaries			
Manager	5,600.00	5,600.00	5,600.00
Worker	1,500.00[a]	3,000.00[a]	4,000.00
Utilities			
Fuel and oil[b]	1,102.50	2,205.00	3,307.50
Electricity	500.00	1,000.00	1,500.00
Veterinary and Medicine Costs[c]	409.50	819.00	1,228.50
Death Loss[d]	1,653.75	3,307.50	4,961.25
Office Supplies	100.00	150.00	200.00
Total Annual Capital Cost	17,811.60	25,791.60	33,771.60
Total Non-Feed Costs	$28,677.35	$41,873.10	$54,568.85
Total Non-Feed Costs Per Head	$40.97	$29.91	$25.99

a/ Part-time labor.

b/ Estimated at .7 cents per head per day - based on Hopkin, John A., Cattle Feeding in California - A Study of Feedlot Finishing, San Francisco, California, Bank of America, February, 1957.

c/ Estimated at .26 cents per head per day - based on Hopkin, John A., and Weisgerber, Pius, Organization and Costs of Cattle Feeding in the Yellowstone Valley, Montana Agricultural Experiment Station, Research Report No. 11, Bozeman, Montana, September, 1959.

d/ Death loss estimated at 1.05 cents per head per day, Ibid.

TABLE VII. BUDGETED ANNUAL CAPITAL INVESTMENT COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item		2800 Head Per Year	5600 Head Per Year	8400 Head Per Year
Land				
Interest $12,000 @ 6%		720.00	720.00	720.00
Taxes @ 1.35/A		54.00	54.00	54.00
Total		$774.00	$774.00	$774.00
Improvements				
Pens	20,410.60			
Equipment	6,193.95			
Bunks	23,564.21			
Concrete	47,512.50			
Corral	960.63			
Well, pump	6,000.00			
Gravel	907.50			
Feed mill storage	150,391.03			
Total	$255,940.42			
Taxes (20 yr. depr. value)		1,209.32	1,209.32	1,209.32
Interest ($\frac{1}{2}$ of 255,940.42 @ 6%		6,398.51	6,398.51	6,398.51
Depreciation @ 5%		12,797.02	12,797.43	12,797.02
Repairs		729.43	729.43	729.43
Total		$21,134.28	$21,134.28	$21,134.28
Equipment				
Tractor	3,000.00			
Trucks (2)	13,000.00			
Pickup	1,500.00			
Cat w/scoop	3,000.00			
Self-unload. wgn.	1,800.00			
Cattle Oiler	12,924.00			
Scales	2,000.00			
Scale house	582.00			
Cattle handling equipment	700.00			
Cattle sprayer	300.00			
Dump Truck	1,500.00			
Misc.	50.00			
Total	$40,356.00			

(continued on next page)

TABLE VII (continued). BUDGETED ANNUAL CAPITAL INVESTMENT COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item	2800 Head Per Year	5600 Head Per Year	8400 Head Per Year
Taxes (10 yr. depr. value)	169.50	169.50	169.50
Interest (½ of 40,356.00 @ 6%)	1,210.68	1,210.68	1,210.68
Depreciation @ 10%	4,035.60	4,035.60	4,035.60
Insurance	342.55	342.55	342.55
Repairs	1,493.17	1,493.17	1,493.17
Total	7,251.30	7,251.30	7,251.30
Working Capital[a/]			
Interest @ 6% $12,500.00 for mill operating capital (½ yearly operation)	32,670.00	64,590.00	96,510.00
Total Annual Capital Cost	$61,829.58	$93,749.58	$125,669.58

a/ Working capital includes $40.00 per hd. feed cost, cattle inventory @ $150/hd. and mill operating capital of $25,000 - figured at 6% interest.

annual cost decreases to a low at the 1400 head lot and then begins to climb for the larger lots. Further research needs to be done in this area but it appears that increasing the size above the 1400 head capacity yard will increase the additional cost, and all things held constant, expansion will be uneconomical at a larger size not far above the 1400 head lot. This is assuming that no other economics of size will arise; however, one could expect more economics with size in terms of cheaper feed purchases; economy in purchasing and selling cattle and feed mill economics. (The above is not a marginal analysis.)

The relative non-feed cost per head for the feedyards is illustrated in Figure 4, page 37. The dashed curves indicate the per head costs at ½, full and 1½ times capacity for a year for the three larger lots. The per head costs for the 450 head yard are very high but drop rapidly as the

TABLE VIII. BUDGETED NON-FEED COSTS FOR 5600 HEAD CAPACITY FEEDYARD - ANNUAL BASIS.

Item	2800 Head Per Year	5600 Head Per Year	8400 Head Per Year
Salaries			
Manager	$ 7,500.00	$ 7,500.00	$ 7,500.00*
Employees @ $4,000.00	(6) 24,000.00	(9) 36,000.00	(9) 36,000.00
Bookkeeper @ 2,200.00	2,200.00	2,200.00	2,200.00
Utilities			
Fuel and oil[a]	6,048.00	7,056.00	10,584.00
Electricity[b]	3,050.00	5,700.00	9,150.00
Veterinary and medicine[c]	2,592.00	3,024.00	4,536.00
Death loss[d]	8,640.00	10,080.00	15,120.00
Office supplies & admin.	430.00	450.00	470.00
Total annual capital cost	61,829.58	93,749.58	125,669.58
Total Non-feed Costs	$116,289.58	$165,759.58	$211,229.58
Total Non-feed Costs Per Head	$41.53	$29.60	$25.46

a/ Estimated at 56 cents per head per day.

b/ Estimated at 35 cents per ton of feed by Kenneth Eubanks. Price per kilowatt hour is set at 2,187 cents.

c/ Estimated at 24 cents per head per day based on Hopkin and Weisgerber.

d/ Estimated at 8 cents per head per day based on Hopkin and Weisgerber.

* Since the 150 percent level has the least variable cost per head for the three different levels, it is assumed the manager will be hired for this level of output. Even if the output is reduced, it is doubtful that the manager would take a cut in his salary, thus the smaller levels of production would still have to pay this salary. If a change in level is a long term decision, then this would not be true. A lower salary could be offered for lower levels, however, we will assume here that changes between the levels will be only on a short run basis.

capacity is increased. The two larger lots, 1400 and 5600 head have lower average costs with a much slower drop when going from $\frac{1}{2}$ to $1\frac{1}{2}$ times capacity. The solid line, AB, of Figure 4 indicates an estimate of the per head non-feed costs at the least cost per head level for all sized feedlots from 100 to 5600 head. There is a decrease in cost at a decreasing rate from \$36.62 for 675 head to \$25.46 for 8400 head. The farm lot cost per head, \$36.24, is a little lower than the lowest point for the 450 head yard, \$36.62, but it is slightly higher than the low points for the two largest units with \$26.27 and \$25.46 per head.

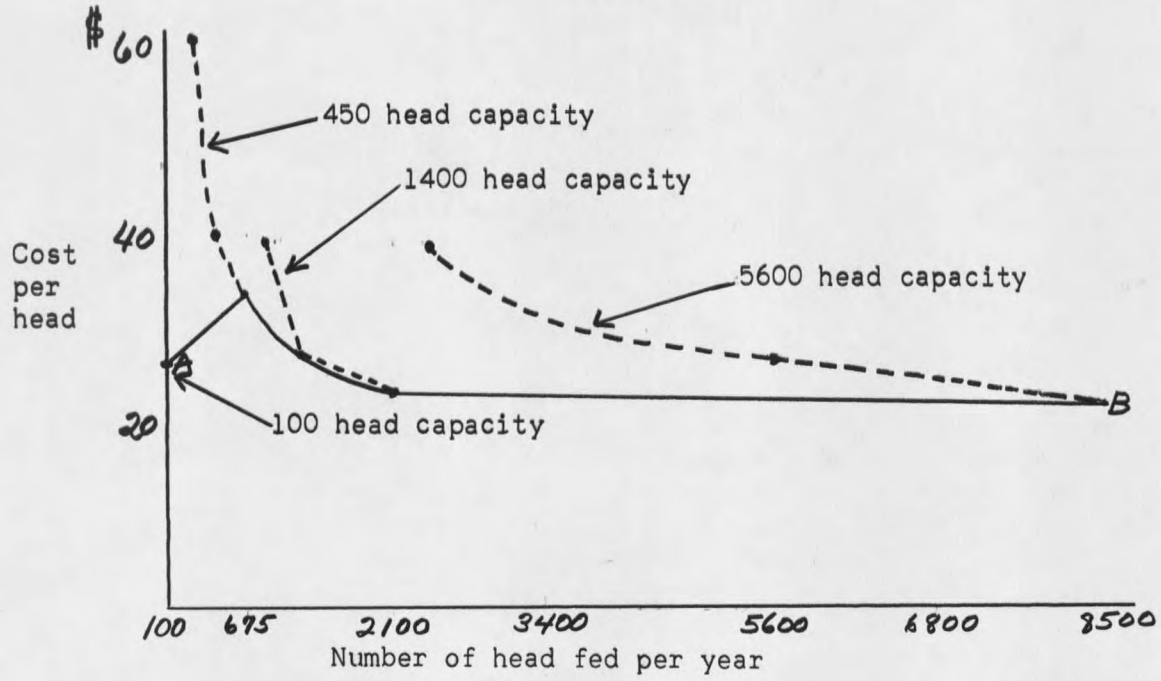

Figure 4. Non-Feed Costs Relative to Number of Animals

The non-feed costs are further illustrated in Figure 5 (below) where capacity on annual basis is used rather than numbers of cattle. The 1400 and 5600 head lots appear fairly close together in terms of per head costs with the 450 head lot much higher and the farm lot in between.

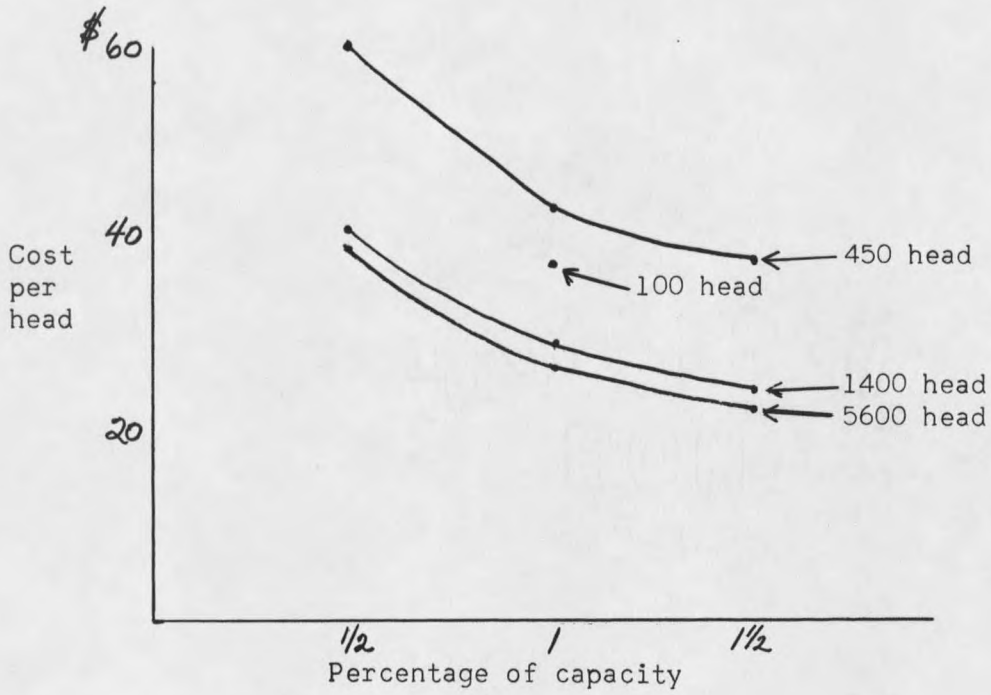

Figure 5. Non-Feed Costs Relative to Capacity

Returns for the Alternative Feeding Systems

Once the non-feed costs were determined, they were added to the feed cost and the per head value to obtain a total cost figure. This amount was subtracted from the expected market value of the animal to arrive at a per head net return or loss.

The prices for feeder cattle were estimated from the Billings market for the last five years. Prices fluctuate greatly, but a figure of $25.00

per hundred-weight was used for an average price. Returns were figured for three situations: (1) feeder and slaughter prices were equal, $25.00; (2) there was a positive $5.00 price spread, and (3) there was a $5.00 negative spread. Tables IX, X, and XI, pages 40 and 41, show the result.

With the feeder price at $25.00 per hundred-weight, a 600 pound steer will be worth $150.00. Add on to this $77.65 for feed and $36.24 for non-feed costs for the farmyard of 100 head, we have a total cost per head of $264.89. When the selling price is also set at $25.00, a 1090 pound steer is worth $272.50. The difference is the net return per animal--in this case $7.61. It can be seen that the 100 head lot competes favorably until the size gets to 1400 head and over. Even here the larger units must be at one or one and one-half times capacity to gain larger returns than the farmlot. If one were to consider that there were no outside opportunities for labor, then the farm feedlot would be in an even more favorable position. In this situation, labor would not be charged because any return to labor would be desirable for the slack season when labor is available and there is no alternate use for it. If the labor is not figured, see Table II, page 27. The per head non-feed cost is $29.49 making the return per head, $14.36. This would allow the farmlot to compete with all sizes except the one and one-half times capacity level for the larger lots, which return $14.41 and $19.80 per head and the one and one-half level for the 1400 head capacity level with a return of $17.86 per head.

Tables X and XI, page 41, show the returns per head for positive and negative price spread. This $5.00 price spread can have an important

TABLE IX. BUDGETED COSTS AND RETURNS FOR ALTERNATE SIZES OF FEEDING YARDS (NO PRICE SPREAD).

	Farm Lot	Cooperative Lots								
		450 Head Capacity			1400 Head Capacity			5600 Head Capacity		
	100 head per year	225	450	675	700	1400	2100	2800	5600	8400
Price of feeder steer/cwt[a]	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Value of feeder steer	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00	150.00
Feed costs[b]										
Barley - 71 bu. @ .75/bu.	53.25	53.25	53.25	53.25	53.25	53.25	53.25	53.25	53.25	53.25
Hay - 1,400# @ 22.00/t	15.40	15.40	15.40	15.40	15.40	15.40	15.40	15.40	15.40	15.40
Supplement 200# @ $4.50/cwt.	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00
Total Feed Costs	77.65	77.65	77.65	77.65	77.65	77.65	77.65	77.65	77.65	77.65
Tax on cattle	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Non-feed costs	36.24	61.81	42.92	36.62	41.65	30.29	26.27	41.53	29.60	25.46
Total (feed & non-feed costs)	114.89	140.46	121.57	115.27	119.62	108.56	104.64	119.09	108.09	102.70
Total costs (with animal cost)	264.89	290.46	271.57	265.27	269.62	258.56	254.64	269.09	258.09	252.70
Selling price of slaughter steers/cwt.	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00	25.00
Market value-slaughter steer (1090#)	272.50	272.50	272.50	272.50	272.50	272.50	272.50	272.50	272.50	272.50
Profit from feeding (per steer)	7.61	-17.96	.93	9.23	2.88	13.94	17.86	3.41	14.41	19.80

[a] Arbitrary choice approximately average feeder cattle price on Billings market over last 5 years.

[b] Based on figures in Midwest Farm Handbook, Iowa State University Staff of Agriculture, The Iowa State Press, Ames, Iowa, 1960.

TABLE X. BUDGETED COSTS AND RETURNS FOR ALTERNATE SIZED FEEDING YARDS ($5.00/CWT. NEGATIVE PRICE SPREAD).

	Farm Lot	Cooperative Lots								
		450 Head Capacity/yr.			1400 Head Capacity/yr.			5600 Head Capacity/yr.		
	100 head per year	225	450	675	700	1400	2100	2800	5600	8400
Price of feeder steer/cwt.	27.50	27.50	27.50	27.50	27.40	27.50	27.50	27.50	27.50	27.50
Value of feeder steer	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00	165.00
Total costs[a]	279.89	306.36	287,47	281.17	285.52	274.46	270.54	284.99	273.99	268.60
Selling price of slaughter steer	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50
Market value, slaughter steer	245.25	245.25	245.25	245.25	245.25	245.25	245.25	245.25	245.25	245.25
Profit per head	-35.54	-61.11	-35.92	-35.92	-4067	-27.21	-25.29	-38.74	-28.74	-23.35

a/Refer to Table I for breakdown of appropriate costs - feed and non-feed; add $.90 per head for additional interest on inventory.

TABLE XI. BUDGETED COSTS AND RETURNS FOR ALTERNATE SIZED FEEDING YARDS ($5.00/CWT. POSITIVE PRICE SPREAD).

	Farm Lot	Cooperative Lots								
		450 Head Capacity/yr.			1400 Head Capacity/yr.			5600 Head Capacity/yr.		
	100 head per year	225	450	675	700	1400	2100	2800	5600	8400
Price of feeder steer	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50	22.50
Value of feeder steer	135.00	135.00	135.00	135.00	135.00	135.00	135.00	135.00	135.00	135.00
Total costs[b]	249.89	274.56	255.67	249.37	253.72	242.66	238.74	253.19	242.19	236.80
Selling price, slaughter steer	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50	27.50
Market value, slaughter steer	299.75	299.75	299.75	299.75	299.75	299.75	299.75	299.75	299.75	299.75
Profit per head	48.96	23.39	42.28	48.58	44.23	55.29	59.21	44.76	55.76	61.15

b/Subtract $.90 per head to adjust interest on cattle inventory.

affect on returns as illustrated in the Tables. Budgeting of costs and revenues must consider this factor when evaluating alternate enterprises. Figure 6, page 43, shows the effects of a $5.00 price spread on total profit per head. With no spread at all, one section of the curse is in the loss area - the 450 head lot at $\frac{1}{2}$ capacity. The other levels of production have varying profit margins.

However, if there is a negative price spread of $5.00, there is an entirely different picture shown. All the lots incur losses, the smaller lots having the greater losses. Just the opposite results when there is a positive $5.00 price spread. All lots have relatively high profits per head.

It should be noted in Tables IX, X, and XI, that the total non-feed costs vary where there is a price spread. This is due to a greater or smaller interest charge on the new cattle inventory. This change in interest cost varies $.90 per head plus for the negative spread and minus for the positive spread.

There are many variables which one must consider when discussing the previous budgeting process. One cannot arrive at a typical nor an average feedlot. Once the criteria are established, a lot can be budgeted and evaluated, but if the basic specifications change, then the entire process must be gone through again.

The results of the budgeting procedure presented in this study depend on some assumptions. The management is considered as average in ability. This means that the costs incurred by the lots should be approximately

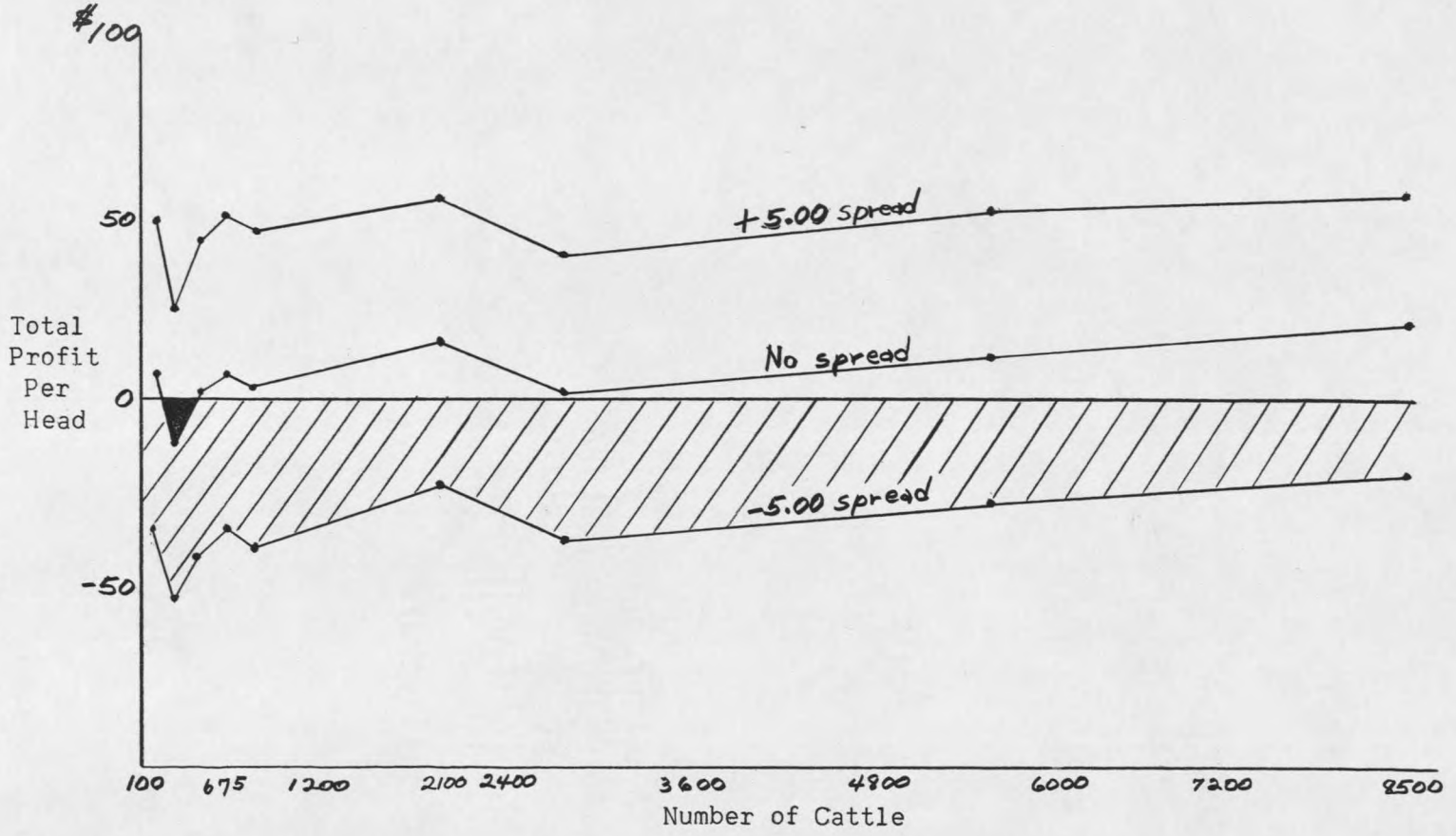

Figure 6. The Effects of a Five Dollar Price Spread on Total Per Head Returns.

equal to the average costs of figures obtained from feedyard studies. This same level of management dictates a figure for the gain per head per day. If the management level changes, this would also likely change.

Certain assumptions are made concerning feedlot facilities. Changing these specifications will change the cost and thus returns. As an example, deleting concrete from in front of the bunks or making the entire lots concrete would greatly change the costs. However, it would also affect the gain per head per day, manure handling costs, disease, etc. Almost all aspects of a feedlot are interrelated and highly complex. The changing of one factor is likely to change many others.

Many factors have been set constant in this study for simplication, such as feed costs, marketing costs, transportation costs, electricity and some power costs, market prices, and so on. It is felt that the larger feedyards could realize some cost efficiencies in the above areas which were set constant in this study. A larger feedyard could buy feed, medicine, and electricity in larger volumes and probably obtain these at cheaper rates. A large unit can do its own trucking and save on transportation costs. These hypotheses could be presented further, however, proof would require much more research.

CHAPTER IV

SUMMARY AND CONCLUSION

The Summary

As pointed out previously, this study had four objectives: (1) to demonstrate the budgeting method which individuals or groups can use to determine costs and expected revenues for a given beef cattle enterprise, (2) to describe and list the fixed investment and variable costs of four different size feedlots, (3) to determine relationships between the various size units in terms of per animal costs and revenues connected with alternative price margins, and (4) to relate this analysis to the feasibility of livestock cooperatives in Montana.

The budgeting procedure used in this study includes, first, observations of existing cooperatives. Based upon these observations, certain specifications were established for the feedyards. Then detailed lists of materials and associated costs were listed for each feedyard. Once the capital investment was determined, the annual capital costs and operating costs were budgeted. From this the return per head was figured. Simply stated, the budgeting method involves listing all the required materials and equipment needed, their costs, and possible returns for this enterprise.

The investment costs for the four alternative feeding operations were listed to give an example of a budgeting analysis. These lists are presented in the Appendix. The variable costs are included in the text. It was found that the investment costs per head increase from the farmlot to a high at the 700 head level of the 1400 head capacity lot and then it

starts to fall again for the largest lot. This apparently is a result of no mill costs included for the first two feedyards. Where feed mill costs are not included there is a decrease in per head costs at a decreasing rate as the size increases. The 100 head feedyard is an exception to this - the 450 head lot has a slightly higher cost per head for investment due to the advantage of using equipment already on the farm for the 100 head lot which reduces some of the investment costs.

The variable costs show about the same relationship as indicated for the investment costs. The 100 head lot has a slightly less per head cost than the 450 head lot, but from the 450 head lot the cost decreases as the size increases.

The returns per head also follow the above pattern since they are based on the investment and variable costs. The market value is held constant, thus the only variables are the cost figures.

If the farmyard has no alternative opportunity for the available labor, then it can compete very well with the larger units except for the 5600 head lot. Where the labor isn't figured as a cost for the 100 head lot, it cannot realize the same returns as the largest lot unless the large lot operates at one or one-half capacity. However, if the farm feedlot is a major enterprise of the farm, then it would have more costs accrued to it and would be in an unfavorable position when trying to compete with the larger cooperative lots.

The Conclusion

The farmer operating a small feeding system can compete with larger

cooperative feedlots. However, the proof of the hypothesis presented in the first chapter is not conclusive. From the data presented in this study, the 100 head farm feedyard can compete with lots as large as 1400 head and even with 5600 head capacity lots at the 50 percent level if labor is not considered as a cost for the smaller lot. It is an entirely different picture if labor and farm equipment already on the farm is charged to the feedyard. Keeping within the scope of the hypothesis, where a farm feedyard is a supplementary enterprise, a farmer is better off, economically, in some cases by building his own farm feedlot.

That is, other things being constant, a farmer would receive a higher return per head if he had a 100 head capacity feedlot as compared to the return per head for all the levels of production of the 450 head capacity lot, and for the 50 percent level for the two largest feedyards. We can conclude, then, that when the farmer can consider his labor and machinery as supplementary inputs for the small feedlot, he can compete with larger units. However, if we drop this assumption, the cost allocation will change with more costs accrued to the 100 head capacity feedlot and it will be less able to compete. Where the break-even point occurs is dependent upon the amount of competition there is between the feedlot and the wheat enterprise for the labor and machinery - thus, how much the opportunity costs total.

This study shows that the larger cooperative feedlots have a greater degree of flexibility due to a greater return per head. As an example, the 5600 head capacity lot can drop the production level from 100 percent to 50 percent and still obtain higher returns per head than certain levels

of smaller feedyards. The per head return is $14.41 at the 100 percent capacity level and drops to $3.41 at 50 percent, but this is still higher than the 450 head capacity lot operating at the 100 percent capacity level with a return of 93 cents per head. The opposite is shown in this study. Going from the 450 head lot to the larger lots the fixed and variable costs per head decrease. The total goes up, of course, but the per head cost is less and decreases with increased size. This results in the larger units having a greater profit margin and thus more flexibility in terms of operation.

There is not much difference between the two larger feedyards relative to per head total costs. The 1400 head and 5600 head capacity can operate at only one-half capacity for the year and still compete with the 450 head capacity lot. This rejects the second statement of the hypothesis.

For a group of farmers interested in establishing a beef feeding cooperative, these conclusions imply certain conditions for a beginning. It is not economical for a cooperative to build a feedlot of less than 1400 head capacity. An individual farmer can obtain no economic advantages by joining such an enterprise. A farmer can enjoy some economic advantages if the lot has a capacity of 1400 head or over. As the feedyard becomes larger, the advantages are greater. Due to the supplementary nature of beef feeding on farms in Montana, the farmer can compete until economies of size arise where larger lots are established.

It must be mentioned again that one important factor of cooperative success is the manager. The level of management selected will greatly affect the assumptions used in this analysis and the returns which can be expected from a cooperative venture.

APPENDICES

TABLE I, APPENDIX A. ESTIMATED MATERIALS AND COSTS FOR 100 HEAD CAPACITY FEEDLOT.

Item		Cost	
Pen			
Fencing			
69 - 6x6x8' posts	@ 1.55	106.95	
16 - 6x6x5' posts-bunk	@ 1.00	16.00	
8 - 2x10x14' bunk	187 bd. ft.		
16 - 2x12x14' bunk	448		
42 - 2x8x14' fence frame	784		
42 - 2x6x14' fence frame	588		
126 - 2x4x14' fence frame	1176		
616 - 1x12x8' windbreak	4928		
	8111 @ 70/M	567.77	
		690.72	
Labor, estimated at 50% of material costs		345.36	
		1,036.08	
Hardware			
94# - 30d nails @ 13.95/cwt		13.11	
284# - 16d nails @ 13.95/cwt		39.62	
Misc. - clips, eyebolts		10.00	
Gates			
1-16 ft. @ 5.88		5.88	
2-12 ft. @ 5.88		11.77	
	Total	1,116.46	
			$1,116.46
Corral			
Lumber			
7 - 6x6x8' posts	@ 1.55	10.85	
15 - 2x6x14' 210			
5 - 2x6x7' 35			
245	@ 70/M	17.15	
Squeeze and headgate		105.12	
Loading chute		22.63	
Hardware			
4# - 30d nails @ 13.95/cwt		.60	
3# - 16d nails @ 13.95/cwt		.41	
12 - 1/2 x 9" bolt @ .21 ea.		2.52	
		159.28	
Labor, estimated 50% of material cost		79.64	
		238.92	
Portable scale		500.00	
	Total	738.92	$ 738.92

TABLE I, APPENDIX A (continued). ESTIMATED MATERIALS AND COSTS FOR 100 HEAD CAPACITY FEEDLOT.

Item	Cost	
Land		
1 acre @ $300.00	300.00	
		$ 300.00
Equipment		
Self-feeder	200.00	
Portable auger	175.00	
Waterer	90.00	
Oiler	179.50	
Pump-pipe-ditching	390.00	
Wiring-poles	100.00	
Manure loader	403.85	
	1,538.35	
		$1,538.35
Total Cost		$3,693.73
Cost Per Head 1/		$36.93

1/ An estimation of the investment costs for the 150 percent capacity level where the feedyard would be competing with the wheat enterprise for the labor and machinery.

Additional Cost		
Tractor (1/3 of investment cost)	500.00	
Truck	2,000.00	
	$2,500.00	
Cost at 100 percent level		$3,593.73
Cost at 150 percent level		2,500.00
Total Cost		$6,093.73
Cost Per Head 150 head		$40.62

TABLE I, APPENDIX B. ESTIMATED MATERIALS AND COSTS FOR 450 HEAD CAPACITY.

Item		Cost	
Pens			
Fencing			
138-6"x6"x8' treated posts (fence row)	@ 1.55	213.90	
56-6"x6"x8' treated posts (end fence)	@ 1.55	86.80	
52-5"x5"x8' treated posts (pen dividers)	@ 1.30	67.60	
16-6"x6"x8' corner posts	@ 1.55	24.80	
10-6"x6"x16' gate posts	@ 4.25	42.50	
306 - 2"x4"x14' fence backing or	2,856 bd. ft.		
102 - 2"x4"x14' fence backing or	1,904		
102 - 2"x6"x14' fence backing or	1,428		
1492 - 1"x12"x8' wind break or	11,936		
224 - 1"x8"x14' line fence between pens	2,091		
	20,215 bd. ft.		
	@ 70/M	1,415.05	
		1,850.65	
Gates			
16 ft. Gate (cable supported)			
4-2"x6"x16' or 64 bd. ft.			
1-2"x6"x10' or 10			
2-1"x6"x10' or 10			
84 bd. ft.	@ 70/M	5.88	
	6 gates	35.28	
12 ft. Gate (no support)			
4-2"x6"x12" or 48			
3-1"x6"x10' or 15			
2-1"x4"x16' or 11			
1-2"x6"x10' or 10			
84 bd. ft.	@ 70/M	5.88	
	4 gates	23.52	
		58.80	
	Total	1,909.45	
Labor - 50% of material cost		954.72	
		$2,864.17	
			$2,864.17

TABLE I, APPENDIX B (continued). ESTIMATED MATERIALS AND COSTS FOR 450 HEAD CAPACITY.

Item		Cost	
Hardware			
147# - 30d nails (fence frame)	@ 13.95/cwt	20.50	
14# - 16d nails (gates	@ 13.95/cwt	1.95	
626# - 16d nails (wind break & line fence)	@ 13.95/cwt	87.33	
12 pr. 18" hinges	@ 5.56/pr.	66.72	
120 ft. steel cable 1/4"	@ .16/ft.	19.20	
6 - turn buckles	@ 1.00 ea.	6.00	
24 - clips	@ .12 ea.	2.88	
6 - eye bolts	@ 1.50 ea.	9.00	
		213.58	213.58
			$3,077.75
Water & Wiring			
4 - Automatic stainless steel electric	@ 90.00	360.00	
			360.00
Wiring			
Underground wire - 100' #10 VF	@ 14¢/ft.	14.00	
Above ground - #6 aluminum wire 1000 ft.	@ 5¢/ft.	50.00	
Insulators - 10	@ 32¢ ea.	3.20	
Yard lights - 4	@ 4.60	18.40	
4 fuse boxes	@ 4.00	16.00	
Piping			
200' plastic 3/4" pipe	@ 6.3¢/ft.	12.60	
500' plastic 1¼' pipe	@ 14.5¢/ft.	72.50	
Fittings			
4 adapters 3/4"	@ .23	.92	
1 adapter 1¼"	@ .48	.48	
4 elbows 3/4"	@ .35	1.40	
1 tee 1¼"	@ .53	.53	
1 cross 1¼"	@ .80	.80	
15 steel clamps	@ .20	3.00	
Ditching - 600' 7' deep	@ .70/ft	420.00	
		613.83	
Labor, 25%		153.46	
		767.29	767.29
Total			$1,127.29

TABLE I, APPENDIX B (continued). ESTIMATED MATERIALS AND COSTS FOR 450 HEAD CAPACITY.

Item		Cost	
Feed Bunks			
138 - 5"x5"x8' posts	@ 1.30	179.40	
138 - 4"x4"x5'	@ .75	103.50	
66 - 2"x8"x14' or 1232 bd. ft.			
132 - 2"x12"x14' 3596			
264 - 2"x8"x14' 4928			
132 - 2"x8"x14' 2464			
66 - 2"x6"x14' 924			
56 - 2"x4"x14' 523			
13,767 bd. ft. @ $70/M		963.69	
		1,246.59	
Labor, 50% of material costs		623.29	
	Total	1,869.88	$1,869.88
Hardware			
138 - ½"x8" machine bolts	@ .20	27.60	
138 - ½"x9" machine bolts	@ .21	28.98	
552 - plate washers	@ .02	11.04	
187# 30d nails	@ 13.95/cwt	26.09	
		93.71	93.71
			$1,963.59
Concrete:			
Standing platforms - 150 cu. yd.			
Water platforms 25			
175 @ 18.10/cu. yd Ready-mix six sack per cu. yd.		3,167.50	
Labor for placing and finishing concrete estimated at 25% of material costs		791.88	
	Total	3,959.38	$3,959.38
Working Corral			
Fencing			
20 - 5"x5"x10' posts	@ 1.40	28.00	
55 - 2"x6"x12' posts or 660 bd. ft.		46.20	
2 - 12' gates	@ 5.88	11.76	
2 - 5' gates	@ 2.70	5.40	
		91.36	

TABLE I, APPENDIX B (continued). ESTIMATED MATERIALS AND COSTS FOR 450 HEAD CAPACITY.

Item			Cost	
Loading Chute				
2 - 6"x6"x12' posts		@ 3.00	6.00	
2 - 6"x6"x10' posts		@ 2.25	4.50	
2 - 6"x6"x8' posts		@ 1.55	3.10	
2 - 2"x10"x12' or 40 bd. ft.				
1 - 1"x12"x4'	8			
14 - 1"x10"x12'	140			
16 - 2"x10"x30"	67			
	255	@ 70/m	17.85	
			31.45	
Working Chute				
10 - 5"x5"x10' posts		@ 1.49	14.00	
4 - 2"x6"x18'	72 bd. ft.			
4 - 2"x12"x18'	144			
3 - 2"x4"x18'	36			
1 - 2"x4"x20'	14			
	266	@ 70/m	18.62	
			32.62	
Headgate				
1 - 2"x6"x16'	16 bd. ft.			
1 - 2"x8"x6'	9			
1 - 2"x4"x4'	3			
1 - 2"x6"x5'	5			
2 - 4"x6"x27"	9			
	42	@ 70/m	2.94	
Hardware				
20# - 30d nails (fence) 7.25/50#			2.90	
5# - 16d nails (gates 7.25/50#			.73	
3# - 16d nails (5' gates) 7.25/50#			.41	
3# - 16d nails (chute) 7.25/50#			.41	
2# - 30d nails (chute) 7.25/50#			.27	
5# - 30d nails (working chute) 7.25/50#			.69	
12 $\frac{1}{2}$"x9" bolt (chute) .20 ea.			2.40	
12 $\frac{1}{2}$"x10" bolt (headgate) .23 ea.			2.76	
2 3/8"x2$\frac{1}{2}$" bolt (headgate) .04 ea.			.08	
4 pair 8" hinges, strap $3.00 ea.			12.00	
Misc. (steel, pipe, etc.)			10.00	
			32.65	
			191.02	
Labor, 50% of material costs			91.10	
			282.12	$ 282.12
Well, Pump, and Pressure System			1,500.00	$1,500.00

TABLE I, APPENDIX B (continued). ESTIMATED MATERIALS AND COSTS FOR 450 HEAD CAPACITY.

Item		Cost	
Gravel			
140 yds - pit run @ $1.50/yd.	6" lift	210.00	
50 yds - pit run @ 1.50/yd.	scale-office	75.00	
		285.00	
Labor, 10 percent of cost		28.50	
		313.50	$ 313.50
Machinery-Equipment			
Tractor		1,500.00	
Truck and self-unloading box		6,500.00	
Manure loader		340.00	
Plus blade		63.85	
Cattle sprayer		111.00	
Cattle oiler, 6 @ $179.50		1,077.00	
Scales - 20,000# capacity 22'x8'		2,000.00	
Scale house		582.00	
Misc. (shovel, broom, etc.)		14.56	
		12,188.41	$12,188.41
Land			
4 acres @ $300		1,200.00	1,200.00
TOTAL INVESTMENT			$25,612.04
	Per head 225		$113.83
	450		$56.91
	675		$37.94

TABLE I, APPENDIX C. ESTIMATED MATERIALS AND COSTS FOR 1400 HEAD CAPACITY FEEDLOT.

Item		Cost	
Pens			
Fencing			
276-6"x6"x8" treated posts @ 1.55 (fence row)		427.80	
168-6"x6"x8" treated posts @ 1.55 (end fence)		260.40	
156-5"x5"x8" treated posts @ 1.30 (pen dividers)		202.80	
40-6"x6"x8' corner posts @ 1.55		62.00	
30-6"x6"x16' gate posts @ 4.25		127.50	
492-2"x4"x14' fence backing or	4,592 bd. ft.		
164-2"x8"x14' fence backing or	3,061		
164-2"x6"x14' fence backing or	2,296		
2,404-1"x12"x8' wind break or	19,232		
672-1"x8"x14' fence line or (between pens)	6,273		
568-1"x8"x14' fence line or (between lots)	5,302		
	40,756 @ 70/m	2,852.92	
		3,933.42	
Gates			
16 ft. (cable supported)			
4-2"x6"x16' or 64 bd. ft.			
1-2"x6"x10' or 10			
2-1"x6"x10' or 10			
84 bd. ft. @ 70/m = 5.88 ea.			
18 gates		105.84	
12 ft. (no support)			
4-2"x6"x12 or 48			
3-1"x6"x10 or 15			
2-1"x4"x16 or 11			
1-2"x6"x10 or 10			
84 bd. ft. @ 70/m = 5.88 ea.			
12 gates		70.56	
		4,109.82	
Labor, 50 percent of material cost		2,054.91	
		6,164.73	6,164.73

TABLE I, APPENDIX C (continued). ESTIMATED MATERIALS AND COSTS FOR 1400 HEAD CAPACITY FEEDLOT.

Item		Cost	
Hardware			
236# - 30d nails (fence frame)	@ 13.95/cwt	32.92	
12# - 16d nails (gates)	@ 13.95/cwt	1.67	
24# - 16d nails (gates)	@ 13.95/cwt	3.34	
32# - 16d nails (12' gates)	@ 13.95/cwt	4.46	
924# - 16d nails (wind break)	@ 13.95/cwt	128.90	
286# - 16d nails (fence line)	@ 13.95/cwt	39.90	
360' - steel cable ¼"	@ .16/ft	57.60	
18 - turn buckles	@ 1.00 ea.	18.00	
72 - clips	@ .12 ea.	8.64	
18 - eye bolts	@ 1.50 ea.	27.00	
18 pr. - steel 18"	@ 5.56/pr.	100.08	
12 pr. - steel 8"	@ 3.00/pr.	36.00	
		458.51	458.51
			$6,623.24
Equipment			
Waterers			
12 - auto electric	@ 90.00	1,080.00	
Wiring			
Underground wire 300' #10	@ .14/ft.	42.00	
Above ground wire 2500' #6 al.	@ .05/ft.	125.00	
30 - insulators	@ .32/ft.	9.60	
12-yard lights	@ 4.60	55.20	
12-fuss boxes	@ 4.00	48.00	
Piping			
900' plastic pipe 3/4"	@ 6.3¢/ft.	56.70	
600' plastic pipe 1¼"	@ 14.5¢/ft.	87.00	
Fittings (adapters, elbows, etc.		29.24	
Ditching - 1500'	@ .70/ft.	1,050.00	
		1,502.74	
Labor, 25 percent of costs		375.68	
		1,878.42	$2,958.42
Feed Bunks			
414 - 5"x5"x8' posts (treated)	@ 1.30	538.20	
414 - 4"x4"x5' posts	@ .75	310.50	
198 - 2"x8"x14' or 3,696 bd. ft.			
396 - 2"x12"x14' or 11,088			
792 - 2"x8"x14' or 14,784			

TABLE I, APPENDIX C (continued). ESTIMATED MATERIALS AND COSTS FOR 1400 HEAD CAPACITY FEEDLOT.

Item		Cost	
396 - 2"x8"x14' or	7,392		
198 - 2"x6"x14' or	2,772		
168 - 2"x4"x14' or	1,569		
	41,301 bd. ft. @ 70/m	2,891.07	
		3,739.77	
Labor, 50 percent of material costs		1,869.88	
		5,609.65	5,609.65
Hardware			
563# - 30d nails	@ 13.95/cwt.	78.54	
414# - ½'x8" bolts	@ .20 ea.	82.80	
414# - ½'x9" bolts	@ .21 ea.	86.94	
1656 - plate washers	@ .02 ea.	33.12	
		281.40	281.40
			5,891.05
Concrete			
Standing platforms	450 cu. yd.		
Water platforms	75		
	525 @ 18.10/cu. yd.	9,502.50	
Labor for placing and finishing concrete estimated at 25 percent of material costs		2,375.62	
		11,878.12	$11,878.12
Working Corral			
Fencing			
2 - 6"x6"x16' posts	@ 4.25	8.50	
32 - 6"x6"x8' posts	@ 1.55	49.60	
53 - 6"x6"x8' posts (lane fence)	@ 1.55	82.15	
25 - 2"x6"x14' or (side)	350		
65 - 2"x6"x14' or (inside)	910		
50 - 2"x6"x14' or (ends)	700		
130 - 2"x6"14' or	1820		
	3780 @ 70/m	264.60	
2 - 16' gates	@ 5.88	11.76	
2 - 12' gates	@ 5.88	11.76	
5 - 5' gates	@ 2.70	13.50	
Loading chute	@ 22.63	22.63	
		464.50	

TABLE I, APPENDIX C (continued). ESTIMATED MATERIALS AND COSTS FOR 1400 HEAD CAPACITY FEEDLOT.

Item		Cost
Headgate and Squeeze		
2 - 4"x6"x10' or 40		
2 - 4"x4"x5' or 14		
2 - 4"x4"x8' or 21		
10 - 2"x6"x6' or 60		
6 - 2"x6"x5' or 30		
165 @ 70/m		11.55
Hardware		
97# - 30d nails	@ 13.95/cwt.	13.53
1½# - 30d nails (16' gates)	@ 13.95/cwt.	.21
3# - 16d nails (16' gates)	@ 13.95/cwt.	.42
5# - 16d nails (12' gates)	@ 13.95/cwt.	.69
8# - 16d nails (5' gates)	@ 13.95/cwt.	1.11
8# - Squeeze 30d nails	@ 13.95/cwt.	1.11
		17.07
1 - 3"x3"x3/8"x30" angle iron	@ 1.08/ft.	32.40
10 - 3/4"x26" pipe	@ .17/ft.	1.70
2 - ½"x4' pipe	@ .13/ft.	1.04
10 - 3/4"x3" bolts	@ .20 ea.	2.00
1 - ¼'x1'x4' strap iron	@ .22/ft.	.88
2 pr. - 8" strap hinges	@ 3.00/pr.	6.00
60 - 5/6"x6" bolts	@ .27/ea.	16.20
40 - 5/6"x8" bolts	@ .30/ea.	12.00
1 - 5/8"x5' steel rod	@ .50 ea.	.50
		72.72
4 pr. - 18" steel hinge		22.24
2 pr. - 8" steel hinge		6.00
		118.03
	Total	594.08
Labor, 50 percent of material costs		297.04
		891.12	$ 891.12
Well, Pump and Pressure System		3,000.00	$ 3,000.00
Gravel		
450 cu. yds. - pit run 6" lift @ 1.50/cu.yd.		675.00
100 yds. - pit run around bldgs. @ 1.50/cu.yd.		150.00
		825.00
Labor, 10 percent of cost		82.50
		907.50	$ 907.50
Land		
15 acres @ $300/acre		4,500.00	$ 4,500.00

TABLE I, APPENDIX C (continued). ESTIMATED MATERIALS AND COSTS FOR 1400 HEAD CAPACITY FEEDLOT.

Item		Cost	
Machinery			
Tractor		1,500.00	
Truck & Self-Unloading Box		6,500.00	
Pickup		1,500.00	
Self-Unloading Wagon		1,800.00	
Manure Loader		403.85	
Cattle Sprayer		111.00	
Cattle Oiler (18) @ 179.50		3,231.00	
Scales 10T 22' x 8'		2,000.00	
Scale House		582.00	
Cattle Handling Equipment		200.00	
Misc. (shovel, brooms, etc.)		14.56	
		17,842.41	$17,842.41
Total without mill			$54,491.86
Cost per head	700		$77.85
	1400		$38.92
	2100		$25.95
Feed Mill Equipment			
Mill & Mixer	5T/hr. mixed ration	12,600.00	
Storage Bin	10,000 bu.	2,800.00	
Storage Bin	1,000 bu.	900.00	
Storage Bin	500 bu.	550.00	
Bldg.	40 x 40	8,600.00	
Elevator	18'	350.00	
		25,800.00	
Labor, 50 percent of material costs		12,900.00	
		38,700.00	$38,700.00
TOTAL INVESTMENT COST			$93,191.86
Cost per head	700		$133.13
	1400		$66.56
	2100		$44.37

TABLE I, APPENDIX D. ESTIMATED MATERIALS AND COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item		Cost	
Pens			
Fencing			
1034 - 6x6x8' posts	@ 1.55	1,602.70	
672 - 6x6x8' posts	@ 1.55	1,041.60	
624 - 5x5x8' posts	@ 1.30	811.20	
152 - 6x6x8' corner posts	@ 1.55	235.60	
120 - 6x6x16' gate posts	@ 4.25	510.00	
984 - 2x4x14' or 9,184			
328 - 2x8x14' or 6,122			
328 - 2x6x14' or 4,592			
4808 - 1x12x8' or 38,464			
2688 - 1x8x14' or 25,092			
2840 - 1x8x14' or 26,510			
109,964	@ $70/m	7,697.48	
		11,898.58	
Gates			
72 - 16 ft. (cable supported)	@ 5.88	423.36	
48 - 12 ft. gate	@ 5.88	282.24	
	Sub-Total	12,604.18	
Labor, 50 percent of material cost		6,302.09	
		18,906.27	$18,906.27
Hardware			
472# - 30d nails	@ 13.95/cwt.	65.84	
48# - 30d nails	@ 13.95/cwt.	6.70	
96# - 16d nails	@ 13.95/cwt.	13.40	
128# - 16d nails	@ 13.95/cwt.	17.86	
1848# - 16d nails	@ 13.95/cwt.	257.80	
1100# - 16d nails	@ 13.95/cwt.	153.45	
1440' - Steel cable $\frac{1}{4}$"	@ .16/ft.	230.40	
72 - turnbuckles	@ 1.00 ea.	72.00	
288 - clips	@ .12 ea.	34.56	
72 - eyebolts	@ 1.50 ea.	108.00	
72 - pr. steel hinges 18"	@ 5.50/pr.	400.32	
48 - pr. steel hinges 8"	@ 3.00/pr.	144.00	
		1,504.33	$ 1,504.33
			$20,410.60
Equipment - Pens			
Waterers			
48 - cattle waterers	@ 90.00	432.00	$ 432.00
Wiring			
Underground wire 1200'	@ .14/ft.	168.00	
Above-ground wire 9000'	@ .05/ft.	450.00	

TABLE I, APPENDIX D (continued). ESTIMATED MATERIALS AND COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item		Cost	
120 insulators	@ .32 ea.	38.40	
48 yard lights	@ 4.60	220.80	
48 fuse-switch boxes	@ 4.00	192.00	
Piping			
3000' plastic pipe 3/4"	@ 6.3¢/ft.	189.00	
2000' pipe 1 1/4"	@ 14.5¢/ft.	290.00	
Fittings			
48 adapters 3/4"	@ .18	8.64	
8 adapters 1 1/4"	@ .30	2.40	
48 elbows 3/4"	@ .25	12.00	
4 tees 1 1/4"	@ .56	2.24	
48 reducers	@ .26	12.48	
24 crosses 1 1/4"	@ .80	19.20	
300 steel clamps	@ .20	60.00	
Ditching 4700'	@ .70/ft.	3,290.00	
	Sub-Total	4,955.16	
Labor, 25% of costs		1,238.79	
		6,193.95	6,193.95
			$ 6,625.95
Well, Pump and Pressure System			$ 6,000.00
Feed Bunks			
1656 - 5x5x8' posts	@ 1.30	2,152.80	
1656 - 4x4x5' posts	@ .75	1,242.00	
792 - 2x8x14' posts or	14,784 bd. ft.		
1584 - 2x12x14' posts or	44,352 bd. ft.		
3168 - 2x8x14' posts or	59,136 bd. ft.		
1584 - 2x8x14' posts or	29,568 bd. ft.		
792 - 2x x14' posts or	11,088 bd. ft.		
672 - 2x4x14' posts or	6,276 bd. ft.		
	165,204 bd. ft.		
	@ $70/m	11,564.28	
	Sub-Total	14,959.08	
Labor, 50 percent of costs		7,479.54	
		22,438.62	$22,438.62
Hardware			
2252# - 30d nails	@ 13.95/cwt.	314.15	
1656# - ½x8" bolts	@ .20	331.20	
1656# - ½x9" bolts	@ .21	347.76	

TABLE I, APPENDIX D (continued). ESTIMATED MATERIALS AND COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item			Cost	
6624# - plate washers		@ .02	132.48	
			1,125.59	$ 1,125.59
				$23,564.21
Concrete				
Standing platforms	1800 cu. yds.			
Water platforms	300			
	2100 cu. yds.	@ 18.10 per cu. yd.	38,010.00	
Labor, 25% of material cost			9,502.50	
			47,512.50	$47,512.50
Working Corral				
Fencing				
9 - 6x6x16' posts		@ 4.25	38.25	
17 - 6x6x8' posts (sides)		@ 1.55	26.35	
6 - 6x6x8' posts (ends)		@ 1.55	9.30	
27 - 6x6x8' posts		@ 1.55	41.85	
23 - 6x6x8' fence line		@ 1.55	35.65	
80 - 2x6x14' fencing on	1120 bd. ft.			
60 - 2x6x14' line fence	840			
	1960	@ 70/m	137.20	
			288.60	$ 288.60
Gates				
9 - 16' gates (cable support)		@ 5.88	52.92	
1 - 12' gate		@ 5.88	5.88	
			58.80	$ 58.80
Chute			22.63	
Squeeze - headgate			84.27	
			106.90	$ 106.90
Hardware				
10 pr. - 18" hinges		@ 5.56/pr.	55.60	
59# - 30d nails		@ 13.95/cwt.	8.23	
180' - $\frac{1}{4}$" cable		@ .16/ft.	28.80	
9 - turn buckles		@ 1.00	9.00	
36 - clips		@ .12	4.32	
9 - eye bolts		@ 1.50	13.50	
			119.45	$ 119.45
		Sub-Total	573.75	
Labor, 50 percent			286.88	286.88
			960.63	$ 960.63

TABLE L, APPENDIX D (continued). ESTIMATED MATERIALS AND COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item		Cost	
Gravel			
1800 yds. - pit run	@ 1.50/yd.	2,700.00	
300 yds. - pit run	@ 1.50/yd.	450.00	
		3,150.00	
Labor, 10 percent of cost		315.00	
		3,465.00	$ 3,465.00
Land			
40 acres	@ $300/A	12,000.00	$ 12,000.00
Machinery			
Tractor (2)		3,000.00	
Truck, self-unloading box (2)		13,000.00	
Pickup		1,500.00	
Used cat with scoop (manure loader)		3,000.00	
Used dump truck (manure use)		1,500.00	
Self-unloading wagon		1,800.00	
Cattle oilers (72)	@ $179.50	12,924.00	
Scales 10T 22'x8'		2,000.00	
Scale house		582.00	
Cattle sprayer		300.00	
Cattle handling equipment		700.00	
Misc. (shovels, forks, etc.)		50.00	
		40,356.00	$ 40,356.00
Total - not including mill			$160,894.89
Cost per head - 2800			$57.46
5600			$28.73
8400			$19.14
Feed Mill and Equipment[a]			
Capacity 6 T. per hour			
Feed Mill Fan, 100 hp.		7,457.94	
Mixer		3,529.70	
Hopper, and scale		1,356.00	
Hoist, truck		1,094.89	
Elevator leg		2,428.43	
Roller mill		4,148.36	
Chain drags		2,711.69	
Load-out bins		5,785.20	

a/ See Appendix E for a complete breakdown of the mill. Prepared by Kenneth Eubanks, Research Assistant, Department of Agricultural Economics, Montana State College, Bozeman, Montana, August, 1961.

TABLE I, APPENDIX D (continued). ESTIMATED MATERIALS AND COSTS FOR 5600 HEAD CAPACITY FEEDLOT.

Item		Cost	
Misc. - chains, spouts, hoppers, bins, switches		20,280.82	
Building, concrete - 50'x100'		35,000.00	
Millright (installation)		12,098.00	
	Sub-total	95,891.03	
Storage bins, Butler type steel 100-125 ton		15,000.00	
Additional cost for steam rolling Roller, air lift, de-stover, cooler, conveyer & millright		39,500.00	
		150,391.03	$150,391.03
	Total Cost		$311,285.92
	Cost per head - 2800		$111.17
	5600		$ 55.58
	8400		$ 37.05

APPENDIX E. FEED MILL BREAKDOWN.*

Equipment for complete feed mill with a capacity of 48 tons of finished feed per eight hours of operation.

The prices are F.O.B., Bozeman, Montana. The millright charge may range from 20 to 30 percent of the value of the equipment. It is put at $12,098.00 in this study.

#6 truck hoist	$ 915.50
3 H.P. 1750 R.P.M. Open Motor	133.00
3 H.P. Starter	31.00
Push Button Control	15.39
	$ 1,094.89
Grill (steel pipe) for dump pit	260.00
Steel Hopper for pit	208.00
20" wide double chain drag feeder 21' - 0" overall length, flights every 4th pitch, 3 H.P. Vari-Drive open motor 60 roller chain drive, starter, push button, hip relay and built up sides	$ 1,920.00
F-99 Mill - fan on separate base, 100 H.P. on mill, 50 H.P. on fan-stub hopper, long sweep elbow; three screws, magnet and ammeter	7,275.94
Mill pipe - 56'	182.00
60" long cone collector	500.00
Swing flow distribution 4' - 12" dia. outlets - indicator cable, etc.	369.00
12" dia. Spouts 4 Spouts 4' long, flanged one end	49.20
9000 # Hopper Scale w/Hopper	1,356.00
One 2 - ton Marion Mixer/chain, sprocket drive 30 H.P. 3/60/440/220, 1160 R.P.M. V belt drive to counter shaft starter push botton. 10" discharge rock and pinion gate set of riser legs for mixer	3,529.70

* Prepared by Kenneth Eubanks.

9" dia. Auger 12' - 0" Overall complete with drive, $1\frac{1}{2}$ H.P. Motor, Starter and push botton	$ 466.00
Fords Model 8524 Elev. Leg - 72' - 0" Discharge Height	1,722.30
3 H.P. Motor TEFC and drive	392.00
3 H.P. starter	31.59
Push button	15.39
Service Platform	100.00
Extra Boot Pocket	16.50
Steel Ladder	42.00
Weather Cover	35.00
Vented Cups	73.65
	$ 2,428.43
Distributor Adapter	50.00
Fords Con-O-Flow Distributor 8' - 8" Outlets Indicator Cable	365.00
Indicator Cable	28.00
	443.00
8" dia. Spouts from Item #16 to Bins 190' - 0" REQD	484.50
Fords Z High Stand Roller Mill Model 1036 W-2	3,400.00
25 H.P. 3/60/220/440 Electric Motor TEFC	665.00
Starter	68.04
Push Button	15.32
	4,148.36
4' - 0" sq. Surge Bin - 45° Bottom Side draw off	400.00
Spout from 19 to 14	35.00
Fords 12" Double Chain Drag Feeder 23' - 6" overall length starter, push button, flights every 4th pitch, RC50, Drive 2 H.P. Gear Head, 150 R.P.M. Motor, Motor Base and Built up sides	1,267.23
Grill for Car Unloading Pit	375.10
Steel Hopper in pit	208.00
Fords 12" Double Chains Drag Feeder 29' - 0" Overall, starter, Pushbutton, Flights every 4th Pitch, RC60 Drive, 3 H.P. Gear Head Motor, Motor Base and built up sides	1,444.46
Drag Head Hopper	175.00

Fords Model 8524 Elev. Leg 72' - 0" Discharge Height	2,378.43
Distributor Adapter	50.00
Fords Con-O-Flow Distributor 10' - 8" Dia. Outlets	440.00
Indicator Cable	28.00
	468.00
8" Dia. Spouts from #28 to Bins 285' - 0" REQD	$ 740.00
Fords 9" screw Feeder with inlet and discharge outlet, Motor Mount, including one 1 ½ H.P. GH Motor, 155 R.P.M. One 1 ½ H.P., 3/60/440 NEMA with starter, one NEMA with push button starter, 20-tooth RC-60, Sprocket, one 30' tooth RC 60 Sprocket; 10' RC 60 chain	616.14
Fords 9" screw feeder with inlet and discharge outlet Motor Mount including one with H.P. GH motor, 155 R.P.M., One 1 H.P. 3/60/440 NEMA Starter, One NEMA Push button 20-tooth RC 60 Sprocket, 30-tooth RC 60 Sprocket, 10' RC 60 chain	496.53
Fords 9" screw Feeder with inlet and discharge outlet, Motor Mount, including one 1 ½ H.P. GH Motor, 155 R.P.M. One 1 ½ H.P., 3/60/440 NEMA with starter, one NEMA with push button starter, 20-tooth RC-60, Sprocket, one 30-tooth RC 60 Sprocket; 10' RC 60 chain	616.14
5' sq. Mash Bin	588.00
Hopper Under Cooler	65.00
Spout From 36 to 38	35.00
6 x 4 Cool Pellet Leg - 66' 0" Discharge Height	
Elev. leg	1,322.50
3 H.P. Motor TEF C and Drive	392.00
3 H.P. Starter	31.59
Push button	15.39
Service Platform	100.00
Steel Ladder	35.00
Weather Cover	35.00
Vented Cups	19.42
	$ 1,950.90
Spout from 38-40	25.50
8" 2-way flop gate	39.50

Spout from Item 41 to 33	37.00
Spout from Item 42 to Bagging 8" Dia. x 6' - 0"	15.30
14" Dia. Pipe from 35 to 46 - 30' - 0" REQD	82.50
Fords Model 120 Belt Feeder 12" Wide 28' - 0" over all complete with 2 H.P. motor starter, push button and weather cover	859.96
Belt Feeder End Hopper	45.00
Fords Con-O-Flow Distributor 4' - 8" Dia. Outlets	275.00
Indicator Cable	15.00
	$ 290.00
4' - 8" Dia. Spouts 5' - 0" Long	51.00
6' sq. Bagging Bin Cap 350 Bu.	536.55
Adapter	415.00
9" Dia. Screw Conveyor 4' - 0" Overall	496.53
9" Dia. Screw Conveyor 4' - 0" Overall	496.53
Manlift and machinery tower	340.00
Pipe Grill	260.00
Steel Hopper in Pit	208.00
Spout From Bin 10-11-12 to Floor Drop	192.00
45° Elbows - REQD 20	320.00
Floor Drop to Mill	260.00
8" K-Valve Offset on 45°	39.50
8" Spout 15' - 0" Long	38.25
8" Spout 22' - 0"	56.10
66-67 Chain Operated Rack and Pinion	166.50
Hopper Over Roller Mill	55.00
Thru. 73 Chain Operated Rack and Pinion	277.50

Thru. 79 Chain Operated Rack and Pinion	333.00
Canvas Shocks	25.00
Spout from Bin 2-3-4 to Hopper Scale	40.50
Spout from Bin 1 to Hopper Scale	3.00
Chain Operated Rack and Pinion	55.50
Thru. 89 Chain Operator Rack and Pinion	333.00
8 Loadout Bins over driveway	5,785.20
	$ 48,793.03
Building, concrete w/warehouse 50' x 100' steel reinforced	35,000.00
Millright charges (installation)	12,098.00
	$ 95,891.03
Storage bins, butter type, steel 100-125 ton capacity	15,000.00
Steam roll mill 70 H.P. Cleaver Brooks boiler 48" Wagner Steamroll De-stoner, air lift Cooler, conveyor and millright costs	39,500.00
	$150,391.03

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