

AN ABSTRACT OF THE THESIS OF

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ADJUSTMENTS ON CATTLE RANCHES IN NORTHEASTERN
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Cattle ranching is the predominant form of business in a large area of eastern Oregon. Many of the ranches are not providing a sufficient income to satisfy their operators.

Numerous reasons are advanced to explain why the operators of these businesses have not been able to obtain the performance from their resources to meet the challenge of changing economic conditions.

In this project six ranches were studied on which the operators have indicated difficulties or where growth in the size of the ranch business has been substantially below the size of business considered attainable by specialists in agriculture and other outside observers. The objectives were (1) to identify those determinants of the level of net income from ranch operations which tend to limit adjustments to changing economic conditions, (2) to analyze the relationships among the determinants as they exist on actual ranches, and (3) to

specifically examine the role of availability of capital in overcoming limitations on net ranch income.

For a basis of comparison the range and livestock management practices at the Squaw Butte Range and Livestock Experiment Station have been analyzed. This analysis shows that a depleted range can be rehabilitated under physical conditions that are more restrictive than the conditions that exist in the study area. A privately operated cattle ranch in the study area was analyzed to determine how the operator overcame limitations on range and meadow forage production to permit growth in earned income.

Analysis of the data obtained from the six ranches in the study area showed that on five of the six, net cash income tended to be too small to provide for family living expenses, investment in improvements, and debt service on borrowed capital.

On every ranch the income could be increased in a short time by using known fertilization practices, weed control, or rehabilitating meadows or rangeland. Some improvements have been made on all ranches but the possibilities of other improvements were not recognized or not made because the operators did not have the needed finances, more specific information was needed, or merely failed to make the improvement.

Three of the ranchers have the potential to greatly expand their income within the resources available to them. The other three are limited by quantity or quality of land resource; however,

their income could be increased by improved livestock, crop and/or range management.

PHYSICAL AND ECONOMIC DETERMINANTS
THAT LIMIT ADJUSTMENTS ON CATTLE
RANCHES IN NORTHEASTERN OREGON

by

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TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
I	INTRODUCTION	1
II	DETERMINANTS OF NET RANCH INCOME	5
	Natural Resources	5
	Success in the Use of Animals to Market	
	Feed Produced	15
	Availability of Capital	19
	The Individual Manager	23
	Market Outlets and Marketing Activities	24
III	DEMONSTRATED ADJUSTMENTS TO CHANGING ECONOMIC CONDITIONS	26
	Squaw Butte Range and Livestock Experiment Station	26
	Adjustments Demonstrated on Ranch A	39
IV	ORGANIZATIONAL ANALYSIS OF SIX SELECTED RANCH BUSINESSES	48
	Ranch Number 1	48
	Ranch Number 2	61
	Ranch Number 3	68
	Ranch Number 4	78
	Ranch Number 5	87
	Ranch Number 6	95
	Managerial Limitations on the Ranches Studied	103
	The Role of Lending Institutions	105
V	SUMMARY AND CONCLUSIONS	107
	BIBLIOGRAPHY	117
	APPENDIX	119

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 Range Number and Acres per Range Operated on the Squaw Butte Range and Livestock Experiment Station Burns, Oregon. 1963	27
2 Number of Cows, Calving Percentage, Percent Calf Crop, and the Average 205-day Weaning Weight of Calves	34
3 The Number of Calves and the Number of Days the Calves Were on Summer Range, Total Weight Gained and Average Weight Gained per Day	36
4 The Number of Yearlings and the Number of Days the Yearlings Were on Summer Range, Total Weight Gained and Average Weight Gained per Day	37
5 Acres of Land Operated Classified by the Land Use on Ranch A. 1961-1963	40
6 Inventory of Livestock for Ranch A	44
7 Receipts, Expenses and Investment Analysis for Ranch A. 1961-1963	46
8 Acreage of Operated Land Classified by the Land Use on Ranch Number 1. 1960-1963	48
9 Land Use Adjustments and Conservation Practices Planned and Applied on Grazingland on Ranch Number 1	49
10 Land Use Adjustments and Conservation Practices Planned and Applied on Cropland of Ranch Number 1	50
11 Inventory of Livestock for Ranch Number 1	55
12 Receipts, Expenses and Investment Analysis for Ranch Number 1	59
13 Acres of Operated Land Classified by the Land Use on Ranch Number 2	61

<u>Table</u>	<u>Page</u>
14 Inventory of Livestock for Ranch Number 2	64
15 Receipts, Expenses and Investment Analysis for Ranch Number 2	67
16 Acres of Operated Land Classified by the Land Use on Ranch Number 3	68
17 Inventory of Livestock for Ranch Number 3	73
18 Variation of the Weight of Heifers and Steers for Ranch Number 3	74
19 Receipts, Expenses and Investment Analysis for Ranch Number 3	76
20 Acres of Land Operated Classified by the Land Use on Ranch Number 4	79
21 Inventory of Livestock for Ranch Number 4	82
22 Receipts, Expenses and Investment Analysis for Ranch Number 4	85
23 Acres of Operated Land Classified by the Land Use on Ranch Number 5	87
24 Inventory of Livestock for Ranch Number 5	91
25 Receipts, Expenses and Investment Analysis for Ranch Number 5	94
26 Acres of Operated Land Classified by the Land Use on Ranch Number 6	95
27 Inventory of Livestock for Ranch Number 6	98
28 Receipts, Expenses and Investment Analysis for Ranch Number 6	100

<u>Appendix</u> <u>Table</u>	<u>Page</u>
1 Herbage and Beef Production on 40 Acres of Sprayed Range	119
2 Species Composition in Percent by Weight	120
3 Forage Yield Data from Ecological Study of Succession Following Sagebrush Removal on Fair and Poor Condition Range Adjusted to Median-Year Precipitation	121
4 Percentage Reduction in Amount of Brush Cover on Sagebrush-Grass Plots Variously Treated in Ecological Study at Squaw Butte	122
5 Utilization and Season of Use for Each Range Unit on the Squaw Butte Range and Livestock Experiment Station	123-131
6 Estimated Pounds of Forage Utilized for Each Range Unit on the Squaw Butte Range and Livestock Experiment Station	132-144
7 Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch A	145
8 Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 1	147
9 Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 2	149

Appendix
Table

Page

10	Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 3	150
11	Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 4	152
12	Depreciation Schedule and Inventory Value of Machinery And Equipment, and Buildings and Improvements for Ranch Number 5	154
13	Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 6	155

PHYSICAL AND ECONOMIC DETERMINANTS THAT LIMIT ADJUSTMENTS ON CATTLE RANCHES IN NORTHEASTERN OREGON

CHAPTER I

INTRODUCTION

Large areas of Oregon, especially east of the Cascades, are limited by natural conditions to the production of forage crops that can be harvested only by grazing. These lands in combination with adjacent meadows and croplands are the site of an extensive livestock industry.

In a large portion of the state, sale of cattle and calves provides a major source of income. Income from sales of cattle and calves from ranches and farms in Oregon east of the Cascades in 1962 was over \$72,000,000. Of this, over \$55,000,000 were from areas south and east of the Columbia Basin. In the Snake River Basin counties, \$22,349,000 or 35.1 percent of total income resulted from the sale of cattle and calves. Specifically, Baker County received 59.3 percent of total income from the sale of cattle and calves, while Malheur, Union and Wallowa counties received 28.5 percent, 33.6 percent, and 36.2 percent, respectively (8; 9).

Changes in relative prices, costs, technology and other economic conditions should lead to changes in the organization and use of resources by individual ranch businesses. Comparison of

performance shown to be possible under experimental conditions and demonstrated on some ranches, with performance observed on other ranches, indicates that there is great variation in the degree to which different ranches have put into practice changes that appear to be economically feasible.

The combination of reasons for this great variation have not been set forth and examined. Previous research conducted on the problems of rangeland improvement and beef cattle production has dealt with single variables which could be studied under controlled conditions, and the results qualified (14, p. 23-25; 15, p. 17-19).

Ecological and species succession studies have been made on improved range in Oregon (5, p. 62-68). The economics of meadow improvement and increased meadow hay production have been analyzed in Oregon and Nevada (2, p. 172-174; 3, p. 1 - 23). Improved beef cattle management practices, as well as the comparative advantages of the various beef production systems have been studied in Eastern Oregon (4, p. 1-44; 6; 17, p. 8-10).

All of these deal with limited aspects of the problems confronting a ranch manager when he plans changes in feed production or utilization on a ranch.

The objectives of this study are as follows:

1. To identify those determinants of the level of net income from ranch operations which tend to limit the ability of ranch managers to adjust their business to changing

economic conditions.

2. To analyze the relationships among the determinants of ranch income as they exist on actual ranches.
3. To specifically examine the role of availability of capital in overcoming limitations on ranch income.

The procedure followed to select the ranch businesses in the study area to be analyzed was to first establish contact with county agents in each of the three counties. Then, with their knowledge of the ranch businesses which exist in the area, two ranches in each county were selected to be analyzed. The principal criterion used in selecting the ranches to be analyzed was the apparent inability or unwillingness of the ranch operator to put into practice the changes that appeared to be economically feasible under experimental conditions and on other ranches.

In addition to the six ranches selected by the above criterion one ranch in the study area was selected as a demonstration of the performance obtained as a result of the operator having made the changes which he considered necessary to meet the challenge of changing economic conditions.

The Squaw Butte Range and Livestock Experiment Station at Burns, Oregon, was included in the study in order to observe the changes in the physical output of the ranch resulting from adjustments in the overall operation of the physical resources on the range. The aim here was to observe the actual performance in relationship to

the performance which was shown to be possible under experimental conditions.

The procedure used to arrive at the determinants of net ranch income was to make an extensive review of the literature. Then the findings were discussed with specialists at Oregon State University, specialists at the Squaw Butte Range and Livestock Experiment Station, county agents, officials of lending institutions and ranchers in order to further identify the determinants of net income which tend to limit the ability of ranch managers to adjust their businesses to the challenge of changing economic conditions.

Data were obtained from every one of the selected ranchers to permit determination of the supposed and actual limitations on income. All ranchers were visited at least three times and some as many as five times. All of the available detail on the natural resources which are either directly or indirectly inputs into the ranch business were obtained. Input-output and financial data for ranches were obtained in order to measure the performance of the inputs in the ranch business. Research workers from the University and the county extension agents were conducted over the ranches to observe and discuss ranch organization and operation on the sites. Data and information obtained were discussed with specialists of the University, county agents and private businessmen as a step in the analysis.

CHAPTER II

DETERMINANTS OF NET RANCH INCOME

There are five major classifications into which the determinants of the net ranch income may be placed: (1) Natural resources, (2) success in the use of animals to market feed produced, (3) the availability of capital, (4) the individual manager, and (5) the market outlets and marketing activities. For every ranch, productivity and net income may vary over a period of time depending upon the technology used with each of the determinants in the above classification.

Natural Resources

Under the generic heading of the "natural resources" there are three sub-classifications to be discussed, (1) land, (2) water and (3) climate.

The organization of the ranch business and the practices, or uses of technology to be followed, depend upon the quantity and quality of land available for use during the different seasons of the year. Generally, cattle are fed hay in the winter and grazed on rangeland or pastures during the summer. Maintenance of a proper balance between herd size and available feed in winter and summer will have an important impact upon the rancher's net income.

Many ranchers in the study area are dependent upon publically

owned lands for summer rangeland. The principal agencies administering the publically owned lands in the area are the U. S. Forest Service, and the Bureau of Land Management. Before a rancher is permitted to lease or rent land from these public agencies, he must meet certain qualifications. A most important qualification which every permittee must meet is that he must have sufficient base property, i. e., privately owned land from which he can produce enough hay to maintain his livestock herd throughout the winter. He will not be issued an allotment permitting him to graze more livestock on public range and forest land than the number of livestock which he can maintain on his base property during the winter.

Ranchers may have the available productive resources to maintain a larger number of livestock during the winter feeding months than the number of livestock which their deeded and leased rangeland may maintain during the summer grazing months. To overcome this problem and to develop and maintain a better balance between the range and meadowland, several alternatives may be considered. These alternatives are (1) improve the forage production on the rangeland owned at the present time, (2) purchase additional rangeland, (3) obtain a larger grazing allotment from public agencies, (4) lease privately owned rangelands from other individuals, (5) use a portion of the meadow hayland for summer grazing, (6) board cattle out on other ranches, (7) feed hay later in the spring or earlier

in the fall, purchasing additional hay if necessary, and (8) change the beef production systems.

The plant cover of a range or meadow is dependent upon the management of the range or meadow, the quality of the soil and the availability of water for production of edible grass. Poor management practices, poor quality of soil, or inadequate water, result in a range or meadow infested with undesirable weeds which may be poisonous, unpalatable, or have a low digestable protein content.

H. R. Hockmuth maintains that it is difficult to conceive of a situation where range improvement practices will not result in increased net productivity of the range. He indicates that the increase in productivity as measured in gross returns to the ranch is not the only basis on which to decide whether range improvement expenditures are economically feasible. He claims the basis for this decision depends upon whether or not the improvement creates a net increase in the returns over the short term or a net increase in capital investment capable of paying an adequate return over a long period of time (5, p. 62-68).

Forest Sneva, at the Squaw Butte Range and Livestock Experiment Station at Burns, Oregon, has conducted an experiment on the herbage and beef production obtained before and after sagebrush was sprayed and killed on 40 acres of range. The results of this experiment are indicated in Table 1 of the appendix. Table 2 of the

appendix shows the species composition in percent by weight on the same test site.

Another project conducted at the Squaw Butte Range and Livestock Experiment Station was concerned with forage yield data from ecological study of succession following sagebrush removal on fair and poor condition range adjusted to the median year precipitation. The sagebrush control methods used were spraying and rotobating. The results of this study are shown in Table 3 of the appendix. Table 4 of the appendix shows the percentage reduction in the amount of sagebrush cover for the two methods of sagebrush control on the poor and fair range sites.

In 1963 and 1964 the cost of spraying rangeland to eradicate sagebrush was \$4.25 per acre and the cost of spraying rangeland to eradicate undesirable weeds was \$2.50 per acre, while the cost of reseeding a range varied from \$10 to \$20 per acre. The cost and benefit of improving rangeland must be compared to the cost and benefit of purchasing additional rangeland at \$25 to \$30 per acre. In addition to the investment required to purchase the land, taxes on the additional purchased rangeland will be an additional expense each year.

In 1964, the fee for grazing on Bureau of Land Management lands was 30 cents per A.U.M. The charge for grazing on U. S. Forest Service land varied according to the site of the grazing

allotment, however, it averaged approximately 65 cents per A.U.M. These two alternatives of leasing additional public rangeland must be compared to the alternative of leasing privately owned rangeland at a cost of \$3.00 per A.U.M. in 1964.

The alternative solution, to the problem of imbalanced range-meadowland, of grazing cows, calves and yearlings on native meadows, will decrease the season of use and the intensity of use on the rangeland, thus allowing for some recovery of the plant coverage on the range. This practice will allow a rancher to renovate a portion of the rangeland or defer the rangeland for a period of time. However, before the rancher makes the decision to follow this practice, there are a number of factors which he must consider. One factor is the production of his native meadowland and the number of animals which he can graze on this hayland during the summer, but yet obtain enough forage for feed throughout the winter. Consideration must also be given to the price of hay and whether or not it is economically feasible to purchase the winter's supply of hay and use his hayland for grazing during the summer.

Native meadows which produce approximately one ton of hay per acre would yield gross income at current hay prices of about \$25 per acre. It is estimated that the same meadows will carry a yearling per acre or a cow and calf on two acres through a five month grazing period. On this basis, if each acre produces

244 pounds of yearling beef at 17 cents per pound, the gross return will be \$41 per acre, compared to the gross return of \$25 per acre on hay production (2, p. 172-174).

It is not known whether nitrogen fertilizer will increase grazing capacity in the same ratio as it does hay yields. It is known, however, that 80 pounds of nitrogen has increased hay yields approximately one ton per acre. If an operator who produced 400 tons of hay on 400 acres fertilized 200 acres with 80 pounds of nitrogen, he might expect to produce 400 tons of hay on 200 acres. This would release 200 acres for pasture. The cost of fertilizer per acre would be about \$13.50 including application costs. If each of the released acres produced 244 pounds of beef valued at \$41, the net return from the use of fertilizer would be \$27.50 per acre on the 200 acres (2, p. 172-174).

A determinant which will have an indirect effect upon net ranch income will be the "managerial costs" of acquisition of land. A renter may be unable to obtain managerial control of the meadow or rangeland which he is renting. Unless a rancher has some managerial control of the land which he is renting and a guarantee that he will be allowed to rent that particular area of land over a period of years, he may be hesitant to increase his herd size to the point where he would be dependent upon the rented land for either summer range or winter hay. He may also hesitate to make a substantial investment to improve the land which he is renting, with the uncertainty of how

many years he will be permitted to rent the land in order to obtain a return of his investment.

Before the decision is made to change from a cow-calf to a cow-yearling or cow-feeder¹ production system, the rancher must carefully consider how he will benefit by this change in the utilization of his resources. There are three limitations which must be recognized, (1) additional finances will be required over a period of at least two years if a rancher changes his production system from a cow-calf to a cow-yearling operation, (2) separate pastures will have to be provided to separate the breeding herd from the yearlings or feeders, and (3) the rancher always risks the possibility of price decline.

Luther Wallace made a comparative study of beef production systems on eastern Oregon ranches in Baker, Umatilla and Grant counties. He found that in each of these three areas there was a considerable income advantage in favor of the cow-feeder system. He illustrated by the use of ranch budgets that the cow-feeder system increased the size of farm business over both the cow-calf, cow-yearling systems. This study also indicates that there is very little net income difference between the cow-calf and cow-yearling beef production systems (20, p. 1-57).

Thomas M. Stubblefield asserts that a cow-yearling beef production system offers more flexibility than a cow-calf operation. He assumes

¹In a cow-feeder beef production system, the calves are weaned and placed directly into the feedlot, fed for maximum rate of gain, and then marketed as slaughter animals.

that a rancher operating a cow-calf system with 300 cows, would expect to provide 5, 209 animal unit months of summer forage and would expect to produce approximately 85, 000 pounds of beef. At 18 cents a pound, the gross income from the sale of these calves would be over \$15, 000. With the same amount of forage under a cow-yearling operation he estimates a capacity of only 240 head of brood cows, but would expect to produce 120, 600 pounds of yearling beef. At a price of 17 cents per pound, the gross sale from the cow-yearling operation would be over \$20, 000 (13, p. 8-10).

If ground water or surface stored water is not available at the right place and time, a limitation will be imposed on the net ranch income. To decide whether water is one of the limiting determinants of the net ranch income, an appraisal must be made of the availability and accessibility of water for both plants and animals. Available and accessible water implies that there may be a high water table in the soil, or the soil may have a high water retention characteristic, or sufficient surface water may be stored to be used for irrigation or by the livestock.

If a rancher is faced with the problem of an inadequate water supply for forage plants, he must consider (1) the investment and expense necessary to supply irrigation water to the plants, (2) reseeding grasses into the range or meadow which demand less

water during the growing stage, or (3) changing the season of use and/or decreasing the utilization of the forage.

An inadequate supply or improper distribution of the water for the stock is another determinant which may limit net ranch income. There are six alternative practices which a rancher may follow to overcome this problem. He may supply water to the cattle during the winter by hauling water to the livestock watering troughs, drilling wells from which to pump water or pumping water from existing wells to the watering troughs. A rancher may supply water to his livestock on the range by locating and developing springs and seeps, locating possible sites where a pond can be developed to catch runoff water, or water may be hauled to watering troughs which are properly distributed over the rangeland.

Under the generic heading of "natural resources," climate is the third classification which may limit net ranch income. The year to year fluctuation in precipitation must be considered by the rancher when he attempts to determine the carrying capacity of his rangeland. The year to year variability of precipitation has a direct effect on the forage production and therefore a direct effect on pounds of beef produced per acre, and obviously a direct effect on net ranch income. Adjusting to this uncertainty influences ranchers' plans for the future. However, during a drought, there are five major practices which ranchers may follow: (1) buy hay during the period of drought,

(2) buy concentrate during the drought, (3) reduce the herd, (4) increase leases of range and cropland, and (5) make no change during the drought. A study made by James R. Gray indicates that the most effective of these five drought actions which were taken on cattle ranches in eastern Oregon during 1955, was the practice of increasing the lease on both the rangeland and the cropland. Not all of the ranchers in the area had an opportunity to take advantage and follow this practice. However, by adopting new techniques these ranchers could have accomplished some of the same results as increasing the lease size, by fertilization of native meadows.

Gray's study directs attention to the fact that increasing the feed supply was superior to reducing the herd size during the drought period. And, the practice of buying hay during the period of drought resulted in a higher net income than did the practice of buying concentrates (4, p. 33-42).

Temperature is also an important determinant of net ranch income. Some areas of the State of Oregon have extremely cold and long winters, such as portions of Wallowa county. This affects the amount of hay required per animal, the length of the feeding period, and time of calving.

If, in such areas, ranchers follow the practice of calving early, such as in February and March, they may expect to maintain closer supervision at calving time, and more adequate wind and weather

shelters than if the animals were born later in April and May. They may have a high death loss from pneumonia and other diseases which are prevalent under these cold and damp calving conditions in February and March.

Success in the Use of Animals to Market Feed Produced

The second major classification for determinants of net ranch income is the success with which animals are used to market feed produced. The number of cattle and also the quality of cattle are both important determinants of net ranch income.

John Landers points out that in nearly every herd on test, the top one-third of the calves outweighed the bottom one-third by 100 pounds or more. In some herds, the top two-thirds of the cows are making all of the profit. He has also indicated that a bull may increase weaning weights by as much as 60 pounds and that each year such a bull earns approximately \$400 more than the average bull (6, p. 1-2).

Herd improvement or quality of the herd in the long run depends on the quality of the replacement heifers. The quality of the livestock in the brood herd can be changed so as to increase the rate of gain of the calves by inducing a genetic change in the brood herd. One effective way to change and maintain a change in the

productivity of the livestock is to make continual use of a production testing program.

Production testing is a simple method of obtaining systematic records which will aid in the selection of, and breeding more productive beef cattle. Cattlemen may rely upon production testing as a method to improve the conformation and to increase the rate of gain of the weaners. Through production testing, the poor producers can be identified and the average pounds of calf produced per cow can be increased by eliminating these poor producers. In addition to being an aid in culling poor producing cows, a production testing record can be used to check and improve percent calf crops, select the best heifers for replacement, measure the productivity of each bull, increase weaning weight of calves produced, improve the grade of calves produced, check on and improve herd management, supplement bull testing information, provide additional information for buyers and increase total income and efficiency of the herd (6, p. 1-2).

The productivity of the replacement heifers can be increased by selecting fast gaining heifers. Selection of these heifers can be facilitated by saving 50 percent more weaner calves than are needed as replacements in the cow herd. Then when these animals are yearlings or two year olds, there is another opportunity to cull the least desirable heifers.

In one state the average weaning weight increased 100 pounds and the average grade increased from "good" to "choice" in herds which were on test over a period of 10 years. Some producers in Oregon who used production testing reported a gain of 50 pounds in three years (6, p. 1-2).

Practices which ranchers follow to increase calving percentages and percent calf crop weaned are also possible determinants of net ranch income. Such practices would be to provide closer supervision, especially during calving time, provide windbreaks and shelters for protection of the cow and calf during calving time, and careful attention to sanitation in an attempt to reduce the death loss.

A rancher operating on a cow-calf system may be particularly interested in achieving a high uniformity of calves at weaning time and at sale time. He may obtain this uniformity and at the same time a high weaning weight by following the practice of having his cattle calve early in the year, and within a short period of time. These may be some of the practices which the rancher follows in an attempt to achieve the distinction of producing reputation cattle for sale.

Along with the domestic livestock, wildlife in the area of a particular ranch must also be supported by the forage produced on the range and meadows. The wildlife may be grouped into two classifications, (1) predators, and (2) competitors. Predators such as bobcats, coyotes and bear may have substantial impact upon the

net ranch income if these predators attack and kill the new-born calves. Competitors of the domestic cattle for the forage include, deer, elk and rodents, such as jackrabbits and gophers. The deer and elk become problems to the rancher by grazing and eating the forage on both rangeland and meadow hayland. Gophers become a problem by destroying the root system of various grasses and legumes.

The deer and elk may become a problem in the early spring when the snow is melting, the ground is soft, and the forage is beginning its spring growth. Although a cattleman may try to protect the forage on the soft, wet ground by delaying the time he turns out his livestock to graze until the ground is firm, the deer and elk cannot be controlled as easily and kept from grazing in these areas. By tearing up the ground with their hoofs and trampling the forage into the ground, they cause extensive damage to the young growth of forage and may reduce the carrying capacity of the range by killing out desirable grasses.

During severe winters when forage is scarce for the deer and elk at the higher elevations, they tend to migrate to the valley floors and feed in the meadows and on the haystacks of the ranchers and cause substantial damage to meadows, haystacks, and fences.

Availability of Capital

The third major classification of determinants of net ranch income is the availability of capital. A limited amount of operating capital may limit a rancher from performing certain operations such as fertilizing meadow hayland, prohibit him from preparing a proper seedbed before reseeding meadows and range sites, or prohibit him from constructing livestock control fences. Limited operating capital may also affect the timing of a rancher's operation, particularly the timing of the sale of livestock.

A rancher whose operation is limited by the amount of his operating capital may rely upon one or several solutions to this problem by seeking outside sources of capital, such as banks and production credit associations. A rancher may also consider the alternative of entering into vertical integration, i. e. , raising cattle under contract for another rancher, businessman or feed and grain company.

Limited internal or external investment capital may restrict ranchers from implementing the adjustments to changing economic conditions which should be made. Lack of available long term credit may prohibit a rancher from purchasing additional rangeland or meadowland. The lack of intermediate credit may prohibit a rancher from purchasing additional cattle or it may prohibit him from either

implementing or continuing a range renovation program.

The problem of unavailable or insufficient intermediate credit for conservation practices may be alleviated by the existence of the Agricultural Conservation Program. This program provides each rancher the opportunity to apply for federal cost-sharing assistance for certain approved conservation practices. A group of ranchers in a local area may also apply for federal cost-sharing assistance by forming a pooling agreement to perform certain approved conservation practices to alleviate a mutual conservation problem on their ranches.

A few of these approved practices are listed as follows: Reseeding rangeland, spraying rangeland to control undesirable shrubs, drilling wells for livestock water, developing springs and seeps for livestock water, constructing livestock water ponds, constructing permanent cross fences or drift fences, constructing stock trails through brush and rock, constructing permanent open or underground drainage systems, reorganizing existing irrigation systems, and leveling land for more effective use of irrigation water (18, p.15-33).

The total allowable payment for all federal cost-shares to any rancher for conservation practices carried out during the year in Baker County is \$1200 per farm, \$1000 and \$1250 per farm in Union and Wallowa counties, respectively.

Mr. R. B. Peck has the opinion that cattlemen have a definite need for long term credit for range development. He has proposed that a direct loan program be set up using private investment money to make available the funds needed by ranchers for range developments. Then, rather than making these loans on a short term basis like the operating loans, such a loan would be made for a longer period of time, such as 10, 15 or 20 years during which time the rancher could repay the borrowed money at a low interest rate. He has also recommended that these private funds for loans be administered by the local banks and that the feasibility and specifications be controlled through existing range agencies. In order to provide some security for the loan, he has proposed that the program be supported by government loan insurance (10, p. 162-163).

The attitude of lenders may also be a limiting determinant of the adjustments which a rancher may be able to make to changing economic conditions. When economic conditions are depressed, banks, Production Credit Associations, Federal Land Banks, and other lending institutions may refuse credit to ranchers in adequate amounts, thus limiting the operations. Also, lenders may apply restrictions to a loan which may discourage a rancher from obtaining the loan. These restrictions may be high interest rates, large monthly repayment demands, or the lending institution may grant the loan only on the condition that they have the prerogative of making certain

management decisions concerning the operation of the ranch, such as the time of sale of the livestock, and the size of livestock herd to be maintained.

When a rancher considers the capital which he has available, either saved or from current income, he may consider the alternative uses for his capital. Before he disburses capital retained from previous income, he may decide whether to use this capital on consumption goods, or make a productive investment. If he decides to make a productive business investment, he may consider what the most profitable allocation of his capital would be between different business investments. He may decide that he would obtain a greater return on his capital by investing in some business other than the ranch, or vice versa.

When a rancher considers what use to make of the capital from his current income, he must decide whether to save this capital for future investment, or spend it on consumption goods. Regardless of the source of available capital, if he decides to spend it on consumption goods, he will forego making those adjustments which require investments of capital to meet the challenge of changing economic conditions.

The Individual Manager

The fourth major classification of the determinants of net ranch income concerns the individual manager, his aims and goals, physical limitations, managerial limitations and also the time limitation.

Education, practices followed by neighboring ranchers, contacts with county agents, extension specialists, agribusinessmen, technical publications and public news media provide data on technology and practices, and economic information needed by a rancher in managing his business. The effectiveness by which new practices and technology are presented by these sources, the faith and working relationships which professional agriculturalists and officers of lending institutions are capable of establishing with ranchers, and the effectiveness by which officers of lending institutions suggest accurate information on practices and new technology to the rancher, may also influence the rancher's aims and goals and be an aid to him in overcoming any managerial limitations.

Other managerial limitations may be inherent. A rancher may have some risk aversion, or he may be limited by inertia to making certain adjustments. Managerial limitations may also prevail because of the fact that technological data is not available to make a manager aware of the potential of the resources available to him. Associated with this, ranch managers may not understand the proper use of

analytical techniques such as the use of the marginal cost-marginal return relationships.

Age and health may be two physical limitations of the ranch manager which are not under his control. They can be, however, important determinants which would influence the rancher's aims and goals, his planning span and his degree of risk aversion.

Ranch managers engaged in activities external to their ranch business may find that they have insufficient time to devote to proper operation of the ranch. Some of these activities may be of particular interest to cattlemen and they may expect that their present donations of time will, in the long run, increase the net ranch income, but one may expect to find that in the short-run, these donations of the ranch manager's time to the external activities may tend to decrease the performance of the ranch manager, and his net income.

Market Outlets and Marketing Activities

A rancher has a limited number of market outlets for his livestock. If these local markets are inadequate, he may overcome this limitation imposed on him by following beef production practices by which he can produce high grade, uniform and fast gaining animals, and then promote the sale of his cattle to markets outside his locality. Also, he may change his livestock production system in order to gain product differentiation and reputation livestock.

He may, however, choose not to work as an individual to increase the number of market outlets for his livestock in order to possibly receive a better price for his livestock than the price which he could receive at one of the local markets. He must then either accept the price he receives, or he may become a member of an organization whose objective is to direct a promotional activity to attract livestock buyers from other areas.

The determinants of net ranch income as they have been set forth above, are expected to have an influence upon the net ranch income and the adjustments which a rancher is capable of making to changing economic conditions.

CHAPTER III

DEMONSTRATED ADJUSTMENTS TO CHANGING ECONOMIC CONDITIONS

Squaw Butte Range and Livestock Experiment Station

The Squaw Butte Range and Livestock Experiment Station is located within Harney County approximately 34 miles west of Burns, Oregon.

During the 26 years between 1932 and 1957, the mean annual precipitation recorded at the Squaw Butte Range and Livestock Experiment Station was 11.0 inches. The range and the variation of the precipitation is indicated by the lowest quartile value of 8.6 and the highest quartile value of 12.1 inches of precipitation received during this period. The median monthly precipitation received was 0.85 in April, 1.25 inches in May and 1.1 inches in June (16, p. 8-9).

As shown in Table 1, 16,141 acres of sagebrush-bunchgrass rangeland are used to provide summer forage for the livestock on the Squaw Butte Range and Livestock Experiment Station. Included in this amount are 960 acres divided into six areas that are used primarily by the selected livestock that are on experiment.

In 1944, a range survey was made and the grazing capacity was determined to be 10 acres per animal unit month. During the

five years following 1944 the administration followed the practice of stocking the Squaw Butte Range at a rate which varied from 11-15 acres per animal unit month, yet the range condition appeared to decline.

TABLE 1
Range Number and Acres per Range Operated on the
Squaw Butte Range and Livestock Experiment Station
Burns, Oregon. 1963

Range	Acres	Range	Acres
1	2145	6	2117
2	2237	7	2143
3 (Total Range 3)	(2076)	8	160
3-1	1705	9	160
3-11	371	10	160
4	2137	11	160
5 (Total Range 5)	(2085)	12	160
5 South	421	13	160
5 East	537	14	40
5 West	326	15	50
5 North	592	16	150
5 Horse Pasture	209		
TOTAL (Squaw Butte Range)			16,140

In 1949 areas of the range were classified by the condition of forage production as either good, fair, or poor. A quantitative survey was then made which provided information to conclude that there is no proper grazing capacity for the areas of rangeland in poor

condition. The areas in fair condition at that time could be grazed on a deferred grazing basis, and with adequate livestock distribution the over-all grazing capacity was estimated to be 17 acres per animal unit month. However, inadequate distribution of livestock, due to topography and lack of adequate stock watering places on all parts of the range, forced an increase in the acreage allowance to about 23 acres per animal unit month. To adjust to this established grazing capacity would have required a reduction in the number of livestock that would have prohibited the continuance of the animal husbandry research program at the existing level.

Five steps were undertaken to alleviate the excessive overstocking; (1) a portion of the livestock were summered on the irrigated native meadow pastures at the winter headquarters, (2) the turnout date was delayed from two to three weeks by feeding hay until the latter part of April, (3) some reduction of livestock numbers was obtained by intensive culling of undesirable cows, (4) the forage production was increased by spraying sagebrush infested rangeland and seeding crested wheatgrass, (5) the distribution of livestock was improved by proper concentration and rotation of cattle, hauling water to lightly grazed areas, and strategic location of salt.

During the period 1936-1938 a number of livestock water ponds were developed on the Squaw Butte range. In 1944 it was decided that because of the topography of the area the livestock watering ponds

did not encourage proper distribution of the livestock on the range. To overcome this problem, the administrators distributed livestock watering tanks on the range and hauled water to these tanks to encourage better distribution of the livestock.

Since 1944 all of the livestock watering ponds except two have either been destroyed or fenced from the livestock. Each year the number of livestock watering tanks on the range have been increased and the livestock have been forced to become more dependent on the amount of water hauled to the tanks distributed on the range.

Until the fall of 1951, the utilization of range units 1, 6 and 7 was determined by rotation deferred grazing systems, while range units 2, 3, 4 and 5 were used during the entire summer grazing season. Sometime before the following spring the administration decided to discontinue the use of the rotation deferred grazing system and adjust the operation to a grass management system. The utilization of the range units 1 through 7 was then determined by (1) the condition of the range unit, and (2) whether or not the range unit had been grazed during the previous year, and if so, what part of the grazing season had the range unit been used.

In 1955 an adjustment was made to increase the supply of summer range forage by spraying sagebrush on 1200 acres in range unit number 5. In 1956, 800 additional acres of sagebrush were sprayed in range unit number 5. By 1956 the benefit of spraying

sagebrush on 1200 acres in range unit 5 during the year 1955 began to appear.

In 1957 approximately 900 acres of sagebrush rangeland was sprayed to kill the sagebrush in range unit number 4, and again in 1958, 1,200 acres of sagebrush was sprayed in range unit number 4, thus completing the sagebrush spraying program on all of the 2,137 acres and 2,085 acres in range units 4 and 5 respectively.

An adjustment to the limited forage production was made again in 1962 by seeding 500 acres in range unit 5 to crested wheatgrass and a total of 200 acres in the areas referred to in Table 1 on range unit 3-1 and range unit 15. Also in 1962, 150 acres were seeded to crested wheatgrass in range unit 3.

In 1962 another adjustment was made to overcome the limitation imposed by the physical determinants of topography on the utilization of the forage produced in range unit 7. A moderately inclined road was constructed in range 7 for two reasons: (1) to provide a path which the livestock could follow to reach areas which previously had been inaccessible because of the steep slopes, and (2) to enable the administration to place and haul water to livestock watering tanks on top of the hills. The administration of the Squaw Butte Range and Livestock Experiment Station estimate that 500 acres which previously were inaccessible, are now being utilized as a result of the construction of the road and livestock trail in range 7.

It is beyond the scope of this study to quantify the results of

each of the adjustments made on the physical determinants of the Squaw Butte Range and Livestock Experiment Station. However, the change in the animal unit months of utilization and the estimated pounds of forage utilized per acre for each range unit can be seen in Appendix Tables 5 and 6 respectively. The data shown are for the years from 1938 through 1955, and 1960 through 1963. Data were not available for the four-year period from 1956 through 1959.

As shown in Appendix Table 5 the animal unit months of summer grazing during the years 1938 to 1949 increased from 786.2 to 1,242.5. During the five-year period from 1945 to 1949, when the grazing capacity was established to be ten acres per A. U. M., the mean animal unit months obtained from the range were 1,340.9.

In 1950 when the proper stocking capacity was established to be 23 acres per animal unit month, the number of animal unit months used on the Squaw Butte Range was decreased to 854.3. This was a decrease to 69 percent of the 1,242.5 animal unit months obtained in 1949, and to 54 percent of the 1,567.8 animal unit months obtained in 1948. During the six years from 1950-1955 the mean animal unit months obtained were 813.0.

By 1960, 1961, 1962 and 1963 the number of animal unit months obtained on the Squaw Butte Range were 1,910.1, 1,387.6, 1,924.3 and 2,017.5 respectively. The mean of the animal unit months obtained during this four-year period was 1,809.9.

The factor of 800 pounds of forage was assumed to be equivalent to one animal unit month. This factor was applied to the animal unit months in Appendix Table 5 to arrive at the pounds of forage utilized by the livestock on each of the ranges as shown in Appendix Table 6. The pounds of forage utilized by the livestock were then divided by the number of acres in each range unit to arrive at the amount of forage utilized per acre by the livestock on the range.

The amount of forage utilized on the Squaw Butte Range ranged from 26.3 pounds per acre in 1943 to 100 pounds per acre in 1963.

During the 22 years for which data are available, the largest apparent increase in the utilization of the individual range is on range units 4 and 5. In range unit 4 the mean pounds of forage utilization per acre during the three-year period from 1939 through 1941 was 27.5 pounds, while the mean pounds of forage utilization per acre during the three-year period from 1961 through 1963 was 97.6. The mean pounds of forage utilized per acre during the four-year period from 1960 to 1963 was 129.8.

The change in the utilization of range unit 5 is exemplified by an increase from 26.6 and 25.4 pounds of forage utilized per acre in 1940 and 1941, respectively, to 164.3, 125.3, 146.1 and 229.5 pounds of forage utilized per acre in 1960, 1961, 1962 and 1963 respectively. The mean number of pounds of forage utilized per acre during the 12-year period from 1944 through 1955 were 37.5, while the mean

number of pounds of forage utilized per acre from 1960 through 1963 were 166.3.

Adjustments have also been made in the breeding and feeding programs of the livestock to improve the performance of the animals. Previous to 1949, only the calves and other livestock on experiment were provided supplement during the winter. An adjustment was made in the feeding program to provide one pound per head per day of protein supplement to the cows in the brood herd; however, this practice was readjusted in 1960 and the amount of protein supplement fed to the cows was decreased because a better quality of the meadow hay was being fed to the livestock.¹

The particular breeding program followed at the Squaw Butte Range and Livestock Experiment Station has improved the conformation of the livestock. According to the judgment of the administration the particular breeding program followed and the genetic change of the livestock has not been as important a factor as the improvement in

¹ Before 1954, as much as 100 tons of hay had been purchased for livestock feed during the winter. In 1954 fertilizer was applied to the native meadows to increase the quantity of the forage produced. The quality of the hay was increased by following the practice of cutting the hay earlier in the season.

As a result of better nutrition, the mean weight of the livestock has been increased. At the present time the heifers are of mature size and weight by the end of three years. In earlier years the heifers did not reach a mature size and weight until the end of five years.

the nutrition of the livestock to obtain the increase in the 205-day weaning weight shown in Table 2. The range in the weaning weight adjusted to a 205-day period in the 13 years from 1951 through 1963 was from a low of 263 pounds in 1952 to a high of 404 pounds in the two years 1954 and 1960.

TABLE 2

Number of Cows, Calving Percentage, Percent Calf Crop,
and the Average 205-day Weaning Weight of Calves

Squaw Butte Range and Livestock Experiment Station
Burns, Oregon. 1951-1963.

Year	Number of Cows	Calving Percentage	Percent Calf Crop	Average 205-day Weaning Weight	
				Actual	3-year Moving Average
1951	162	87	84	275	
1952	164	75	69	263	311
1953	166	81	78	395	354
1954	151	87	85	404	388
1955	144	84	82	365	372
1956	154	87	84	347	355
1957	153	85	83	353	348
1958	153	83	80	343	341
1959	165	90	87	326	358
1960	180	94	91	404	372
1961	189	95	94	386	395
1962	196	88	86	396	384
1963	221	87	80	369	

Nine years were selected during the period of 1946 through 1963 to indicate: (1) the increase in the average weight of the calves at the time they were taken off the summer range, and (2) the average increase in the pounds of weight gained per day by the calves. The years were selected on a basis of three different time periods, (1) before major adjustments were made in the range and livestock management program, (2) during the time which adjustments were being made in the range and livestock management program, and (3) after major adjustments had been made in the range and livestock management program. In 1946 the average weight of the calves at the end of 158 days on range was 270 pounds, or an average gain per day of 1.1 pounds as shown in Table 3. The average weight of the calves has increased to 377 pounds after 155 days on range in 1962, and 352 pounds after 157 days on range in 1963, for an average daily gain of 1.5 and 1.4 pounds respectively. During the three consecutive years of 1960, 1961 and 1962 an average rate of gain per day was maintained at 1.5 pounds.

In Table 4 data are shown for the same years that were selected in Table 3 to indicate (1) the increase in the average weight for yearlings, and (2) the average pounds of gain per day for the yearlings. The lowest average weight of yearlings was 494 pounds after 118 days on range with an average of 1.4 pounds of gain per day in 1947. The highest average weight of yearlings was 782 pounds after 167 days on

TABLE 3

The Number of Calves and the Number of Days the Calves Were on Summer Range
 Total Weight Gained and Average Weight Gained per Day
 Squaw Butte Range and Livestock Experiment Station
 Nine Selected Years between 1946 and 1963

Year	Date	No. ¹	Weight ²	No. of Calves Born on Range	Date	No.	Weight	No. Days on Range	Total Wt. Gain	Average Weight	Average Gain/Day
1946	4/19	123	10,975	44	9/24	123	33,265	158	22,290	270	1.1
1947	4/30	148	16,451	24	10/1	143	41,365	154	24,914	289	1.1
1950	5/2	128	13,840	30	9/5	128	35,640	126	21,800	278	1.4
1951	5/14	130	17,140	29	9/11	129	36,775	120	19,635	285	1.3
1956	5/15	131	18,302	11	9/25	130	44,890	133	26,588	345	1.5
1960	4/19	166	19,384	2	9/15	30	11,065	149	42,206	369	1.5
					10/18	132	50,525	182		383	
1961	4/25	177	25,039	10	9/12	177	62,410	140	37,371	352	1.5
1962	4/30	170	23,493	5	10/2	169	63,765	155	40,273	377	1.5
1963	4/30	176	23,207	3	10/4	176	62,000	157	38,793	352	1.4

¹ The number of calves includes the number of calves born on the range during the summer.

² In the years 1946 through 1956 the indicated weight of the calves was obtained at the Squaw Butte Range after the calves were allowed a fill on grass. In the years 1960 through 1963 the weight of the calves was obtained at the winter headquarters. The weight of the calves is based on the live calves' weight plus an assumed weight of 75 pounds for each calf born on the range during the summer.

TABLE 4

The Number of Yearlings and the Number of Days the Yearlings Were on Summer Range ,
 Total Weight Gained and Average Weight Gained per Day
 Squaw Butte Range and Livestock Experiment Station
 Nine Selected Years between 1946 and 1963

Year	Date	No.	Weight ¹	Date	No.	Weight	No. Days on Range	Total Wt. Gain	Average Weight	Average Gain/Day
1946	4/29	61	24,055	9/24	61	34,420	148	10,365	564	1.1
1947	4/30	54	18,080	8/26	54	26,685	118	8,605	494	1.4
	4/30	10	3,950	10/1	10	5,775	154	1,825	578	1.2
1950	5/2	145	54,275	8/5	144	75,430	95	21,155	524	1.5
1951	5/5	28	9,901	9/24	28	16,155	142	6,254	577	1.6
	5/5	126	57,795	9/12	126	77,631	130	19,836	616	1.2
1956	5/10	6	3,725	9/25	6	4,645	138	920	774	1.1
	5/10	110	60,915	9/17	110	76,445	130	15,530	695	1.1
1960	4/19	140	64,485	8/23	100	66,390	126	31,365	664	1.6
				10/18	40	29,460	182		736	
1961	5/2	156	80,774	7/11	114	74,750	70	23,401	656	1.7
				9/12	42	29,425	133		700	
1962	5/2	150	85,796	7/31	101	68,441	90	19,935	678	1.1
				10/23	49	37,290	174		761	
1963	5/2	135	69,618	9/2	93	65,670	123	28,137	706	1.5
				10/16	41	32,085	167		782	

¹ In the years 1946 through 1956 the indicated weights of the yearlings were obtained at the Squaw Butte Range after the yearlings were allowed a fill.

range in 1963. The highest number of pounds of gain per day was 1.7 in 1961. In 1960 and 1951 the average number of pounds gained per day was 1.6, followed by 1.5 pounds of gain in 1963 and 1950. The lowest number of pounds of gain was 1.1 in 1962, 1956 and 1946.

There are several adjustments that were made in the range and livestock management programs that attributed to this change in the weight of calves off the range and the adjusted mean weaning weights of the calves. The adjustment was made to increase the quality and quantity of summer forage. The nutrition of the livestock was improved and the breeding program was changed to facilitate the utilization of the summer range forage by having a higher percent of the cows calve before the cow and its calf were placed on the range at the beginning of the summer.

Adjustments Demonstrated on Ranch A

As shown in Table 5 the operator of ranch A increased the acreage of summer range from 8,017 acres in 1960, to 11,317 in 1963. Of the 8,017 acres of summer range operated in 1961, the operator owned 6,717 acres and rented 1,300 acres. In 1962, he rented a total of 2,500 acres and in 1963, 4,600 acres.

In 1958 the operator constructed one mile of cross fencing to gain a better distribution of the livestock on the range and, therefore, better utilization of the range forage by the cattle. In 1959 he constructed an additional three-quarters of a mile of cross fencing and in 1963 three-quarters of a mile.

This rancher has increased the production from the summer range by reseeding 163 acres in 1960 with a mixture including four pounds pubescent wheatgrass, four pounds crested wheatgrass, one pound of nomad alfalfa, one pound of ladak alfalfa, one-fourth pound of bulbous bluegrass and two pounds big bluegrass per acre. After the seeding was made, the operator applied 200 pounds of ammonium sulfate per acre at an approximate cost of \$8 per acre. The range reseeding program was continued in 1961 by seeding 144 acres of summer range to grass and 40 acres with ten pounds of alfalfa per acre. In 1963 he seeded 50 acres at the rate of 14 pounds of seed per acre to reed canarygrass, white clover, bluegrass, alfalfa,

TABLE 5
Acres of Land Operated Classified by the
Land Use on Ranch A. 1961-1963

Land Use	1961	1962	1963
	Acres		
Summer Range	8,017	9,217	11,317
Native Meadow Hay and Pasture	216	181	154
Irrigated Alfalfa Hay	370	370	300
Irrigated Native Pasture	105	105	105
Irrigated Grain Hay	--	--	97
Irrigated Grain	--	50	35
Dryland Grain	655	732	730
Summer Fallow	<u>475</u>	<u>383</u>	<u>400</u>
Total Cropland	1,821	1,821	1,821
Other	<u>50</u>	<u>50</u>	<u>50</u>
Total Operated	9,888	11,088	13,188

timothy, red clover and alsike clover. Also in 1963 he selected 120 acres where the soil would respond to fertilizer and applied 200 pounds per acre of ammonium sulfate and phosphate at a cost of \$8 an acre.

One of the major limitations on the number of livestock which this rancher can maintain during the winter and summer is the imbalance in forage supply between the range and the meadows. At the present time, this operator has a larger supply of forage and can feed more cattle on the summer range than the number of cattle to which he can supply winter feed from the meadowland and hayland. He has made adjustments to overcome this limitation by (1) reseeding the marginal land between the cropland and rangeland to grasses and legumes, and (2) contracting during the last two years for yearlings to be fed in a feedlot off the ranch. A third plan of action which he will follow if necessary rather than reducing the brood herd, is to buy the quantity of additional hay necessary to winter the livestock.

Also, if necessary, he would rent meadowland if it were available to increase the winter feed supply. To a degree, he prefers renting land rather than owning land because in his particular situation, land is available to rent and in his judgment, the cost to rent would be less than the tax and interest costs to own land. However, because of the insecurity of tenure on rented land, he would rather own the land and be able to plan and manage the area as he so desired.

Of the 1,821 acres of cropland shown in Table 5, the operator

owns 821 acres and leases 1,000 acres. He attempts to make the best utilization possible of the 1,821 acres by leveling the land to improve irrigation, fertilizing the grain and forage crops produced, following a chemical weed control program, allowing the livestock to graze on the alfalfa early in the fall, and later on the wheat, holding to a minimum the acres of cropland taken out of production by roads and fence-lines, allowing the cattle to graze on the 50 acres classified as "other" land, and by grazing the side ditches by the road. By improving irrigation and fertilizing the alfalfa hayland, the operator has obtained a yield of seven tons of alfalfa hay per acre. Although the cattle are wintered on the 105 acres of native pasture, he obtains three and one-half tons of hay per acre from this land by irrigation, weed control, and fertilization practices. The wheat which he raises on irrigated land produces as high as 80 bushels per acre and wheat not grown under irrigation yields 40-50 bushels per acre, depending upon the particular land site.

This operator has available an adequate water supply for irrigation. He is the only rancher using irrigation water from one of the ditches, and therefore, has complete control over the amount of water he desires to use whenever he wants to irrigate the cropland. There is no irrigation water fee; however, he must bear the cost of cleaning the ditch and building and maintaining the headgates. The cost for this is less than 50¢ per acre of irrigated land.

An adequate and well distributed water supply for the livestock on the summer range was a limitation on the utilization of the range at one time. However, the operator has followed a planned program to develop an average of four livestock water ponds per year to encourage better utilization of the range forage by the livestock.

Temperature imposes a limitation on the net income of this rancher. The length of the winter feeding season demands that the rancher either begin the season with two and one-half tons of hay per animal or purchase hay during the winter.

From January 1, 1961, through December 31, 1963, the operator of ranch A increased the size of his cow herd by 181 cows from 294 head on January 1, 1961, to 475 head on December 31, 1963, as shown in Table 6. This increase in cow numbers was obtained by purchasing a total of 187 cows in three years and introducing a total of 145 replacement heifers to the herd. During the same period of time, 140 head of cows were sold.

The criteria used to cull the least desirable cows from the herd are age, milk producing ability, conformation, and pregnancy testing.

Although livestock weighing facilities exist on the ranch, this operator has not followed the practice of improving the effectiveness of his culling program by culling the cows according to the calculated rate of gain of the calves produced. The average weaning weight of

TABLE 6

Inventory of Livestock for Ranch A
Beginning January 1, 1961 through December 31, 1963

Inventory of Livestock	1961 Beginning			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets												
Cows	294	\$ 200	\$ 58,800	346	\$ 200	\$ 69,200	410	\$ 200	\$ 82,000	475	\$ 200	\$ 95,000
Replacement Heifers	56	161	9,016	27	161	4,347	62	161	9,982	65	161	10,465
Bulls	16	400	6,400	16	400	6,400	17	400	6,800	19	400	7,600
Horses	3	200	600	4	200	800	5	200	1,000	5	200	1,000
Dairy	3	150	450	3	150	450	3	150	450	3	150	450
Beaver	10	1200	<u>12,000</u>	12	1200	<u>14,400</u>	14	1200	<u>16,800</u>	16	1200	<u>19,200</u>
Sub-Total			\$ 87,266			\$ 95,597			\$117,032			\$133,715
Non-Capital Livestock Assets												
Yearlings	295	173	<u>51,035</u>	334	173	<u>57,782</u>	305	173	<u>52,765</u>	320	173	<u>55,360</u>
TOTAL			\$138,301			\$153,379			\$169,797			\$189,075

all the calves at the end of seven months has varied from 425 pounds in 1961, to 400 pounds in 1962, 425 pounds for the steers in 1963 and 405 pounds per heifer in 1963. During the three year period he has had an average calf crop of 90 percent.

The operator is anticipating a change in the type of animals that will be demanded by the consumer. He has plans for the adjustments that he will have to make on his ranch and in his livestock management program to meet the expected change in the market situation.

The lack of available capital earned from the ranch business has not been a serious limitation on the adjustments that this rancher has made to meet the changing economic conditions. As can be seen by the amount of interest on operating capital in Table 7, the operator has borrowed a substantial amount of capital in addition to his current operating capital requirements in order to make adjustments and improvements that will earn a return on the investment on his ranch in the future. The amount of net cash income from current operations has been sufficient to provide family living expenses as well as debt service on those borrowed funds.

A lack of labor has not prevented this operator from making adjustments in the size of the business. As the size of the ranch business increased, he hired the amount of labor necessary to do the work.

The operator of ranch A indicated that a limitation was imposed

TABLE 7

Receipts, Expenses and Investment Analysis for Ranch A. 1961-1963

	1961			1962			1963		
RECEIPTS, excluding sale of livestock capital assets									
Livestock sales		\$50,390			\$49,925			\$48,008	
Livestock products sales		--			--			--	
Crop sales		35,540			31,096			26,283	
Miscellaneous receipts		2,329			6,271			8,195	
Timber sales		<u>11,060</u>			<u>7,610</u>			<u>7,599</u>	
TOTAL		\$99,319			\$94,902			\$90,085	
EXPENSES, excluding purchase of livestock capital assets									
Grazing fees	\$	469			\$ 1,774			\$ 1,969	
Cropland rental		2,500			2,500			2,500	
Livestock purchased		--			--			--	
Hay purchased		16,892 ¹			--			1,250	
Other L.S. feed purchased		--			4,619			11,068	
Machine and building repair		6,554			6,723			2,766	
Hired labor		12,858			11,055			12,138	
Machine hire and custom work		240			182			636	
Vet., medicine and supplies		1,433			791			1,529	
Breeding fees and misc. L.S. exp.		326			50			--	
Seed purchased		--			3,400			1,180	
Fertilizer		--			1,091			8,001	
Misc. crop expenses		--			--			--	
Range improvement		--			--			--	
Irrigation		--			--			--	
Dust and sprays		191			--			--	
Gas, oil and grease		3,640			3,596			4,511	
Licenses and insurance		2,158			2,172			2,445	
Utilities		471			296			264	
Farm supplies		1,560			6,988			3,838	
Log hauling		3,253			--			--	
Taxes		7,285			7,069			7,108	
Interest on operating capital		10,170			13,715			14,299	
Adv., mag., acct. fees, bus. travel		369			581			567	
Miscellaneous		<u>538</u>			<u>492</u>			<u>3,727</u>	
TOTAL		<u>70,907</u>			<u>67,094</u>			<u>79,796</u>	
RECEIPTS MINUS EXPENSES, excluding the sale and purchase of livestock capital assets									
		\$28,412			\$27,808			\$10,289	
PURCHASE OF LIVESTOCK CAPITAL ASSETS									
Cows, 2 yrs. old or older	\$18,000			\$12,366			\$6,165		
Bulls	3,918			1,300			1,725		
Horses	160			350			--		
Dairy	--			--			--		
SALE OF LIVESTOCK CAPITAL ASSETS									
Cows, 2 yrs. old or older	15,259			3,312			3,750		
Bulls	1,595			--			280		
Horses	--			--			--		
Dairy	--			--			--		
NET CASH FROM THE PURCHASE AND SALE OF LIVESTOCK CAPITAL ASSETS									
	\$-5,224			\$-10,704			\$-3,860		
NET CASH INCOME									
	\$23,188			\$17,104			\$ 6,429		
Less Depreciation: ² Machinery & Equipment									
	\$ 9,911			\$10,059			\$ 8,247		
Buildings and Improvements	3,581			3,581			3,601		
Change in Inventory Value of Non-Depreciable Assets:									
Crops, feed and supplies	-2,061			9,115			4,158		
Non-Capital Asset Livestock	6,747			-5,017			2,595		
Change in Inventory Value of Livestock Capital Assets:									
Cows, 2 yrs. old or older	-800			18,600			6,000		
Mature Replacement Heifers	2,184			1,053			2,418		
Weaner Replacement Heifers	-4,669			5,635			483		
Bulls	--			400			800		
Horses	200			200			--		
Dairy	--			--			--		
Beaver	2,400			2,400			2,400		
Value livestock eaten ³	<u>500</u>			<u>500</u>			<u>500</u>		
NET FARM INCOME									
	\$14,197			\$36,350			\$13,935		
INTEREST ON AVERAGE INVESTMENT									
Land	\$452,510	5%	\$22,626	\$452,510	5%	\$22,626	\$452,510	5%	\$22,626
Buildings and Improvements	3,581	5%	179	3,581	5%	179	3,601	5%	180
Non-Capitalized Livestock	54,408	6%	3,264	55,274	6%	3,316	54,062	6%	3,244
Capitalized Livestock	91,432	6%	5,486	106,314	6%	6,379	125,374	6%	7,522
Crops, Feed and Supplies	48,164	6%	2,890	51,690	6%	3,101	58,327	6%	3,500
Machinery	<u>9,911</u>	6%	<u>595</u>	<u>10,059</u>	6%	<u>604</u>	<u>8,247</u>	6%	<u>495</u>
TOTAL	\$660,006		\$35,040	\$679,428		\$36,205	\$702,121		\$37,567
LABOR INCOME									
	\$-20,843			\$ 145			\$-23,632		
Value of Operator's Labor	\$ 3,000			\$ 3,000			\$ 3,000		
RETURN TO CAPITAL									
	\$ 11,197			\$33,350			\$ 10,935		
% Return to Capital	1.7			4.9			1.6		

¹ Includes feed, seed and fertilizer.² See Appendix Table 7.³ The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

on the net ranch income¹ because the cattle prices are low in his area compared to other market areas. He has overcome the limitation of a low cattle price since he has established reputation² cattle and sells the cattle to buyers outside the area. The quality of the cattle for sale can be substantiated by the history of records from commercial feedlots. The marketing procedure that he follows is to contact prospective buyers approximately two months before the time of the expected sale.

¹ Net ranch (farm) income is the net cash income plus an increase, or minus a decrease in the total farm capital and minus the value of unpaid family labor (not including the value of the operator's labor).

² Reputation cattle are the cattle that have a high rate of gain, that do well in a feedlot, and that are purchased year after year by the same buyers.

CHAPTER IV
ORGANIZATIONAL ANALYSIS OF SIX
SELECTED RANCH BUSINESSES

Ranch Number 1

On ranch number 1 there are 6,800 acres of deeded land and 500 acres leased from the Bureau of Land Management. Of the 6,800 acres shown in Table 8, there are 4,600 acres of sagebrush rangeland, 1,800 acres woodland, 394 acres of cropland, and 30 acres of waste land. The 4,600 acres of deeded rangeland surrounds the 500 acres leased from B. L. M. and also surrounds a total of 1,800 acres of grazing land owned by three other ranchers.

TABLE 8
Acreage of Operated Land Classified by the
Land Use on Ranch Number 1. 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	6,900	6,900	6,900	6,900
Native Meadow Hay	227	227	227	227
Alfalfa Hay	117	125	117	117
Grain	20	12	15	20
Irrigated Pasture	30	30	35	30
Total Cropland	394	394	394	394
Other	30	30	30	30
Total Operated	7,324	7,324	7,324	7,324

Tables 9 and 10 list the grazing land, and the cropland use adjustments and conservation practices which have been recommended by the Soil Conservation Service, and the adjustments and conservation practices which have been followed during the years 1960 through 1963.

TABLE 9

Land Use Adjustments and Conservation Practices
Planned and Applied on Grazingland
of Ranch Number 1. 1960-1963

Adjustments and Practices	Planned Amount Units	Amounts applied each year			
		1960	1961	1962	1963
Sagebrush Control	2,500 acres	165		200	300
Range Seeding	2,000 acres				
Rotation Deferred Grazing	4,300 acres				
Deferred Grazing	1,200 acres				
Spring Developments	23 No.	1			
Water Troughs and Tanks	23 No.	1			2
Farm Ponds	16 No.		4	3	
Woodland Thinning	800 acres	5			
Livestock Control Fence	9 miles				

TABLE 10

Land Use Adjustments and Conservation Practices
Planned and Applied on Cropland
of Ranch Number 1. 1960-1963

Adjustments and Practices	Planned	Amounts applied each year			
	Amount Units	1960	1961	1962	1963
Ditch and Canal Lining	3,500 l.f.*				
Field Ditches	1 mile				
Improved Water Application	185 acres				
Land Leveling	150 acres	20			
Drainage Improvement	35 acres				

* l.f.: Linear feet

In 1959, an 80-acre site of rangeland was selected and sprayed to observe the results which could be achieved by spraying sagebrush. Following this experiment a program of sagebrush spraying was initiated. In 1961 and 1964, no sagebrush was sprayed, because the rancher anticipated that weather conditions would be unfavorable, and thus a desirable kill would not be achieved.

A more productive stand of grasses could be obtained on the rangeland by seeding the rangeland after the sagebrush has been sprayed. However, this rancher delayed making this adjustment for several reasons. To date, the dead sagebrush has not deteriorated to a point where a proper seedbed can be prepared for new seedings.

Also, there is a good understory of grasses on the areas sprayed which this rancher has chosen not to disturb, but rather to let the existing varieties of grass reseed and re-establish themselves over a period of years.

The practice of rotation deferred grazing has not been used in the past years because there are no livestock control fences on the 6,900 acres of rangeland operated by this rancher. The utilization of the range grass is controlled by distributing the cattle over the 5,100 acres of sagebrush rangeland, and the 1,800 acres of woodland. This rancher indicated that he chose not to use cross fences, because he would rather have the cattle distributed over his entire rangeland than to have a concentration of cattle on any area of his range. He indicated that usually the livestock did not concentrate in any particular area of the sagebrush rangeland. But, during the summer months, some of the cattle tend to concentrate in the 1,800 acres of woodland and graze this area quite heavily. To overcome this problem, he plans to construct a livestock control fence between the range grassland and the woodland grazing area.

This rancher indicated that a better stand and growth of grass could be obtained by following a timber-thinning program. However, he has not carried out such a program in past years because of a limited supply of unpaid family labor, and because there has not been any market for the timber.

The present distribution of the livestock watering ponds is such that the livestock are not more than three-quarters of a mile away from water. Topography and distribution are such that he has not considered it necessary to construct any additional ponds in order to gain better utilization of the forage.

The number of acres used to produce native meadow hay, alfalfa hay, grain and irrigated pasture are shown in Table 8. The usual yield has been three tons per acre on the alfalfa hayland and one and one-half tons per acre on the native meadow hayland. Commercial fertilizer has been applied to the alfalfa hayland and a response was obtained, but, the increased yield was not known. Commercial fertilizer has not been applied to the 227 acres of native meadow hay. The necessary economic information has not been available to this rancher to figure the fertilizer marginal costs-marginal returns on his 394 acres of cropland.

In the spring, water overflows from a nearby ditch and floods a portion of his meadow. The problem of flooding of the meadows cannot be overcome until certain flood control practices are exercised on the ditch. However, several practices listed in Table 10, if followed, would enable him to partially overcome the problem of limited hay production on the flooded meadows. The productivity of his meadows is also limited by old and unproductive stream and ditch channels which run through the meadows. Along these channels there

is a dense population of willows. During the past several years, a number of the willows have been thinned out of the meadow, but a large population of willows have been left in the stream channels to control erosion and to provide windbreaks for the cattle during the calving season.

He indicated that he is not using all the present production from his meadowland, but he did not wish to stock his ranch with the number of cattle to fully utilize this production because he was improving his range by following moderate grazing practices.

His indicated major natural resource limitation was that there was no additional public or private summer range available to lease or purchase.

The best way for him to overcome this limitation would be to carry out the proper fertilization program on his alfalfa and native meadowland which would respond immediately and allow him to make immediate use of a portion of the meadow for summer grazing. This would give him an increased supply of summer feed and allow the number of yearlings to be increased. Other practices which he could follow would take a longer period of time to realize the increase in the amount of summer feed available. One such practice would be to improve the drainage and then seed more land to alfalfa.

The recommendation to improve the application of irrigation water on 185 acres of meadow has not been followed for several

reasons. A sprinkler irrigation system was not used to improve the application of irrigation water because the gopher population in the meadows could be controlled more easily by flood irrigation. The application of flood water for irrigation was not improved because, until recently, he was limited by the amount of family labor, and the scarcity of desirable hired labor.

In establishing priorities for use of investment capital, the use of capital for range or meadow improvement might have a lower priority than the use of capital for purchasing rangeland or meadowland for reasons peculiar to this ranch business. The amount of capital invested per acre in the additional rangeland or meadowland may not give an immediate return as high as the same amount of capital used to improve the present acreage of rangeland or meadowland but with four sons in this business, the objectives of ultimately having a much larger business forces consideration of need for more land. Thus priority must be given to the use of capital in the purchase of additional land at the time when land can be purchased, in order to take advantage of the limited opportunities to purchase additional land and increase the size of the ranch business.

The number of animals used to market the feed produced on this ranch have been increased during the years 1960 to 1963. As shown in Table 11, the inventory of brood cows has increased from 261 on January 1, 1960, to 318 on December 31, 1963. Since no

TABLE 11

Inventory of Livestock for Ranch Number 1
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	261	\$200	\$ 52,200	271	\$200	\$ 54,200	273	\$200	\$ 54,600	281	\$200	\$ 56,200	318	\$200	\$ 63,600
Replacement Heifers	30	115	3,450	30	115	3,450	43	115	4,945	64	115	7,360	32	115	3,680
Bulls	17	550	9,350	18	550	9,900	19	550	10,450	20	550	11,000	22	550	12,100
Horses	8	100	800	8	100	800	8	100	800	8	100	800	10	100	1,000
Dairy	3	150	<u>450</u>	3	150	<u>450</u>	3	150	<u>450</u>	3	150	<u>450</u>	3	150	<u>450</u>
Sub-Total			\$ 66,250			\$ 68,800			\$ 71,245			\$ 75,810			\$ 80,830
Non-Capital Livestock Assets															
Yearlings	24	115	2,760	20	115	2,300	19	120	2,280	7	120	840	33	115	3,795
Yearling Steers	--	--	--	1	132	132	4	150	600	6	150	900	11	122	1,342
Weaners	198	110	<u>21,780</u>	229	110	<u>25,190</u>	258	110	<u>28,380</u>	246	110	<u>27,060</u>	254	95	<u>24,130</u>
TOTAL			\$ 90,790			\$96,422			\$102,505			\$104,610			\$110,097

brood cows or replacement heifers were purchased from an outside area because of anaplasmosis,¹ this increase in the number of cows was attained by saving a larger number of replacement heifers each year than the number of cows that died or were sold. This has reduced the number of heifers available for sale.

Another limitation has been placed upon the net income of this ranch by an average loss of 12.2 cows per year over a four year period. The death loss has been 9, 20, 11 and 9 cows in 1960, 1961, 1962 and 1963, respectively.

The effectiveness of culling brood cows and replacement heifers on this ranch is limited because no production testing practices are followed. Culling of brood cows and replacement heifers from the herd and selection of the replacement heifers to go into the brood herd is done without benefit of actual weights and accurate information on rate of gain.

Over the four year period the average weight of the calves when they are sold in January has been 400 pounds. This average weight can be increased by production testing, by purchasing production and fertility tested bulls,² and by changing the length of time the bulls

¹ Anaplasmosis exists in this area. Livestock, if suddenly exposed to anaplasmosis, can die in a very short period of time.

² According to John Landers (6, p. 1-2), animal science specialist at Oregon State University, some ranchers in Oregon who have been following production testing practices have increased the

are with the cow herd. The amount by which this would increase the gross sales from weaner calves cannot be calculated precisely because this rancher follows the practice of selling his calves at the ranch, priced by the head rather than by weight.

The average weaning weight could be increased and the size of the weaners would be more uniform if the breeding practices were changed. The practice of breeding the cows while they are on the summer range has been followed because breeding pasture facilities are not available. All of the beef cattle except the bulls are distributed on the range during April. Then during May the bulls are placed with the herd and allowed to remain with the herd until all of the livestock are brought into the meadows during September through November. By following this practice, a number of the cows calve on the range during the following summer, and the calving period may extend until late August. By following this practice, there may be as much as six months difference in age. No record is kept of the date of birth of the calves, so this age difference makes it difficult to select the weaners to be sold and also difficult to select the fastest gaining animals for replacement heifers.

By this long calving season, the maximum utilization cannot

weaning weight of their calves by 50 pounds in three years. The use of production tested bulls may increase the weaning weights by as much as 60 pounds.

be made of the summer forage. To make the best utilization of the summer forage, all of the cows should have calved by the time they are distributed on the range in the spring. This would allow the calf to make a fast gain from the milk flow resulting from the spring growth of forage.

Although many of the calves are born on the range during the spring and summer, predators were not found to be one of the limiting determinants of net ranch income. The competitors which were found to be limiting determinants on net ranch income were the large number of deer which grazed on the meadows in the spring and early in the summer. The deer population, which has been observed grazing upon the meadows during the spring and summer, has been increasing.

The availability of internal operating capital has been a limitation on this rancher. This is reflected in Table 12 by the amount of interest paid on operating capital in relation to the net cash income. The interest paid on operating capital has ranged from a low of 13 percent in 1962, to a high of 25 percent of the net cash income, in 1963.

After the living expenses and other uses of capital are deducted from the net cash income, the amount of capital left over for investment in range and meadow improvement, or livestock, is limited.

An attempt has not been made to obtain large amounts of outside

TABLE 12

Receipts, Expenses and Investment Analysis for Ranch Number 1, 1960-1963

	1960			1961			1962			1963		
RECEIPTS, excluding sale of livestock capital assets												
Livestock sales			\$17,942			\$21,020			\$24,396			\$21,945
Livestock products sales			--			--			--			--
Crop sales			--			--			--			--
Miscellaneous receipts			<u>1,854</u>			<u>2,317</u>			<u>2,062</u>			<u>2,930</u>
TOTAL			\$19,796			\$23,337			\$26,458			\$24,875
EXPENSES, excluding purchase of livestock capital assets												
Grazing fees	\$	47		\$	41		\$	41		\$	64	
Cropland rental	--			--			--			--		
Livestock purchased	--			--				35			40	
Hay purchased	--			--			--			--		
Other L.S. feed purchased		573			483			535			730	
Machine & Bldg. repair		2,168			2,390			1,767			1,948	
Hired labor		1,885			1,304			1,887			3,538	
Machine hire & custom work		80			61			397			130	
Vet., medicine & supplies		139			175			199			356	
Breeding fees & misc. L.S. exp.		70			117			221			380	
Seed purchased		156			248			315			335	
Fertilizer	--			--			--			--		
Misc. crop expenses	--			--			--			--		
Range improvement	--			--			--			--		
Irrigation		1,064			954			958			990	
Dust and sprays		30			70			131			88	
Gas, oil and grease		872			990			992			1,300	
Licenses and insurance		340			348			356			792	
Utilities		480			528			641			627	
Taxes		1,647			1,843			2,838			2,847	
Interest on operating capital		1,445			1,856			1,910			1,612	
Adv., mag., acct. fees, bus. travel		840			798			766			972	
Miscellaneous		<u>273</u>			<u>370</u>			<u>460</u>			<u>200</u>	
TOTAL		<u>12,109</u>			<u>12,611</u>			<u>14,451</u>			<u>16,918</u>	
RECEIPTS MINUS EXPENSES, excluding the sale & purchase of livestock capital assets												
			\$ 7,687			\$10,726			\$12,007			\$ 7,957
PURCHASE OF LIVESTOCK CAPITAL ASSETS												
Cows, 2 years old or older	--			--			--			--		
Bulls	\$1,875			\$2,300			\$1,725			\$2,300		
Horses	--			--			--			375		
SALE OF LIVESTOCK CAPITAL ASSETS												
Cows, 2 years old or older	865			1,036			3,383			2,133		
Bulls	545			567			547			228		
Horses	--			--			--			<u>100</u>		
NET CASH FROM THE PURCHASE & SALE OF LIVESTOCK CAPITAL ASSETS												
			\$ -465			\$ -697			\$ 2,205			\$ -214
NET CASH INCOME												
			\$7,222			\$10,029			\$14,212			\$6,468
Less Depreciation: ¹ Machinery	\$	1,848		\$	2,070		\$	2,052		\$	1,985	
Buildings & Improvements		152			152			152			452	
Change in Value of Non-Depreciable Assets: Crops, Feed & Supplies		206			-117			-440			-321	
Non-Capital Asset Livestock		3,082			3,638			-2,460			467	
Change in Inventory Value of Livestock Capital Assets:												
Cows, 2 years old or older		-4,000			-5,600			-7,000			-5,400	
Mature Replacement Heifers		2,550			2,550			3,655			5,440	
Weaner Replacement Heifers		--			1,495			2,415			3,680	
Bulls		550			550			550			1,100	
Horses		--			--			--			200	
Value livestock eaten ²		<u>140</u>			<u>140</u>			<u>140</u>			<u>140</u>	
NET FARM INCOME												
			\$ 7,750			\$10,463			\$ 8,868			\$10,612
INTEREST ON AVERAGE INVESTMENT												
Land	\$204,500	5%	\$10,225	\$205,201	5%	\$10,260	\$205,201	5%	\$10,260	\$206,066	5%	\$10,303
Land Improvements	701	5%	35	--	--	--	865	5%	43	1,275	5%	64
Buildings & Improvements	1,216	5%	61	1,064	5%	53	912	5%	46	7,754	5%	388
Non-Capitalized Livestock	24,540	6%	1,472	29,441	6%	1,766	30,030	6%	1,802	29,034	6%	1,742
Capitalized Livestock	66,250	6%	3,975	70,022	6%	4,201	73,528	6%	4,412	78,320	6%	4,699
Crops, Feed & Supplies	11,027	6%	662	11,072	6%	664	10,793	6%	648	10,412	6%	625
Machinery and Equipment	12,673	6%	760	12,802	6%	768	11,830	6%	710	13,480	6%	809
TOTAL	\$320,997		\$17,190	\$329,602		\$17,712	\$333,159		\$17,921	\$346,341		\$18,630
LABOR INCOME												
			\$-9,440			\$-7,249			\$-9,053			\$-8,018
Value of Operator's Labor			\$ 3,000			\$ 3,000			\$ 3,000			\$ 3,000
RETURN TO CAPITAL												
			\$ 4,750			\$ 7,463			\$ 5,868			\$ 7,612
% Return to Capital			1.5			2.3			1.8			2.2

¹ See Appendix Table 8.² The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

investment capital for purposes of range or meadow improvement, because as has been stated earlier, the management plan is to let the range reseed naturally and improve over a long period of time.

There is no limitation imposed on the net income by the number of marketing outlets used. The weaners are often sold by consignment to buyers from California. The yearlings are sold in October to feedlots in Washington. There is a limitation imposed upon the net ranch income as a result of the marketing practices followed. Because there are no weighing facilities at the ranch, the distance which the animals must be hauled before they can be weighed varies from 35 to 70 miles, depending upon the market outlet used. By hauling the animals this distance before they are weighed, the percent of weight lost by shrinkage can be as high as ten percent. Under these circumstances, this rancher has chosen to sell the calves by the head at the ranch rather than by their weight.

By installing livestock weighing facilities on the ranch, the rancher could weigh the livestock periodically and especially at the time of sale. Sufficient family labor is available to follow the practice of periodically weighing the livestock, and by doing this the rancher could supply the buyer accurate information about the rate of gain of the animals.

Ranch Number 2

The operators of this ranch reduced the acreage operated from 5,420 acres in 1960 to 4,200 acres in 1963, as shown in Table 13, but during the same period of time, they increased the inventory number of cows.

TABLE 13

Acres of Operated Land Classified by the
Land Use on Ranch Number 2. 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	3,445	1,645	1,445	1,445
Native Meadow Hay	780	780	780	780
Alfalfa Hay	35	35	35	35
Irrigated Pasture	977	1,057	1,097	1,097
Native Meadow Hay Aftermath Pasture			660	660
Grain	73	73	73	73
Summer Fallow	<u>60</u>	<u>60</u>	<u>60</u>	<u>60</u>
Total Cropland	1,925	2,005	2,705	2,705
Other	<u>50</u>	<u>50</u>	<u>50</u>	<u>50</u>
Total Operated	5,420	3,700	4,200	4,200

Part of the acreage reduction was made by leasing 1,800 fewer acres of range in 1961 and 200 fewer acres in 1962. The cropland operated to supply feed for the livestock was increased in 1961 and 1962, by renting an additional 80 acres and 40 acres, respectively,

of irrigated pasture. Also in 1962, an additional 660 acres of native meadow hayland was rented after the hay was harvested to be pastured by the livestock.

The usual average yield of the native meadow hayland during the study period was one and one-half tons per acre while the usual yield per acre on the 35 acres of alfalfa hayland was two and one-half tons per acre.

There are three major limitations imposed on the productivity of the native meadow, and alfalfa hayland. One limitation is the number of acres of highly alkaline soil. The second limitation is the lack of water after July to irrigate the native meadow hay, the alfalfa hay and the pastures. The third limitation is the lack of an early spring growth of grass.

The limitation imposed upon net ranch income by the acreage of the highly alkaline soil can be overcome by seeding grasses adapted to this soil. Or, the land could be leveled and an effective drainage system developed to leech the alkali salt from the soil. A higher priority should be given to the use of investment capital to level and reseed land, and establish a drainage system, than to the use of capital to purchase additional land, because in the near future a sufficient quantity of irrigation water will be made available to the operators of this ranch.

There is little adjustment that the operators of this ranch can

make within the present limitation of the amount of water available to increase the amount of water available for irrigation. However, this limitation does not prevent other adjustments from being made to increase the amount of forage produced on the ranch. The hay production can be increased by the use of nitrogen fertilizer. However, to gain the most effective use of the fertilizer, the time of application must be coordinated with the irrigation practices.

As shown in Table 14, the number of cows in the brood herd of this cow-calf, cow-yearling operation, has been increased by 92 head during the study period. During the four years 208 cows were sold, 123 cows were purchased, and 218 replacement heifers were put in the cow herd. The operators of this ranch indicated that they did not want to increase the present inventory number of livestock, but they would rather increase the net ranch income by increasing the performance of the livestock.

One of the limitations on improving the performance of the livestock, is the lack of actual and accurate livestock weight records. Lack of this information reduces the operator's effectiveness in culling the least desirable cows from the brood herd, and selecting replacement heifers which have a high rate of gain.

To permit an effective production testing program, livestock weighing facilities need to be installed on the ranch. Then information could be available to calculate the rate of gain per calf, and to

TABLE 14

Inventory of Livestock for Ranch Number 2
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	439	\$200	\$ 87,800	449	\$200	\$ 89,800	501	\$200	\$100,200	546	\$200	\$109,200	531	\$200	\$106,200
Replacement Heifers	20	150	3,000	80	150	12,000	64	150	9,600	54	150	8,100	50	150	7,500
Bulls	11	350	3,850	10	350	3,500	15	350	5,250	17	350	5,950	26	350	9,100
Horses	6	100	600	6	100	600	8	100	800	7	100	700	7	100	700
Dairy	2	190	<u>380</u>	2	190	<u>380</u>	2	190	<u>380</u>	2	190	<u>380</u>	2	190	<u>380</u>
Sub-Total			\$ 95,630			\$106,280			\$116,230			\$124,330			\$123,880
Non-Capital Livestock Assets															
Sheep	190	12	2,280	--	--	--	--	--	--	--	--	--	--	--	--
Yearlings	112	125	<u>14,000</u>	143	125	<u>17,875</u>	116	110	<u>12,760</u>	30	110	<u>3,300</u>	138	100	<u>13,800</u>
TOTAL			\$111,910			\$124,155			\$128,990			\$127,630			\$137,680

facilitate selecting those replacement heifers that have the highest rate of gain among the heifer calves with the conformation and other characteristics desired. Also, information would be available to identify and cull the cows that produce the calves with the lowest rate of gain.

The percent of calf crop weaned has imposed a major limitation on the net income of this ranch. The percent of calf crop weaned has been 83, 85, 84 and 81 percent in 1960, 1961, 1962 and 1963 respectively. The information was not available to calculate and compare the percent of cows that calved to the percent calf crop weaned. However, the operators indicated that the percent of cows that did not calve was small, and the major reason for the low percent calf crop weaned was the death of calves from calfhoo diseases.

If one assumes that a 90 percent calf crop would have been maintained during the study period in relation to the number of cows shown in Table 14, then 31, 22, 30 and 50 additional calves could have been sold in 1960, 1961, 1962 and 1963 respectively. If one assumes an average weight of 410 pounds and an average price of 22 cents per pound, the operators of this ranch would have realized \$2,796 from the sale of the respective additional calves in 1960, \$1,984 in 1961, \$2,706 in 1962 and \$4,510 in 1963.

The cash income earned from the ranch business has imposed a limitation on the availability of capital for the operating expenses,

the living expenses of the families of three operators, investment in ranch improvements, and debt service. However, this limitation is being overcome as can be seen in Table 15 by the net cash income, which has increased from \$9,603 in 1960 to \$14,473, \$19,141, and \$18,357 in 1961, 1962 and 1963 respectively.

The operators of this ranch indicated that although the number of market outlets did not impose a limitation on the marketing of their product, the type of market available for the weaner calves posed an indirect limitation on the net ranch income. This indirect limitation is a result of the cost of transporting the weaner calves to an area where they will be fed in a feedlot. The magnitude of this limitation is beyond the scope of this study and was not calculated.

The marketing activity imposes a limitation on the net ranch income. This limitation is a result of not having the rate of gain information for individual calves, hence, the bargaining position of the ranch operators is reduced. This limitation can be overcome by establishing livestock weighing facilities and following an approved livestock production testing program.

TABLE 15

Receipts, Expenses and Investment Analysis for Ranch Number 2. 1960-1963

	1960	1961	1962	1963
RECEIPTS, excluding sale of livestock capital assets				
Livestock sales	\$23,268	\$36,821	\$46,524	\$28,426
Sale of sheep	2,280	--	--	--
Crop sales	8,011	76	--	5,614
Miscellaneous receipts	1,275	1,553	3,350	4,108
TOTAL	\$34,834	\$38,450	\$49,874	\$38,148
EXPENSES, excluding purchase of livestock capital assets, and other capital investments				
Grazing fees	\$ 1,170	\$ 937	\$ 1,550	\$ 1,557
Cropland rental	--	--	--	--
Livestock purchased	--	--	--	--
Hay purchased	--	--	--	435
Other L.S. feed purchased	2,772	2,698	3,319	1,667
Machine & Building repair	3,479	3,131	1,732	1,224
Hired labor	3,314	3,903	3,800	2,930
Machine hire & custom work	522	776	791	783
Vet., medicine & supplies	123	100	200	175
Breeding fees & misc L.S. exp	--	--	--	104
Seed purchased	40	240	202	162
Fertilizer	--	--	--	--
Misc. crop expenses	--	--	--	--
Range improvement	--	--	--	--
Irrigation	--	--	--	--
Dust and sprays	336	91	153	96
Gas, oil and grease	1,982	2,536	2,165	1,589
Licenses and insurance	430	582	609	561
Utilities	234	270	251	196
Farm supplies	1,391	856	2,083	675
Taxes	3,950	3,763	4,746	3,757
Interest on operating capital	1,856	1,968	2,536	2,297
Adv. mag., acct. fees, bus. travel	511	793	610	711
Miscellaneous	18	--	46	--
TOTAL	22,128	22,644	24,793	18,919
RECEIPTS MINUS EXPENSES, excluding the sale & purchase of livestock capital assets & other capital investments	\$12,706	\$15,806	\$25,081	\$19,229
PURCHASE OF LIVESTOCK CAPITAL ASSETS				
Cows	\$6,905	\$2,780	\$9,440	--
Bulls	1,600	2,815	1,880	\$3,180
Horses	--	525	--	350
SALE OF LIVESTOCK CAPITAL ASSETS				
Cows	4,452	4,087	3,880	4,150
Bulls	950	700	1,500	252
Horses	--	--	--	--
NET CASH FROM THE PURCHASE & SALE OF LIVESTOCK CAPITAL ASSETS	\$-3,103	\$-1,333	\$-5,940	\$ 872
NET CASH INCOME	\$ 9,603	\$14,473	\$19,141	\$18,357
Less Depreciation: ¹ Machinery	\$ 1,884	\$ 2,294	\$ 2,469	\$ 2,535
Buildings & Improvements	330	330	460	544
Change in Inventory Value of Non-Depreciable Assets:				
Crops, Feed & Supplies	1,980	320	1,000	620
Non-Capital Asset Livestock:				
Sheep	-2,280	--	--	--
Yearlings	3,875	-5,115	-9,460	10,500
Change in Inventory Value of Capital Asset Livestock:				
Cows	-2,000	-1,600	12,200	-1,000
Mature Replacement Heifers	1,000	4,000	3,200	2,700
Weaner Replacement Heifers	9,000	-2,400	-1,500	-600
Bulls	-350	1,750	700	3,150
Horses	--	200	-100	--
Dairy	--	--	--	--
Value livestock eaten ²	270	270	270	270
NET FARM INCOME	\$18,884	\$ 9,274	\$22,522	\$32,662
INTEREST ON AVERAGE INVESTMENT				
Land	\$249,440 5%	\$12,472	\$249,440 5%	\$12,472
Land Improvement	-- 5%	--	870 5%	44
Buildings & Improvements	3,000 5%	150	2,670 5%	134
Non-Capitalized Livestock	17,078 6%	1,025	15,318 6%	919
Capitalized Livestock	100,955 6%	6,057	111,255 6%	6,675
Crops, Feed & Supplies	14,601 6%	876	15,751 6%	945
Machinery & Equipment	10,777 6%	647	12,546 6%	753
TOTAL	\$395,851	\$21,227	\$407,850	\$21,942
LABOR INCOME	\$-2,343	\$-12,668	\$ 313	\$10,030
Value of Operator's Labor	\$ 9,000	\$ 9,000	\$ 9,000	\$ 9,000
RETURN TO CAPITAL	\$ 9,884	\$ 274	\$13,522	\$23,662
% Return to Capital	2.5	0.1	3.3	5.6

¹ See Appendix Table 9.² The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

Ranch Number 3

Ranch number 3 is organized on a combination cow-calf and cow-yearling beef production system. As shown in Table 16, the number of acres operated by this rancher remained constant through the years 1960 through 1962. In 1963, the size of the operation was increased by leasing a total of 610 acres, which included 560 acres of summer rangeland, and 50 acres of alfalfa hay.

TABLE 16

Acres of Operated Land Classified by the
Land Use on Ranch Number 3. 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	391	391	391	951
Alfalfa Hay	140	153	153	225
Clover Hay	25	25	15	15
Irrigated Pasture	90	71	94	67
Grain	169	175	162	177
Summer Fallow	<u>152</u>	<u>152</u>	<u>152</u>	<u>142</u>
Total Cropland	576	576	576	626
Other	<u>75</u>	<u>75</u>	<u>75</u>	<u>75</u>
Total Operated	1,042	1,042	1,042	1,652

The quality of the range resource poses a limitation on the net ranch income. The 391 acres of deeded rangeland are located on a steep, rocky foothill. On the top of this hill there is a bench which

has relatively deep soil and produces a good stand of forage but the livestock do not utilize this forage because the steep slope makes the area inaccessible. A further limitation is imposed on the utilization of the forage produced on the summer range because the property includes approximately 80 acres of steep land on the opposite side of the ridgetop from the base ranch.

A shortage of water and poor distribution of watering places on the rangeland also imposes a major limitation on the utilization of the forage. No seeps or springs exist on the top or the far side of the steep hill that can be developed and used to encourage distribution of the livestock on the range. The flow of water from each of two seeps developed in 1963 is less than ten gallons per hour.

At the present time, there is no road to the top of the ridge that can be used to haul water to improve the livestock water supply on the summer range. However, this limitation can be overcome by improving and completing an existing road that extends to within one-quarter of a mile of the top of the ridge, and hauling water to properly distributed livestock water storage tanks. The problem of the limited supply of livestock water could also be overcome by attaining the assistance available under the Agricultural Conservation Program to (1) construct a moderately inclined stocktrail to the ridgetop, and (2) install a pipe line to supply water to the livestock on the ridgetop.

The quality of the cropland owned by rancher number 3 imposes

a limitation on the kinds of crops that can be produced. Approximately 55 acres of highly alkaline soils are scattered throughout the 576 acres of cropland owned by this rancher. The composition of the subsoil increases the difficulty of removing the alkaline salt to increase the productivity of the soil. Approximately one-half of the cropland is underlaid with gravel, but an impervious layer of rock exists under the other half of the cropland and limits the methods that can be used to remove the alkaline salt. At the present time he is flood irrigating the cropland and thus, washing the alkaline salt from the surface of the soil.

Another limitation is imposed on the productivity of the ranch by infestations of thistles and morning glories. The operator of this ranch controls the weed infestations by mechanical methods rather than using chemical controls, because in his particular situation, the mechanical method of control is less expensive and more effective than the chemical control.

The cost of renting or buying land is a major limitation imposed on the adjustments which this rancher may make. The amount of land which he is able to rent is determined by the limited number of opportunities to rent land, and the operating capital which he has available for rental expense. There are two determinants that reduce the willingness of this operator to purchase land. One determinant is that the price of land is higher than he wishes to pay per

acre. The second determinant which reduces his willingness to purchase land is the amount of taxes that he pays each year. Taxes are his greatest single cash expense, aside from the purchase of non-capital livestock assets.

The supply of water to flood irrigate the cropland during the late summer months is not adequate. Also during the early summer months there is a large variation in the level of the ground water table at different locations on the ranch because of the composition of the subsoil. The problem of an inadequate water supply to flood irrigate the cropland may be alleviated by using the water that is available more efficiently with a well-planned sprinkler irrigation system. A sprinkler system has not been used on forage crops because less labor is necessary to flood irrigate from the irrigation ditches that exist on the ranch. One possible alternative to solve the problem of limited late summer irrigation water would be to obtain the services available under the Agricultural Conservation Program and investigate if it is possible to adequately seal a nearby gravel pit, owned by the rancher, to store water during the spring of the year for use later in the summer. An attempt has been made to drill a well to increase the supply of irrigation water, but to date, the ultimate results have not been determined.

Another solution to the limited amount of late summer irrigation water is to change the nature of the livestock production system.

This change would permit the operator to purchase weaners in the fall or winter and sell them as yearlings in the summer before the water supply becomes inadequate for irrigation. If the operator chooses this solution, he would have to take the risk of the changes which may occur in the market.

As shown by the livestock inventory in Table 17, the number of cows have increased from 36 in 1960 to 82 in 1963. This increase was obtained by purchasing 40 cows to place into the herd and by adding a total of 53 replacement heifers to the brood herd during the study period.

The information was not available to calculate the percent of cows calved or the percent of calf crop weaned. Neither was the information available to calculate the average weaning weight for the calves until late in the study period. The lack of this information has posed a limitation on this rancher to effectively cull the least desirable cows from the herd, and to select the heifers with the highest rate of gain for replacement heifers. Livestock weighing facilities are present on this ranch, thus a limitation has not been imposed on the rancher because of lack of livestock weighing facilities but rather by the lack of hired labor.

In 1963, this rancher began a production testing program on his beef cattle. As shown in Table 18, there was a difference of 60 pounds between the weight of the heifer that had the highest

TABLE 17

Inventory of Livestock for Ranch Number 3
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	36	\$200	\$ 7,200	34	\$200	\$ 6,800	31	\$200	\$ 6,200	93	\$200	\$ 18,600	82	\$200	\$ 16,400
1-2 year old Replacement Heifers	--	--	--	13	150	1,950	25	150	3,750	15	150	2,250	13	150	1,950
1 year old Replacement Heifers	14	100	1,400	32	100	3,200	16	100	1,600	*	--	--	15	100	1,500
Bulls	1	350	350	2	350	700	1	350	350	2	350	700	5	350	1,750
Horses	1	100	100	1	100	100	1	100	100	1	100	100	1	100	100
Dairy Cows	2	150	<u>300</u>	1	150	<u>150</u>	1	150	<u>150</u>	3	150	<u>450</u>	2	150	<u>300</u>
Sub-Total			\$ 9,350			\$ 12,900			\$ 12,150			\$ 22,100			\$ 22,000
Non-Capital Livestock Assets															
Weaners and/or Yearlings	--	--	--	30	50	1,500	24	50	1,200	25	50	1,250	41	104	4,256
Dairy Beef	--	--	--	--	--	--	--	--	--	79	64	4,056	133	98	13,034
Swine	--	--	<u>--</u>	2	20	<u>40</u>	2	20	<u>40</u>	--	--	<u>--</u>	--	--	<u>--</u>
TOTAL			\$ 9,350			\$ 14,440			\$ 13,390			\$ 27,406			\$ 39,290

* All calves one year old or less from the 1962 calf crop are included with the weaners and/or yearling classification.

actual weaning weight of 380 pounds and the heifer having the lowest actual weaning weight of 320 pounds. The heifer weighing 380 pounds had an actual daily gain of 1.89 pounds per day, while the heifer weighing 320 pounds had an actual daily gain of 0.89 pounds per day, making a difference of one pound of gain per day. When the weaning weights of the heifers were adjusted to a 205 day basis, the heifer with the highest rate of gain would have weighed 516 pounds, while the heifer with the lowest gain would have weighed 310 pounds, making a difference between these two animals of 206 pounds at the end of a 205 day period.

TABLE 18

Variation of the Weight of Heifers and
Steers for Ranch Number 3. 1963

Classification of the Weight Variation of the Heifers and Steers	Actual Weaning Weight	Actual Daily Gain	Weaning Weight Adjusted to 205 Days
<u>Heifers</u>			
Heaviest	380 pounds	1.89 pounds	516 pounds
Average	N. A.	1.30 pounds	390 pounds
Lightest	320 pounds	0.89 pounds	310 pounds
Difference Between Heaviest and Lightest	60 pounds	1.00 pounds	206 pounds
<u>Steers</u>			
Heaviest	565 pounds	2.15 pounds	531 pounds
Average	N. A.	1.41 pounds	397 pounds
Lightest	350 pounds	1.00 pounds	294 pounds
Difference Between Heaviest and Lightest	215 pounds	1.15 pounds	237 pounds

N. A.: Not available

The highest weaning weight of any of the steers was 565 pounds, while the lowest weaning weight was 350 pounds, making a difference of 215 pounds. Adjusted to a 205 day period, the steer weighing 565 pounds would have weighed 531 pounds, while the steer with the lowest weaning weight would have weighed 294 pounds. The heaviest steer averaged 2.15 pounds of actual daily gain, while the lightest steer averaged 1.00 pounds actual daily gain, making a difference in the actual daily gain of 1.15 pounds.

If one assumes that these animals on test were sold the day the weights were taken at an average selling price of 22 cents per pound, the heaviest heifer which weighed 380 pounds would have returned \$13.20 more than the lightest heifer on test. By the same assumptions, the heaviest steer which weighed 565 pounds would have returned \$47.30 more than the lightest steer which weighed 350 pounds.

The availability of capital earned from the ranch business to be used for operating capital or investment capital can be seen in Table 19 by the relationship of the interest paid on operating capital in relationship to the net cash income. In 1960, the interest paid on operating capital relative to the net cash income was two percent, which in 1961 increased to three percent. In 1962 there was a loss of net cash income of \$2,997 of which \$579 was interest paid on operating capital. In 1963, the loss of net cash income was \$6,929 of which \$761 was a result of interest paid on operating capital.

TABLE 19

Receipts, Expenses and Investment Analysis for Ranch Number 3, 1960-1963

	1960	1961	1962	1963
RECEIPTS, excluding sales of livestock capital assets				
Livestock sales	\$ 6,571	\$19,588	\$ 5,903	\$ 3,215
Livestock products sales	--	--	--	--
Crop sales	10,030	7,289	15,114	10,205
Miscellaneous receipts	<u>1,673</u>	<u>578</u>	<u>365</u>	<u>720</u>
TOTAL	\$18,274	\$27,492	\$21,382	\$14,140
EXPENSES, excluding purchases of livestock capital assets				
Grazing fees	--	--	--	\$ 1,500
Cropland rental	--	--	--	--
Livestock purchased	--	\$ 8,772	\$ 5,130	4,442
Hay purchased	--	--	--	--
Other L.S. feed purchased	\$ 270	954	282	2,490
Machine & Building repair	849	964	1,252	1,488
Hired labor	1,828	1,740	2,317	2,490
Machine hire & custom work	505	388	18	722
Vet., medicine & supplies ¹	--	--	--	--
Breeding fees & misc L.S. exp.	--	9	--	83
Seed purchased	882	703	1,121	--
Fertilizer	--	--	--	--
Misc. crop expenses	--	--	--	--
Range improvement	--	--	--	--
Irrigation	--	--	--	--
Dust and sprays	--	--	--	63
Gas, oil and grease	1,359	1,061	896	1,088
Licenses and insurance	116	148	309	149
Utilities	224	162	236	244
Farm supplies	800	477	339	1,540
Taxes	3,335	3,063	2,729	2,813
Interest on operating capital	127	345	579	761
Adv. mag., acct. fees, bus. travel	--	--	--	--
Miscellaneous	<u>309</u>	<u>247</u>	<u>708</u>	<u>326</u>
TOTAL	<u>10,604</u>	<u>19,033</u>	<u>15,916</u>	<u>20,199</u>
RECEIPTS MINUS EXPENSES, excluding the sale & purchase of livestock capital assets	\$ 7,670	\$ 8,459	\$ 5,466	\$-6,059
PURCHASE OF LIVESTOCK CAPITAL ASSETS				
Cows (2 yrs. old or older)	--	\$ 200	\$8,725	\$ 153
Bulls	\$ 600	--	770	1,820
Horses	--	--	--	--
SALE OF LIVESTOCK CAPITAL ASSETS				
Cows (2 yrs. old or older)	308	3,358	698	819
Bulls	--	--	334	284
Horses	--	--	--	--
NET CASH FROM THE PURCHASE & SALE OF LIVESTOCK CAPITAL ASSETS	\$ -292	\$ 3,158	\$-8,463	\$ -870
NET CASH INCOME	\$ 7,378	\$11,617	\$-2,997	\$-6,929
Less Depreciation: ² Machinery	\$ 1,919	\$ 2,616	\$ 1,987	\$ 3,146
Buildings & Improvements	606	606	606	1,115
Change in Inventory Value of Non-Depreciable Assets:				
Crops, Feed & Supplies	2,070	-230	3,320	3,430
Non-Capital Asset Livestock:				
Weaners and/or yearlings	1,500	-300	50	3,006
Dairy Beef	--	--	4,056	8,978
Swine	40	--	-40	--
Change in Inventory Value of Capitalized Livestock:				
Cows, 2 years old or older	-400	-3,200	10,000	2,800
Mature Replacement Heifers	--	650	1,250	-300 ³
1-2 yr. old replacement heifers	700	1,600	800	--
Under one year old replacement heifers	1,800	-1,600	-1,600	1,500
Bulls	350	-350	350	1,050
Horses	--	--	--	--
Dairy Cows	-150	--	300	-150
Value of livestock eaten ⁴	<u>150</u>	<u>150</u>	<u>150</u>	<u>150</u>
NET FARM INCOME	\$10,913	\$ 5,115	\$13,046	\$ 9,274
INTEREST ON AVERAGE INVESTMENT				
Land	\$153,775 5%	\$ 7,689	\$153,775 5%	\$ 7,689
Buildings & Improvements	8,482 5%	424	7,876 5%	394
Non-Capitalized Livestock	770 6%	46	1,390 6%	83
Capitalized Livestock	11,125 6%	668	12,525 6%	752
Crops, Feed & Supplies	3,445 6%	207	4,365 6%	262
Machinery & Equipment	8,507 6%	510	10,678 6%	641
TOTAL	\$186,104	\$ 9,544	\$195,465	\$10,119
LABOR INCOME	\$1,369	\$-4,706	\$ 2,927	\$-2,753
Value of Operator's Labor	\$3,000	\$ 3,000	\$ 3,000	\$ 3,000
RETURN TO CAPITAL	\$7,913	\$ 2,115	\$10,046	\$ 6,274
% Return to Capital	4.2	1.1	5.1	2.7

¹ Included in farm supplies.² See Appendix Table 10.³ All one to two year old replacement heifers in 1963 were carried over in the same age classification they were in the previous year.⁴ The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

Wildlife imposes a limitation on the success with which the domestic livestock are used to market feed on the ranch. The operator has observed as many as nine deer feeding on the top of one haystack. He also indicated that in the spring of 1964 he counted over 200 deer grazing on his 125 acres of wheat at one time.

The attitude of financial lenders has imposed a limitation on the investment capital available from external sources to the rancher. This operator has chosen to obtain his livestock investment capital from a bank rather than the Production Credit Association. The bank is a better source of capital for investment than the Production Credit Association according to his judgment and the particular situation which exists on his ranch. The Production Credit Association will loan more money for investment than the bank, however, the Production Credit Association requires a second mortgage on the ranch plus a chattel mortgage, while only a chattel mortgage is required by the bank.

Another limitation is placed upon the net ranch income by the marketing outlets used, and the marketing activity used by the operator. The number of market outlets is limited by choice. The responsibility of marketing his livestock product is shifted to the local livestock auction. He has chosen this marketing practice because by his judgment he now receives a price for his livestock which would not justify him to take the time necessary to thoroughly investigate the market.

Ranch Number 4

The two operators of ranch number 4 own and operate a total of 1,120 acres. As shown in Table 20, the operators are partially dependent on 590 acres of summer rangeland and 40 acres of permanent pasture to supply forage during the summer for the livestock in this cow-yearling operation.

The amount of the summer forage available is one of the major limitations on the adjustments which the ranchers may make to changing economic conditions. They would like to have approximately 1,000 acres more summer range or pasture, but at the present time, there is no rangeland or cropland in their immediate area available to purchase or rent. Likewise, there are no allotments of public rangeland available, or any private range available to lease.

The operators of this ranch indicated that by raising wheat on fewer acres they could produce a sufficient winter forage supply for all the livestock in a cow-yearling operation with 150 head of brood cows, but they have not made this adjustment for two reasons. One reason is that they do not have sufficient summer forage available for more livestock than 100 head of brood cows and their off-spring. The second reason they have not made this adjustment is that they have chosen not to reduce the wheat allotment acreage, because the market value of the ranch would be decreased.

TABLE 20

Acres of Land Operated Classified by the
Land Use on Ranch Number 4, 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	590	590	590	590
Native Meadow Hay			3	3
Alfalfa Hay	75	75	102	134
Permanent Pasture	40	40	40	40
Brome Grass Pasture		18		
Grain	212	190	178	217
Green Peas	140	125	130	36
Summer Fallow	58	77	72	95
Total Cropland	525	525	525	525
Other	5	5	5	5
Total Operated	1, 120	1, 120	1, 120	1, 120

In 1960, they began to overcome part of the limitation of an inadequate supply of summer forage by boarding 22 cows with calves on another rancher's grazing land. In 1961 and 1962 they continued this practice, and by 1963, they had increased the number of livestock that they were boarding out to 40 pairs. The cost to board the livestock on another rancher's grazing land was \$2. 50 per pair per month in 1960, 1961 and 1962, and \$3. 00 per pair per month in 1963.

An additional amount of forage could be obtained in the spring by pasturing their wheat. Neighboring ranchers have followed this practice and apparently have gained in two different ways. One is

that they were able to defer use of rangeland until the first of May, and second, as a result of heavily grazing the Gaines variety of wheat, the wheat stooled and increased the yield per acre.

The productivity of an estimated 30 percent of the summer rangeland is limited because of thin soil and rock out-croppings, and on these range sites infestations of medusa-head ryegrass had become established. To date, there is no known chemical control for medusa-head ryegrass; however, it is known that this undesirable shallow rooted annual usually exists on range sites that are not cultivated, and sites that have been overgrazed.

The operators of this ranch follow the practice of placing a portion of their livestock on the alfalfa hayland after the hay has been harvested. In their judgment they benefit from following this practice because the forage on the rangeland is given a chance to reseed and regain growth for use later in the fall or the following spring.

Better utilization could be made of the forage produced on the alfalfa hayland through a better distribution of the livestock by hauling water to properly distributed watering tanks on the alfalfa hayland.

The lack of well distributed livestock watering facilities also imposes a limitation on the utilization of the forage on the summer range. Six livestock watering ponds have been developed on this ranch; three livestock watering ponds were developed before 1960, one in 1960, one in 1961 and another in 1962. There are three

additional sites where a livestock watering pond could be developed; however, this adjustment has not been made because of the uncertainty of whether or not the ponds developed at these locations would seal and hold water during the year. One of the ponds developed since 1960 did not seal, and as a result, the pond is usually dry by the end of July. However, this was overcome in 1963 by placing salt blocks in the dry pond and letting the cattle pack the soil on the bottom of the pond as they fed on the salt blocks.

The operators of this ranch have not irrigated the hayland or pasture land because of the lack of an available supply of water.

The annual rainfall in this area is usually 20-22 inches, however, the uncertainty in the amount of precipitation and its distribution during the year places a limitation on the number of acres of rangeland that the operators may plow and seed during the year.

The inventory of cows as shown in Table 21, has increased from 60 on January 1, 1960, to 96 on December 31, 1963. This increase of 36 cows was achieved by introducing 68 replacement heifers to the brood herd during the study period and culling a total of 38 cows during the same period. The percent of the cows culled was 11, 3, 7 and 16 in 1960, 1961, 1962 and 1963 respectively, or an average of 9 percent per year.

The combination of criteria used to select the cows which are to be culled from the herd are as follows: whether or not the cow

TABLE 21

Inventory of Livestock for Ranch Number 4
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	60	\$175	\$ 10,500	73	\$175	\$ 12,775	74	\$175	\$ 12,950	88	\$175	\$ 15,400	96	\$175	\$ 16,800
Replacement Heifers	15	125	1,875	15	125	1,875	23	125	2,875	15	125	1,875	13	125	1,625
Bulls	4	300	1,200	4	300	1,200	5	300	1,500	5	300	1,500	4	300	1,200
Horses	1	150	<u>150</u>	2	150	<u>300</u>	2	150	<u>300</u>	3	150	<u>450</u>	3	150	<u>450</u>
Sub-Total			\$ 13,725			\$ 16,150			\$ 17,625			\$ 19,225			\$ 20,075
Non-Capital Livestock Assets															
Yearlings	27	125	<u>3,375</u>	41	125	<u>5,125</u>	47	125	<u>5,875</u>	47	125	<u>5,875</u>	69	125	<u>8,625</u>
TOTAL			\$ 13,725			\$ 21,275			\$ 23,500			\$ 25,100			\$ 28,700

has calved, the age of the cow, and the apparent milk production of the cow. A limitation is imposed upon the operators of this ranch to cull cows from the herd by accurate and actual information on the weight and rate of gain of the calves produced by the cows. The operators are unable to obtain this information because no livestock weighing facilities exist on the ranch. This installation has not been made because of the substantial investment required and also in their particular situation where they do not sell weaner calves, they have a longer period of time to judge the performance of the heifers which they ultimately will select as replacement heifers.

The cows and replacement heifers have not been pregnancy tested because of the high calving percentage which has been maintained. The actual percentage of cows which calved was not available, however the necessary data was available to calculate the percentage of calves weaned which reflects in three years out of four the highest calving percentage which was acceptable to the operators. The calf crop weaned was 95 in 1960, 97 in 1961, 85 in 1962, and 94 in 1963.

In 1962, the percent of calf crop weaned was lower than in the other three years because of calf scours. An adjustment in the feeding program was made in the last two years by feeding vitamin A to the cattle. They were unable to say if the deficiency of vitamin A was a single cause of calf scours, however, in 1963 and 1964 they

did not have any calf scour problems.

The wildlife that impose a limitation on the net ranch income are the gophers and mice. In the particular situation of these operators, the damage which the gophers have done to the forage has not been serious, however the gopher population is increasing and may become serious.

The lack of available capital earned from the ranch business has not placed a serious limitation on the adjustments which the operators of this ranch can make to changing economic conditions. Moreover, as can be seen in Table 22, this limitation is being overcome as indicated by the amount of interest paid on operating capital relative to the net cash income. This relationship which was eight percent in 1960, has been reduced to one percent, two percent, and one percent in 1961, 1962 and 1963 respectively. If one assumes \$3,000 per operator for living expenses to be deducted from the net cash income, the amount of capital available from the ranch earnings for debt service and adjustments to changing economic conditions was \$4,298 in 1960, \$8,859 in 1961, \$8,836 in 1962 and \$14,040 in 1963.

Some capital has been invested in range and meadow improvement and more is planned in the near future. The priority given to the use of capital for purchase of additional range or meadowland must depend on availability of land for purchase. However, with the other improvements possible some increase in size of business is

TABLE 22

Receipts, Expenses and Investment Analysis for Ranch Number 4, 1960-1963

	1960	1961	1962	1963
RECEIPTS, excluding sale of capital livestock assets				
Livestock sales	\$ 4,226	\$ 6,355	\$ 5,956	\$ 6,756
Livestock products sales	--	--	--	--
Crop sales	12,782	14,635	13,059	19,945
Miscellaneous receipts	2,370	3,969	5,021	2,543
TOTAL	\$19,378	\$24,959	\$24,036	\$29,244
EXPENSES, excluding purchase of capital livestock assets				
Grazing fees	\$ 325	\$ 336	\$ 336	\$ 750
Cropland rental	--	--	--	--
Livestock purchased	--	24	90	--
Hay purchased	--	--	--	--
Other L.S. feed purchased	521	611	965	687
Machine & Building repair	834	994	300	1,161
Hired labor	--	--	--	--
Machine hire and custom work	180	230	448	--
Vet., medicine and supplies	240	244	225	209
Breeding fees & misc L.S. exp.	--	70	--	--
Seed purchased	70	250	696	69
Fertilizer	929	1,802	1,470	1,753
Misc. crop expenses	--	--	--	--
Range improvement	--	--	--	--
Irrigation	--	--	--	--
Dust and sprays	339	494	370	558
Gas, oil and grease	1,695	1,408	1,851	1,694
Licenses and insurance	352	310	485	446
Utilities	262	233	290	320
Taxes	2,236	2,416	2,018	1,853
Interest on operating capital	850	132	234	235
Adv. mag., acct. fees, bus. travel	--	--	--	--
Miscellaneous	284	246	192	384
TOTAL	9,117	9,800	9,970	10,124
RECEIPTS MINUS EXPENSES, excluding the sale and purchase of livestock capital assets	\$10,261	\$15,159	\$14,066	\$19,120
PURCHASE OF LIVESTOCK CAPITAL ASSETS				
Cows	--	--	--	--
Bulls	\$ 350	\$ 300	--	\$ 725
Horses	165	--	\$ 175	--
SALE OF LIVESTOCK CAPITAL ASSETS				
Cows	332	--	945	980
Bulls	220	--	--	665
Horses	--	--	--	--
NET CASH FROM THE PURCHASE AND SALE OF LIVESTOCK CAPITAL ASSETS	\$ 37	\$ -300	\$ 770	\$ 920
NET CASH INCOME	\$10,298	\$14,859	\$14,836	\$20,040
Less Depreciation: ¹ Machinery	\$ 806	\$ 866	\$ 861	\$ 1,348
Buildings & Improvements	168	168	168	168
Change in Inventory Value of Non-Depreciable Assets:				
Crops, feed and supplies	374	-44	1,210	2,703
Non-Capital Asset Livestock	1,750	750	--	2,750
Change in Inventory Value of Capital Asset Livestock:				
Cows, 2 years old or older	-350	175	1,050	2,800
Mature Replacement Heifers	750	750	1,150	750
Weaner Replacement Heifers	--	1,000	--	-250
Bulls	--	300	--	-300
Horses	150	--	150	--
Value livestock eaten ²	200	200	200	200
NET FARM INCOME	\$12,198	\$16,956	\$17,567	\$27,177
INTEREST ON AVERAGE INVESTMENT				
Land	\$119,750 5% \$ 5,988	\$119,750 5% \$ 5,988	\$119,750 5% \$ 5,988	\$119,750 5% \$ 5,988
Buildings & Improvements	4,760 5% 238	4,592 5% 230	4,424 5% 221	4,256 5% 213
Non-Capitalized Livestock	4,250 6% 255	5,500 6% 330	5,875 6% 352	7,250 6% 435
Capitalized Livestock	14,938 6% 896	16,888 6% 1,013	18,425 6% 1,106	19,650 6% 1,179
Crops, Feed & Supplies	4,807 6% 288	4,972 6% 298	5,555 6% 333	7,512 6% 451
Machinery & Equipment	4,130 6% 248	4,476 6% 268	3,740 6% 224	5,310 6% 319
TOTAL	\$152,635 \$ 7,913	\$156,178 \$ 8,127	\$157,769 \$ 8,224	\$163,728 \$ 8,585
LABOR INCOME	\$4,285	\$ 8,829	\$ 9,343	\$18,592
Value of Operator's Labor	\$6,000	\$ 6,000	\$ 6,000	\$ 6,000
RETURN TO CAPITAL	\$6,198	\$10,956	\$11,567	\$21,177
% Return to Capital	4.1	7.0	7.3	12.9

¹ See Appendix Table 11.² The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

possible within the existing land holdings.

There are no apparent limitations imposed on the operators of this ranch by the lack of number of outlets available to market the livestock. The operators follow the practice of obtaining bids from three different markets. Usually, the same markets or buyers place a bid on the yearlings sold each year.

Ranch Number 5

The land operated by rancher number 5 as shown in Table 23, has increased from 827 acres in 1960 to 947 acres in 1963. This increase was made by purchasing 120 acres of cropland. The complementary rangeland owned is 627 acres, and 40 acres are leased from the U. S. Forest Service.

TABLE 23

Acres of Operated Land Classified by the
Land Use on Ranch Number 5. 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	667	667	667	667
Alfalfa Hay	40	40	40	40
Clover and Grass Hay	25	25	25	25
Irrigated Grain Hay		20	15	
Irrigated Pasture	70	70	90	90
Permanent Pasture			85	85
Grain	20		20	35
Total Cropland	155	155	275	275
Other	5	5	5	5
Total Operated	827	827	947	947

A major limitation is imposed on the net ranch income by the amount of forage produced on the 667 acres of summer range. At the present time, the estimated carrying capacity is 56 head of cows

with calves for six and one-half months, or 364 animal unit months.

The Soil Conservation Service has estimated that approximately 150 acres of this rangeland is abandoned cropland which at one time had been plowed and seeded to a grain crop. When abandoned, the cropland had never been seeded to re-establish the native grass. The Soil Conservation Service estimates that the forage production could be doubled on the 150 acres of abandoned cropland. The increase in the grazing capacity which would be obtained by reseeding the abandoned cropland could not be estimated because it was not known what proportion of the available forage is being produced upon the abandoned cropland.

The 85 acres of permanent pasture shown in Table 23 are a part of the additional 120 acres of cropland purchased in 1962. The operator estimated that he plowed and reseeded 30 acres of the permanent pasture in 1962. There is an apparent limitation on the productivity of the 85 acres of permanent pasture because of the lack of nitrogen. This limitation could be overcome by the application of commercial fertilizer.

The 40 acres of irrigated alfalfa hayland usually yields three and one-half tons per acre while the clover and grass hayland usually yields two and one-half tons per acre. The relatively low yield on the alfalfa results from fall and winter pasturing which is necessary because of the lack of an adequate winter feeding area. This limitation could be overcome by changing the beef production system from the cow-calf, to a cow-yearling system. By making this change, fewer

cows would be kept on the ranch, thus reducing the winter feeding area needed. Only enough cows would be kept to serve as guides for the yearlings to make the best utilization of the forage on the rangeland.

Short yearlings could be purchased in the late winter or early spring, thus less hay would be required to winter the yearlings and the smaller number of cows in the herd. This would allow conversion of some of the irrigated alfalfa hayland to irrigated pasture. The cow herd and the calves which were purchased during the early winter and spring could be wintered on wheat stubble and on the 85 acres of permanent pasture.

However, at the present time, the operator is unable to winter the livestock on the 85 acres of permanent pasture because of an insufficient supply of livestock water. This limitation could be overcome by developing the necessary facilities to maintain a water supply for the livestock.

Additional forage could be obtained during the early spring by grazing the wheat and then moving the cows and yearlings to the summer range during the month of April. The young growth of forage on the range could then be utilized by the yearlings along with a small number of cows with calves to serve as guides for the yearlings to make the best utilization of the rangeland grass. Then in July in order to maintain a high rate of gain, the yearlings should be

transferred to the base ranch and placed upon the irrigated pasture. This practice would allow the grasses on the range to recover their growth during the time when a small number of cows with calves are on the range and provide an increased amount of available forage in the following spring.

The location of the base ranch is such that there is an adequate supply of water during the entire summer for irrigation. However, the organization of the present irrigation system does not permit the operator to irrigate the 85 acres of permanent pasture. In order to irrigate this area, a pump would be required to raise the water 20 feet above the source. The operator has not made this adjustment because in his particular situation and by his knowledge and judgment, the cost of following this practice would be greater than the benefit received.

The inventory of cows as shown in Table 24 increased during the year 1960 from 97 to 102. This inventory number of cows then remained constant during the study period except in the year 1962, when it dropped to 100 cows. During the study period, 42 replacement heifers were introduced in the cow herd, three cows were purchased, 39 sold, and one died, effecting a total increase of five cows.

The criteria used by the operator of this ranch to cull cows from the herd are (1) age of the cow, and (2) the apparent performance of the cow's calf. However, the lack of accurate and actual

TABLE 24

Inventory of Livestock for Ranch Number 5
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	97	\$175	\$ 16,975	102	\$175	\$ 17,850	102	\$175	\$ 17,850	100	\$175	\$ 17,500	102	\$175	\$ 17,850
Replacement Heifers	16	125	2,000	5	125	625	5	125	625	16	125	2,000	14	125	1,750
Bulls	4	300	1,200	3	300	900	3	300	900	4	300	1,200	4	300	1,200
Horses	3	200	600	3	200	600	3	200	600	3	200	600	3	200	600
Dairy	1	125	<u>125</u>	1	125	<u>125</u>	1	125	<u>125</u>	1	125	<u>125</u>	1	125	<u>125</u>
Sub-Total			\$ 20,900			\$ 20,100			\$ 20,100			\$ 21,425			\$ 21,525
Non-Capital Livestock Assets															
Swine	--	--	--	--	--	--	--	--	--	6	40	240	50	23	1,150
Fall Calves	22	70	<u>1,540</u>	5	70	<u>350</u>	28	70	<u>1,960</u>	24	70	<u>1,680</u>	24	60	<u>1,440</u>
TOTAL			\$ 22,440			\$ 20,450			\$ 22,060			\$ 23,345			\$ 24,115

weaning weights of individual calves limit the rancher in his effectiveness to cull from the herd those cows which produced calves with the lowest rate of gain. The lack of this information also limits the rancher in his effectiveness to select heifers with the highest rate of gain to be used as replacements. Livestock weighing facilities exist on the ranch; however, the practice of using these facilities to obtain accurate weaning weight and rate of gain information are not used because of the lack of labor. The operator has not obtained hired labor to help perform this task because of the increased expense that would be involved.

He indicated that creep-feeding the fall calves would increase their rate of gain; however, because of the labor required he has not followed such practice.

The breeding program followed is planned so that approximately one-half of the cows calve during the months of November and December. The other one-half of the cows calve during the months of March and April. The operator gains some flexibility by having about one-half of his cows calve during the fall because this allows him to sell weaner calves from August through November.

The purebred bulls which he purchases from local ranchers are not performance tested or fertility tested because he feels that in his particular situation, it would not be profitable for him to invest in performance or fertility tested bulls unless time and labor

were available to improve the management of the cow herd.

Insect damage and fluctuations in precipitation are limitations on the utilization of this rancher's summer rangeland. He has followed the practice of under-utilizing the rangeland, thus protecting himself against the risk of a shortage of summer forage by placing only 40 cows with calves on the summer rangeland instead of the potential carrying capacity of 56 head of cows with calves.

The net cash income earned from the ranch business poses a limitation on the amount of capital available for operating capital, investment capital, or family living expenses. As shown in Table 25, net cash income ranged from a low of \$1,864 in 1961 to a high of \$5,356 in 1962. If one assumes a \$3,000 withdrawal for family living expenses, then a disinvestment of \$1,136 would have occurred in 1961, while the maximum amount of capital earned from the ranch business for investment or long term debt service would have been \$2,356 in 1962.

Another limitation is imposed on the net ranch income of this operator because in his judgment he does not have reputation cattle for sale which would be demanded by buyers of reputation cattle. The lack of actual and accurate rate of gain and weaning weight information poses a limitation on the marketing activities which this operator may perform. As a result, the responsibility of marketing the livestock is shifted to the local auction.

TABLE 25

Receipts, Expenses and Investment Analysis for Ranch Number 5, 1960-1963

	1960	1961	1962	1963
RECEIPTS, excluding sale of livestock capital assets				
Livestock sales	\$ 7,182	\$ 6,553	\$ 9,379	\$ 8,304
Swine sales	--	--	199	239
Crop sales	--	--	1,916	1,472
Miscellaneous receipts	142	--	218	413
TOTAL	\$ 7,324	\$ 6,553	\$11,712	\$10,428
EXPENSES, excluding purchase of livestock capital assets				
Grazing fees	\$ 10	\$ 10	\$ 10	\$ 10
Cropland rental	1,000	1,000	1,000	1,000
Livestock purchased	--	571	40	369
Hay purchased	--	--	--	--
Other L.S. feed purchased	105	80	433	656
Machine & Building Repair	847	539	808	689
Hired labor	310	81	333	307
Machine hire & custom work	87	60	224	410
Vet., medicine & supplies	51	157	122	131
Breeding fees & misc L.S. exp.	--	--	--	--
Seed purchased	84	87	280	145
Fertilizer	--	230	--	572
Misc. crop expenses	--	--	--	--
Range improvement	--	--	--	--
Irrigation	105	105	--	125
Dust and sprays	--	--	--	--
Gas, oil and grease	680	704	616	713
Licenses and insurance	296	175	300	457
Utilities	--	50	157	229
Farm supplies	444	641	728	306
Taxes	1,033	950	1,355	1,228
Interest on operating capital	180	280	361	360
Adv. mag., acct. fees, bus. travel	--	--	--	--
Miscellaneous	--	--	38	--
TOTAL	5,232	5,720	6,805	7,707
RECEIPTS MINUS EXPENSES, excluding the sale & purchase of livestock capital assets	\$ 2,092	\$ 833	\$ 4,907	\$ 2,721
PURCHASE OF LIVESTOCK CAPITAL ASSETS				
Cows	--	--	--	\$ 525
Bulls	\$ 500	\$ 350	\$ 350	200
Horses	--	--	--	--
SALE OF LIVESTOCK CAPITAL ASSETS				
Cows	1,525	1,031	799	2,160
Bulls	496	350	--	256
Horses	--	--	--	--
NET CASH FROM THE PURCHASE & SALE OF LIVESTOCK CAPITAL ASSETS	\$ 1,521	\$ 1,031	\$ 449	\$ 1,691
NET CASH INCOME	\$ 3,613	\$ 1,864	\$ 5,356	\$ 4,412
Less Depreciation: ¹ Machinery	\$ 767	\$ 767	\$ 767	\$ 767
Buildings & Improvements	518	518	528	528
Change in Inventory Value of Non-Depreciable Assets:				
Crops, Feed & Supplies	450	-270	-100	315
Non-Capital Asset Livestock:				
Swine	--	--	240	910
Fall Calves	-1,190	1,610	-280	-240
Change in Inventory Value of Capital Asset Livestock:				
Cows	-1,925	1,925	-350	-1,575
Mature Replacement Heifers	800	250	250	800
Weaner Replacement Heifers	-1,375	--	1,375	-250
Bulls	-300	--	300	--
Horses	--	--	--	--
Dairy	--	--	--	--
Value livestock eaten ²	90	90	90	90
NET FARM INCOME	\$-1,122	\$ 4,184	\$ 5,586	\$ 3,167
INTEREST ON AVERAGE INVESTMENT				
Land	\$ 40,185 5%	\$ 40,185 5%	\$ 74,385 5%	\$ 74,385 5%
Buildings & Improvements	5,016 5%	4,498 5%	5,980 5%	5,452 5%
Non-Capitalized Livestock	945 6%	1,155 6%	1,940 6%	2,255 6%
Capitalized Livestock	20,500 6%	20,100 6%	20,762 6%	21,475 6%
Crops, Feed & Supplies	3,685 6%	3,775 6%	3,590 6%	3,698 6%
Machinery	4,624 6%	3,857 6%	3,090 6%	2,323 6%
TOTAL	\$ 74,955	\$ 73,570	\$109,747	\$109,588
LABOR INCOME	\$-5,167	\$ 218	\$ -194	\$-2,609
Value of Operator's Labor	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
RETURN TO CAPITAL	\$-4,122	\$ 1,184	\$ 2,586	\$ 167
% Return to Capital	-5.0	1.6	2.4	0.2

¹ See Appendix Table 12.² The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

Ranch Number 6

In 1960 rancher number 6 operated a total of 2,150 acres as shown in Table 26. Of this total acreage, he owned and used 1,800 acres to produce forage for the livestock in his cow-calf beef production system. The 350 acres of grain was rented on a share-crop basis. In 1961 he purchased a 1,240 acre ranch which increased his deeded summer range to 2,870 acres and increased his native meadow hay and pasture land by 98 acres. He has not produced any grain since 1960.

TABLE 26
Acres of Operated Land Classified by the
Land Use on Ranch Number 6. 1960-1963

Land Use	1960	1961	1962	1963
	Acres			
Summer Range	1,730	2,870	2,870	2,870
Native Meadow Hay	68	140	120	
Native Meadow Pasture		26	46	166
Grain	<u>350</u>	<u> </u>	<u> </u>	<u> </u>
Total Cropland	418	166	166	166
Other	<u>2</u>	<u>4</u>	<u>4</u>	<u>4</u>
Total Operated	2,150	3,040	3,040	3,040

The soil on the 2,870 acres of rangeland is deep, productive soil, except for a few locations where there are rock outcroppings.

However, the forage production on the range is limited and is below the quality of forage which can be produced because of a heavy infestation of weeds. The operator has not followed a chemical control program because of the lack of economic information pertaining to his particular situation, which would enable him to decide whether the program would be profitable, and because the steep topography of the range makes it difficult to prepare a satisfactory seedbed for reseeding.

Another limitation is imposed on the production of available forage on the summer range by the scarcity of rainfall in August and September. The operator of this ranch has partially overcome this limitation by purchasing all of his hay for winter feed and changing the principal use of his native meadows from hay production to pasture. By pasturing the native meadows in August and September, the demands for forage from his summer range has been reduced.

With the exception of exceedingly dry years, there is an adequate supply of ground water which sub-irrigates approximately 68 acres of the native meadow. But a limitation is imposed on the amount of forage produced on approximately 30 acres of the remaining 98 acres of native meadowland by not utilizing an available supply of irrigation water. The forage production could be increased on these 30 acres of meadowland by combining the two following practices:

- (1) plowing and reseeding approximately 15 acres of the native

meadow pasture and (2) constructing irrigation ditches to facilitate the use of the available supply of water.

Temperature places another limitation on the type of forage which can be grown on this ranch and therefore limitation on the amount of forage produced. Unexpected frosts have damaged alfalfa as late as May 27. For this reason, the operator of this ranch depends more upon the forage produced by native grasses than alfalfa.

As can be seen in Table 27, the cow herd has been increased from 140 on January 1, 1960 to 182 on December 31, 1963. The increase of 42 head of cows during the period of the study was a result of purchasing 85 head of cows, introducing 66 replacement heifers into the herd, and selling 107 culled cows. The major criterion used to cull cows from the herd is the record of the weight of each cow's calf rather than the calculated rate of gain per calf. The information available on the weight of each calf is not used in the best manner to affect the intended results in selecting the cows to be culled from the herd and in selecting the replacement heifers.

Another limitation on the success in the use of livestock to market the feed produced, and therefore a limitation on the net ranch income, is the high number of cows which have had trouble calving. As high as 10 to 12 percent of the cows customarily have calves born b r e e c h , i. e. , hind feet first. Although the operator has spent considerable time with the cows during the calving period, a number

TABLE 27

Inventory of Livestock for Ranch Number 6
Beginning January 1, 1960 through December 31, 1963

Inventory of Livestock	1960 Beginning			1960 Ending			1961 Ending			1962 Ending			1963 Ending		
	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value	No.	Price	Value
Capital Livestock Assets															
Cows	140	\$200	\$ 28,000	119	\$200	\$ 23,800	193	\$200	\$ 38,600	196	\$200	\$ 39,200	182	\$200	\$ 36,400
Replacement Heifers	15	150	2,250	18	150	2,700	15	150	2,250	18	150	2,700	32	150	4,800
Bulls	9	400	3,600	8	400	3,200	8	400	3,200	9	400	3,600	9	400	3,600
Horses	16	400	<u>6,400</u>	16	400	<u>6,400</u>	15	400	<u>6,000</u>	11	400	<u>4,400</u>	12	400	<u>4,800</u>
Sub-Total			\$ 40,250			\$ 36,100			\$ 50,050			\$ 49,900			\$ 49,600
Non-Capital Livestock Assets															
Swine	--	--	<u>--</u>	--	--	<u>--</u>	--	--	<u>--</u>	40	40	<u>1,600</u>	--	--	<u>--</u>
TOTAL			\$ 40,250			\$ 36,100			\$ 50,050			\$ 51,500			\$ 49,600

of the calves which were born in this way were lost at birth. The operator has kept a record of the cows which have had those breech-births and has found that it occurs with different cows each year. According to his records, there is no apparent correlation with the sire used.

A limitation has been imposed on the percent of calf crop weaned by the calving trouble which the first calf heifers have had in 1963. The operator indicated that he lost approximately one-half of the calves from the 18 replacement heifers that calved in 1963.

In spite of the loss of calves at birth the overall percent of calf crop weaned has been 96 percent, 93 percent, 88 percent and 96 percent in 1960, 1961, 1962 and 1963, respectively.

An increasing limitation is being imposed on the amount of capital available for operating or investment capital and living expenses by the amount of income earned from the ranch business. As can be seen in Table 28, the amount of interest paid on operating capital in relation to the net cash income has increased from 7 percent in 1960, to 11 percent in 1962, and 16 percent in 1963. In 1961 the relationship between the interest paid in operating capital and the net cash income was not calculated because of the negative net cash income of \$11,022. The net cash income is negative in 1961 because

TABLE 28

Receipts, Expenses and Investment Analysis for Ranch Number 6, 1960-1963

	1960	1961	1962	1963
RECEIPTS, excluding the sale of capital livestock assets				
Cattle	\$11,574	\$14,432	\$16,200	\$21,311
Sale of hogs	--	--	--	5,234
Crop Sales	3,275	--	--	--
Miscellaneous receipts	593	82	296	628
Sale of machinery	--	--	2,750	--
TOTAL	\$15,442	\$14,514	\$19,246	\$27,173
EXPENSES, excluding the purchase of capital livestock assets				
Grazing fees	--	--	--	--
Cropland rental	--	--	--	--
Livestock purchased	--	--	175	7,752
Hay purchased	3,176	3,598	2,592	5,900
Other L.S. feed purchased	190	197	909	2,706
Machine repair	200	50	100	118
Building repair	400	490	540	625
Hired labor	1,223	532	194	75
Machine hire & custom work	--	270	--	--
Vet., medicine & supplies	85	141	367	171
Breeding fees & misc. L.S. exp.	--	--	--	59
Seed purchased	--	--	--	--
Fertilizer	--	--	--	--
Misc. crop expenses	--	--	--	--
Range improvement	--	--	--	--
Irrigation	--	--	--	--
Dust and sprays	--	--	--	--
Gas, oil and grease	456	400	711	559
Licenses and insurance	247	211	252	477
Utilities	340	560	306	452
Taxes	628	1,243	1,323	1,412
Interest on operating capital	850	908	1,507	1,475
Adv.,mag.,acct. fees, bus. travel	--	--	--	--
Miscellaneous	442	--	--	--
TOTAL	8,237	8,600	8,976	21,781
RECEIPTS MINUS EXPENSES, excluding the sale & purchase of livestock capital assets	\$ 7,205	\$ 5,914	\$10,270	\$ 5,392
PURCHASE OF LIVESTOCK CAPITAL ASSETS				
Cows, 2 years old or older	--	\$17,750	--	\$ 4,070
Bulls	--	1,150	\$ 1,900	2,445
Horses	--	--	--	1,350
SALE OF LIVESTOCK CAPITAL ASSETS				
Cows, 2 years old or older	\$ 4,762	1,014	1,700	9,866
Bulls	200	550	1,550	1,800
Horses	--	400	2,010	285
NET CASH FROM THE PURCHASE & SALE OF LIVESTOCK CAPITAL ASSETS	\$ 4,962	\$-16,936	\$ 3,360	\$ 4,086
NET CASH INCOME	\$12,167	\$-11,022	\$13,630	\$ 9,478
Less Depreciation: ¹ Machinery	\$ 1,365	\$ 2,158	\$ 1,188	\$ 1,620
Building & Improvements	725	1,125	1,125	1,161
Change in Value of Non-Depreciable Assets: Crops, Feed & Supplies	-1,900	2,500	-1,900	-640
Non-Capital Asset Livestock	--	--	1,600	-1,600
Change in Inventory Value of Capital Livestock Assets:				
Cows, 2 years old or older	-7,200	11,200	1,200	-6,400
Mature Replacement Heifers	750	900	750	1,600
Weaner Replacement Heifers	450	-450	450	2,100
Bulls	-400	--	400	--
Horses	--	-400	-1,600	400
Value livestock eaten ²	50	50	50	50
NET FARM INCOME	\$ 1,827	\$ -505	\$12,267	\$ 2,207
INTEREST ON AVERAGE INVESTMENT				
Land	\$ 58,550 5%	\$ 2,928	\$109,100 5%	\$ 5,455
Buildings & Improvements	14,100 5%	705	19,371 5%	968
Non-Capitalized Livestock	-- 6%	--	18,250 5%	912
Capitalized Livestock	38,175 6%	2,290	888 6%	53
Crops, Feed & Supplies	6,890 6%	413	49,975 6%	2,998
Machinery & Equipment	6,702 6%	402	7,490 6%	449
			10,090 6%	605
TOTAL	\$124,417	\$ 6,738	\$195,793	\$195,764
LABOR INCOME	\$-4,911	\$-10,835	\$ 1,795	\$-8,269
Value of Operator's Labor	\$ 3,000	\$ 3,000	\$ 3,000	\$ 3,000
RETURN TO CAPITAL	\$ 1,173	\$ -2,495	\$ 9,267	\$ 793
% Return to Capital	0.9	-1.3	4.7	0.4

¹ See Appendix Table 13.² The value of livestock eaten is one of several non-cash sources of income which is realized by the rancher. This item was included in order to show the disposition of the livestock.

the operator made an investment of \$17,750 in 63 cows.¹

As shown in Table 28, his expense for hired labor has decreased from \$1223 in 1960 to \$75 in 1963. By discontinuing the practice of producing his own winter hay supply he did not need to hire labor during the haying season. At other times during the year the demands for more than the operator's labor are met by exchanging labor among neighboring ranchers.

The use of capital for range or meadow improvement should have a higher priority than the priority given to the use of capital for purchase of additional rangeland or meadowland because of the particular situation that exists on this ranch. An investment to develop the resources which are presently owned but not fully developed or utilized, would yield a higher return per dollar invested than would be received by the purchase of additional rangeland.

The operator of this ranch has three major market outlets that bid to purchase the livestock. These markets are (1) the local livestock auction, (2) local feedlot, and (3) a Utah market outlet. In August the operator of this ranch usually contracts the sale of the calves to be delivered to one of the markets in October.

Although the operator of this ranch has kept weight records on

¹The operator paid an average of \$282 per cow for the 63 cows. This price is \$82 more per cow than the price he used to calculate the inventory value of cows in previous years, thus the inventory value of these 63 cows is \$5,166 less than the price he paid.

each of the calves, there is a limitation imposed on the effectiveness of his marketing activity by the lack of information on the daily weight gained by each calf.

Managerial Limitations on the Ranches Studied

Management was one of the major limitations on the adjustments the ranch operators made to changing economic conditions. This does not imply that the individuals were poor managers. In some cases, managers did not act to adjust to recognized problems because they felt that they did not have the necessary information to permit decision making. In other cases, managers appeared to be limited in ability to perform the functions of supervision and coordination in carrying out adjustments that were recognized as needed. In other situations, limitations on adjustments were self-imposed when managers after considered judgment decided that the economic return discounted by the risk involved, was low.

Allocation of their time by the ranch managers affected the amount of management, as a factor, in ranch organization and operation. One rancher indicated that he has improved the management on his ranch during the study period by spending very little time doing the physical labor compared to the amount of time he spends making management decisions. Another manager stated that he thought such a shift would improve his business but that he had been unable to withdraw himself from physical labor. The time allocated to management by several other ranch managers was limited because they were devoting time to activities external to the ranch business.

There was considerable variation in the desire of the ranch managers to make adjustments to changing economic conditions. Some ranch managers did not care to make adjustments if the adjustment demanded additional time and labor from the operator while other ranch managers were willing to try any adjustment at least once. Other operators indicated that they would make adjustments to changing economic conditions if very little risk were involved and they could observe the results of these adjustments on other ranches.

The indicated planning span of the operators varied from one to seven years for the cropland, and from one to six years for livestock. None of the ranchers had any detailed plans on paper concerning the adjustments which they planned to make on either the cropland, grazing land, or livestock. The number of cows by which the operators planned to increase their cow herds varied from none to 70. No schedule of dates was set out as guides to those adjustments.

Age and health have, in some cases, limited the adjustments which have been made as well as the adjustments that will be made and the rate at which these adjustments will be made. Those operators who had physical limitations were unwilling because of certain circumstances to hire additional labor.

The Role of Lending Institutions

The role that lending institutions perform to provide capital for ranchers to make improvements and develop available resources on the ranch was discussed with the lending officers of two Production Credit Associations and five different commercial banks that serve the study area. It was established that credit is made readily available to the ranchers for operating expenses, livestock investments, machinery purchases, range improvement and land investment. Short term or operating credit is provided by the banks and Production Credit Associations for operating expenses, livestock investments and range improvements and machinery purchases. The second type of investment which was available only through the banks was long term investment in land.

Not one of the five banks nor the two Production Credit Associations in the study area provide a direct means to the operators of the ranches to finance the purchase of livestock, the purchase of machinery, or range improvement through an intermediate loan. The policies of the banks and the Production Credit Associations were that if each of the ranchers so demanded to make livestock purchases and range improvements, and machinery purchases, the necessary capital in most cases would be provided by including this disbursement of capital in the operating loan budget and the unpaid balance would

be refinanced each year at the going interest rate for operating capital until the amount of the loan for such investment purposes was either paid off or terminated.

Although the officers of these lending institutions are in a position to observe the adjustments made by different ranchers to the changing economic conditions in each of the counties, they do not maintain the policy of drawing upon this wealth of information to provide counsel to ranchers on livestock or range management.

It was found that some lending institutions desire to employ agricultural fieldmen who were at one time ranch operators and for one reason or another discontinued their ranch business. In addition, it was deemed undesirable by some lending institutions to employ an individual who had some college training in either farm management, animal husbandry, or range management to be an agricultural finance fieldman.

CHAPTER V

SUMMARY AND CONCLUSIONS

The seven ranches studied and the Squaw Butte Range and Livestock Experiment Station illustrate a number of different limitations on the size of ranch business and successful methods for overcoming these limitations.

The Squaw Butte Range and Livestock Experiment Station is included to provide examples of adjustments in physical size of business through changing technical practices in resource use.

In 1949 the range on the Squaw Butte Range and Livestock Experiment Station was judged to be severely overstocked relative to the carrying capacity as based on the condition of the existing plant cover and ability to control distribution of animals for the utilization of the forage. Rehabilitation of the range grasses to permit maintenance of the cow herd or ultimate increase in cow numbers dictated that the number of animal units on the range must be decreased temporarily. This situation is typical of conditions on many privately owned ranches.

Economic limitations on the administration and the experimental program required that adjustments must be made without purchase of additional land or significantly reducing number of cows. The

following five adjustments were made: (1) a portion of the livestock were summered on the irrigated native meadow pastures at the winter headquarters, (2) the turnout date was delayed from two to three weeks by feeding hay until the latter part of April, (3) some reduction of livestock numbers was obtained by intensive culling of undesirable cows, (4) the forage production was increased by spraying sagebrush infested rangeland and seeding crested wheatgrass, and (5) the distribution of livestock was improved by proper concentration and rotation of cattle, hauling water to lightly grazed areas, and strategic location of salt.

Since the need for a range improvement program was recognized, the number of animal unit months of grazing utilized on the Squaw Butte Range and Livestock Experiment Station has varied from 1,242 in 1949 to 701 in 1954, 1,910 in 1960 and 2,018 in 1963. The number of cows has been increased from 151 in 1954 to 221 in 1963.

In addition to the adjustments made in the management and the utilization of the summer range, the nutrition of the livestock in the winter was improved. The breeding program was also changed to facilitate the utilization of the summer range forage by having a higher percent of the cows calve before the cow and its calf were placed on the range at the beginning of the summer. The number of calves born on the range has dropped from 44 in 1946 to an average of 5 in the years 1960-1963.

Percentage of calf crop has been maintained or increased.

Average weaning weights have increased and sufficient forage has been available to increase the average weight of yearlings off range from 494 pounds in 1947 to 782 pounds in 1963.

Ranch A was chosen to illustrate the adjustments made by this rancher to meet the changing economic conditions.

He has increased the production from the summer range by re-seeding the grasses and then applying commercial fertilizer on those sites where the soil would respond.

By constructing cross fences, he has improved the distribution of his livestock and therefore, the utilization of the available range forage by the cattle.

Additions to rangeland through purchase or lease have permitted an increase in cow numbers. With the present size of the cow herd this operator has a limited supply of forage for winter feed in relation to the number of livestock that he can maintain on his summer range. He has made several adjustments to partially alleviate the restriction imposed on livestock numbers by the limited supply of winter feed. He has reseeded and fertilized the marginal land between the cropland and the rangeland to grasses and legumes which can provide hay and fall pasture. He is using wheat stubble for early winter feed. Also during the last two years, he has contracted for the yearlings to be fed in a feedlot off the ranch.

The operator has attempted to realize the potential productivity of his cropland by leveling the land and improving irrigation. Fertilization and chemical weed control practices have also been followed to facilitate obtaining the highest yields possible from the grain and forage crops produced on the cropland.

On ranch number 1, a major limitation on the net ranch income is the imbalance of forage production between the summer rangeland and the meadow hayland. But this rancher has not used the limited amount of capital available to him to fertilize the meadow hayland which would provide an immediate increase in the forage produced. This practice would allow him to produce more hay and still pasture the meadows during the summer and thus provide forage for an additional number of animal units on the ranch without acquiring additional land.

Spraying sagebrush, understocking and improvement of watering places have improved the carrying capacity of the rangeland, but a limitation has been imposed on the utilization of the range grass because there are no livestock control fences on the 6,900 acres of summer range. One cross fence will be built in the near future to separate the forested range. The operators preference for undivided range will preclude or delay the construction of further cross fences.

The practice of allowing the bulls to remain with the cow herd from May through September has also imposed a limitation on the

extent of the utilization that can be made of the summer forage. All the cows do not calve by the time they are distributed on the range, and the fast gain that a calf can obtain from the milk flow from the cow on the spring growth of forage is forfeited.

On ranch number 2 there are three major limitations imposed on the productivity of the native meadow and alfalfa hayland; (1) a large number of acres of the soil is highly alkaline, (2) the native meadow hay, the alfalfa hay and the pastures cannot be irrigated after July because of the lack of water, and (3) the present grasses do not provide an early spring growth of forage.

The lack of actual and accurate livestock weight records has imposed a limitation on the improvement of the performance of the livestock.

Thus a limitation has been imposed on the cash income earned from the ranch business to be used for operating expenses, the living expenses of the families of three operators, the investment in ranch improvements and debt service.

On ranch number 3 the quality and utilization of the range is limited by the topography and the lack of livestock water from seeps and springs. The operator has not hauled water to water tanks distributed on the range because there is no road on the steep slope of the hill that will permit the operator to follow this practice.

The areas of highly alkaline soils scattered throughout the

cropland imposes a limitation on the kinds of crops that can be produced. Also the composition of the subsoil increases the difficulty of removing the alkaline salt to increase the productivity of the soil.

The inadequate supply of water to flood irrigate the cropland during the late summer months poses a limitation on the present production of the cropland compared to the potential production. He has not used a sprinkler irrigation system because the labor requirement is less to flood irrigate from the irrigation ditches that exist on the ranch.

Until 1963 the lack of actual and accurate weaning weights has imposed a limitation on the ability of this operator to cull the least desirable cows from the herd and to select the heifers with the highest rate of gain for replacement heifers. Livestock weighing facilities are available on the ranch, but the operator did not use these facilities until 1963 to record the weight of calves because of the additional time and labor required.

The amount of net cash income earned by the ranch business has placed a limitation on the amount of capital available for operating expenses, investment capital and the family living expenses of the operator.

The operators of ranch number 4 have not been able to supply summer forage for as many cows and yearlings as they can maintain during the winter because (1) the soil on the summer rangeland is

thin and rocky, (2) medusa-head ryegrass has infested large areas of the range, and (3) inadequate supply and distribution of livestock water has hampered utilization of range forage. The operators have overcome part of the limitation of an inadequate supply of summer forage by boarding livestock on another rancher's grazing land.

The lack of livestock weighing facilities imposes a limitation on the amount of information available to use to cull cows from the herd and select replacement heifers. The installation of livestock weighing facilities has not been made because of the substantial investment required, and since they do not sell weaner calves, they have until the yearlings are to be bred to judge the performance of the heifers which will ultimately be selected as replacement heifers.

On ranch number 5 a major limitation is imposed on the net ranch income by the amount of forage produced on the summer range and the permanent pasture. This limitation has not been overcome because the operator has not recognized the possibilities for increased forage production or has not obtained the available information to make this management decision.

The necessary area of land needed to feed the present size of the livestock herd on during the winter is limited because of an insufficient water supply. As a result a portion of the livestock are fed during the winter on the alfalfa hayland.

The present practice of wintering livestock on the alfalfa

hayland limits the hay production and the number of acres of land that could otherwise be used for irrigated spring and summer pasture.

The lack of actual and accurate individual weaning weights of calves limit the operator in his effectiveness to select heifers with the highest rate of gain for replacement heifers. Livestock weighing facilities are available on the ranch; however, these facilities are not used because of the lack of labor.

The net cash income earned from the ranch business poses a limitation on the amount of capital available for operating capital, investment capital and family living expenses.

The operator of ranch number 6 has a limited quantity and quality of summer forage available because of the density of weeds on the rangeland. The operator has not followed a reseeding program because topography of the range restricts a satisfactory seedbed from being prepared for reseeding. He has not followed a chemical weed control program because he has not obtained the available information necessary to determine whether or not such a program would be profitable.

A limitation is imposed on the production of available forage on the summer range by the scarcity of rainfall in August and September. He has partially overcome this limitation by purchasing all of his hay for winter feed and using the native meadows in August and September for pasture.

The operator has actual weaning weight information; however, he has not used this information in the best manner to achieve the intended results in the selection of cows to be culled from the herd or the selection of the replacement heifers because he has not realized the results that could be obtained if he used the available information.

The net cash income earned from the ranch business is posing an increasing limitation on the amount of capital available for operating expenses, capital investments and family living expenses.

On all of the ranches studied, management is one of the major limitations on the adjustments that the ranch operators make to changing economic conditions. In some cases the limitations on adjustments are self-imposed by the manager after deciding that the economic return discounted by the risk involved, was low. In other cases, the managers do not adjust to recognized problems because they feel that they do not have the necessary information to permit decision making. In some cases the manager appeared to be limited in ability to perform the function of supervision and coordination to carry out the adjustments recognized as needed.

Credit is made readily available to most ranchers for operating expenses, livestock investments, machinery purchases, range improvement and land investment. The policies of the banks and the Production Credit Associations are such that the approved investment in livestock, machinery and land improvement is included in the

operating loan budget as an expense. The unpaid balance of the investment is then refinanced each year at the going interest rate for operating capital until the amount of the loan for such investment purpose is either paid off or terminated.

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APPENDIX

APPENDIX TABLE 1

Herbage and Beef Production on 40 Acres of Sprayed Range (14, p. 24)

Years	Precipitation Oct. to July (inches)	Forage ¹ Production (lb/A air dry)	Stocking Rate (yearling days)	Yearling Gains	
				(lb/day)	(lb/A)
1950	7.45	95	224	1.09	6.1
1951	11.26	280	406	0.58	5.6
1952	10.40	305	450	0.74	8.4
Pre-spray Averages	9.71	227	360	0.80	6.7
1953	13.28	723	1,146	0.62	17.6
1954	8.18	536	640	1.37	21.6
1955	5.79	290	336	1.18	9.9
1956	13.23	1,020	1,485	0.53	20.0
1957	12.99	924	1,248	0.43	13.6
1958	15.82	1,077	1,120	0.88	24.2
1959	5.84	391	360	1.80	16.2
1960	9.18	718	400	0.95	10.0
1961	7.05	370	275	0.87	6.0
1962	7.52	422	290	1.41	10.5
Post-spray Averages	9.89	647	730	1.00	15.0

¹ Non-forage weeds and legumes are not included.

APPENDIX TABLE 2

Species Composition in Percent by Weight (14, p. 25)

Year	Agsp ¹	Feid	Stth	Sihy	Kocr	Elcn	M. G.	Forbs	Brte
1951	31	10	5	--	24	-	28	2	--
1952	26	8	7	10	28	-	15	3	3
1953	23	6	5	14	28	-	10	10	4
1954	21	6	5	18	36	-	10	0	4
1955	30	11	8	18	23	-	9	0	1
1956 ²	26	8	4	10	26	-	13	4	9
1957	31	9	4	6	19	7	7	3	14
1958	25	11	2	5	15	5	6	1	30
1959	24	10	6	10	11	4	5	2	28
1960	26	9	2	4	7	5	6	2	39
1961	33	11	5	7	9	5	6	3	21
1962	26	5	9	4	7	8	11	2	28

- ¹ Agsp: Bluebunch wheatgrass
 Feid: Idaho fescue
 Stth: Thurber's needlegrass
 Sihy: Squirreltail grass
 Kocr: Junegrass
 Elcn: Great Basin ryegrass
 M. G.: Miscellaneous
 Forbs: includes Senecio, Tapertip hawksbeard and buckwheat
 Brte: Cheatgrass

- ² Species composition prior to 1956 estimated visually.
 Species composition as of 1956 to date were separated and weighed.

APPENDIX TABLE 3

Forage Yield Data from Ecological Study of Succession Following Sagebrush Removal on Fair and Poor Condition Range
Adjusted to Median-Year Precipitation (Pounds per Acre)¹ (15, p. 18)

Herbage Yield Index	Check							Spray							Rotobeat						
	1954	1955	1956	1957	1959	1961	1963	1954	1955	1956	1957	1959	1961	1963	1954	1955	1956	1957	1959	1961	1963
	.72	.47	1.30	1.18	.49	.60	N.A. ²	Same as for Check							Same as for Check						
FAIR CONDITION																					
Bluebunch wheatgrass	--	--	--	--	--	--	--	14	6	27	46	100	51	85	13	2	9	8	22	7	16
Idaho fescue	28	26	28	23	68	15	16	46	20	43	41	116	41	16	28	16	34	53	122	55	31
Thurber needlegrass	71	40	54	46	94	50	23	40	30	34	41	96	48	37	47	16	65	54	150	53	46
Squirreltail	46	24	41	27	48	23	26	48	32	72	69	136	121	150	36	4	51	78	198	129	49
Junegrass	4	2	7	6	8	4	2	3	2	23	28	42	23	21	23	2	42	74	40	19	15
Sandberg bluegrass	26	4	21	21	16	1	36	18	6	40	56	18	8	60	11	--	12	45	12	2	74
Cheatgrass	--	--	--	--	--	--	1	--	--	--	--	--	--	32	--	--	--	--	T ³	--	6
Other grasses	3	--	2	1	--	--	--	1	--	13	17	66	4	7	--	T	--	--	--	--	1
Total grasses	178	96	153	124	234	93	104	170	96	252	298	574	296	418	158	40	213	312	544	265	248
Total forbs	6	1	96	26	48	10	102	3	--	51	18	14	26	19	4	10	136	56	30	17	38
TOTAL	184	97	249	150	282	103	206	173	96	303	316	588	322	437	162	50	382	368	574	282	286
POOR CONDITION																					
Bluebunch wheatgrass	11	6	28	26	40	26	14	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Idaho fescue	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Thurber needlegrass	--	--	--	--	--	--	--	--	--	--	--	--	--	1	1	2	4	4	16	5	3
Squirreltail	10	4	7	12	20	19	36	28	22	113	137	232	108	66	43	16	101	150	256	143	74
Junegrass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	8
Sandberg bluegrass	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	1	2	--	--	1
Cheatgrass	--	--	--	--	84	--	46	--	--	--	20	336	41	414	--	--	--	9	202	10	180
Other grasses	1	T	3	2	44	10	13	--	--	7	13	6	2	4	--	--	4	1	30	17	2
Total grasses	22	10	38	40	188	55	109	28	22	120	170	574	151	484	44	18	110	166	504	175	268
Total forbs	27	8	48	55	76	8	23	20	2	325	180	372	118	10	17	2	292	252	236	68	26
TOTAL	49	18	86	95	264	63	132	48	24	445	350	946	269	494	61	20	402	418	740	243	294

¹ Adjusted yield = $\frac{\text{actual clipped oven-dry weight}}{\text{correction factor}}$

² N. A. : Not Available

³ T: Trace

APPENDIX TABLE 4

Percentage Reduction in Amount of Brush¹ Cover on Sagebrush-Grass
Plots Variouslly Treated in Ecological Study at Squaw Butte (15, p. 19)

Treatment	Range Condition	Brush Numbers			Brush Intercept in Ft.		
		1953	1961	Percent Reduction	1953	1961	Percent Reduction
Check	Fair	187	130	30.5	227.7	203.5	10.6
	Poor	458	295	35.6	361.5	303.9	15.9
	Mean			33.1			13.3
Rotobeat	Fair	214	38	82.2	165.2	10.0	93.9
	Poor	294	236	19.7	254.4	42.2	83.4
	Mean			50.9			88.6
Spray	Fair	234	2	99.1	125.2	0.0	100.0
	Poor	359	41	88.6	274.3	22.8	91.7
	Mean			93.8			95.8

¹ Nearly all big sagebrush, Artemisia tridentata, with a scattering of green rabbitbrush, Chrysothamnus viscidiflorus.

APPENDIX TABLE 5
Utilization and Season of Use for Each Range Unit on the Squaw Butte Range
and Livestock Experiment Station, Burns, Oregon. 1938-1963¹

Year	Range 1 (2145 acres)			Range 2 (2237 acres)			Range 3-I ⁴ (1705 acres)		
	AUD ²	AUM ³	Season	AUD	AUM	Season	AUD	AUM	Season
1938	5955	198.5	4/15-6/16	5827	194.2	4/15-11/5			
1939	4150	138.3	7/10-8/9	2719	90.6	4/13-8/9			
1940	5767	192.2	7/15-9/1	3684	122.8	4/17-9/1			
1941	6238	207.9	6/9-8/1	4438	147.9	4/15-9/19			
1942	4677	155.9	5/1-6/10	4561	152.0	5/1-9/18			
1943	4867	162.2	5/1-6/22	3235	107.8	5/1-9/15			
1944	5352	178.4	6/22-8/10	5257	175.2	4/25-9/25			
1945	5060	168.6	8/7-9/17	5764	192.1	5/1-9/18			
1946	5535	184.5	8/9-9/23	5873	195.7	5/1-9/23			
1947	6472	215.7	6/21-8/12	6310	210.3	4/30-9/30			
1948	5950	198.3	5/1-6/20	6364	212.1	5/1-10/4			
1949	5808	193.6	6/1-7/19	5969	198.9	6/1-9/27			
1950	2496	83.2	5/2-5/25	3390	113.0	5/2-9/5			
1951	5001	166.7	5/14-9/11	3714	123.8	5/14-7/26			
1952	5271	175.7	5/13-9/15	5550	185.0	6/3-9/15			
1953	4366	145.5	5/8-9/28	1635	54.5	6/12-7/14			
1954	3216	107.2	5/7-8/12	1917	63.9	7/30-9/7			
1955	2532	84.4	5/26-6/21	4008	133.6	4/9-7/14			
1960	3128	104.3	4/21-5/25	1628	54.3	5/2-5/24	1632	54.4	4/21-5/23
TOTAL	3128	104.3		1628	54.3		1632	54.4	
1961	3528	117.6	8/24-9/11	3100	103.3	6/15-7/10	4216	140.5	5/11-6/14
TOTAL	3528	117.6		3100	103.3		4216	140.5	
1962	4700	156.7	5/1-5/21	4648	154.9	6/4-7/30	1035	34.5	5/2-5/17
							1476	49.2	5/17-6/4
TOTAL	4700	156.7		4648	154.9		2511	83.7	
1963	-- ⁵	--	--	1530	51.0	7/3-8/2	329	11.0	5/3-5/10
				1612	53.7	8/2-8/28	780	26.0	5/10-5/23
							372	12.4	5/23-5/29
							1734	57.8	5/29-7/2
TOTAL				3142	104.7		3215	107.2	

APPENDIX TABLE 5 (Continued)

Year	Range 3-II (371 acres)			Total Range 3 (2076 acres)			Range 4 (2137 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938				--	--	--	--	--	--
1939				845	28.2	5/17-8/15	2017	67.2	8/10-8/23
1940				1316	43.9	6/1-7/31	1001	33.4	8/1-11/1
1941				1677	55.9	4/15-6/19	3600	120.0	6/19-9/18
1942				2219	74.0	5/1-9/18	--	--	--
1943				--	--	--	--	--	--
1944				2400	80.0	4/26-7/3	105	3.5	9/1-9/6
1945				4350	145.0	5/2-7/2	--	--	--
1946				1820	60.7	4/29-6/3	6896	229.8	6/3-9/24
1947				2772	92.4	4/30-6/5	5600	186.6	6/6-8/25
1948				7575	252.5	4/30-6/21	5796	193.2	6/21-8/18
1949				2958	98.6	5/3-6/1	6324	210.8	6/2-8/3
1950				3798	126.6	5/2-6/5	4350	145.0	6/6-8/5
1951				2160	72.0	6/8-7/30	2190	73.0	6/8-7/30
1952				3627	120.9	6/24-8/11	3234	107.8	6/24-7/30
1953				2244	74.8	6/12-7/14	5208	173.6	6/12-9/28
1954				2784	92.8	6/24-7/16	2418	80.6	6/4-6/23
1955				3687	122.9	8/2-9/8	2619	87.3	7/5-8/1
1960	570	19.0	7/15-8/3				4920	167.0	4/21-6/1
							3876	129.2	6/1-7/5
							2755	91.8	7/5-8/3
							2090	69.7	8/3-8/22
							960	32.0	8/22-9/15
							<u>3552</u>	<u>118.4</u>	9/15-10/17
TOTAL	570	19.0		2202	73.4		18153	605.1	
1961	672	22.4	7/11-8/8				99	3.3	5/24-6/2
	1428	47.6	8/8-9/11				816	27.2	6/2-6/6
							3090	103.0	6/6-6/21
							<u>3570</u>	<u>119.0</u>	6/21-7/8
TOTAL	2100	70.0		6316	210.5		7575	252.5	
1962	2695	89.8	7/16-7/27				5880	196.0	6/22-7/16
TOTAL	2695	89.8		5206	173.5		5880	196.0	
1963	200	6.7	8/22-8/27				9306	310.2	7/27-8/27
	202	6.7	8/28-8/30				640	21.3	8/27-9/12
	262	8.7	8/30-9/1				63	2.1	7/27-8/5
	1722	57.4	9/3-10/15						
TOTAL	2386	79.5		5601	186.7		10009	333.6	

APPENDIX TABLE 5 (Continued)

Year	Range 5 south (421 acres) ⁶			Range 5 east (537 acres)			Range 5 west (326 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938									
1939									
1940									
1941									
1942									
1943									
1944									
1945									
1946									
1947									
1948									
1949									
1950									
1951									
1952									
1953									
1954									
1955									
1960	434	14.5	6/1-6/15	94	3.1	5/25-5/26	93	3.1	5/25-5/26
	1260	42.0	8/3-9/14	1960	65.3	5/26-6/15	1960	65.3	5/26-6/15
	40	1.3	8/3-8/23	1400	46.7	6/15-6/29	1400	46.7	6/15-6/29
				91	3.0	9/1-9/15	91	3.0	9/1-9/15
				245	8.2	9/15-10/20	245	8.2	9/15-10/20
TOTAL	1734	57.8		3790	126.3		3789	126.3	
1961	--	--	--	3893	129.8	4/27-5/31	3893	129.8	4/27-5/31
				292	9.7	7/31-9/14	293	9.8	7/31-9/14
TOTAL				4185	139.5		4186	139.6	
1962	450	15.0	5/14-5/29	3797	126.6	5/22-6/22	3798	126.6	5/22-6/22
	2139	71.3	5/29-8/6						
TOTAL	2589	86.3		3797	126.6		3798	126.6	
1963	2788	92.9	5/29-8/5	2639	88.0	5/29-6/11	6765	225.5	6/24-7/27
	714	23.8	8/5-8/22	2070	69.0	6/11-6/29			
				615	20.5	6/21-6/24			
TOTAL	3502	116.7		5324	177.5		6765	225.5	

APPENDIX TABLE 5 (Continued)

Year	Range 5 north (592 acres)			Range 5 horse pasture (209 acres)			Total Range 5 (2085 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938							--	--	--
1939							--	--	--
1940							2081	69.4	9/5-9/15
1941							1990	66.3	9/22-11/1
1942							--	--	--
1943							--	--	--
1944							4339	144.6	7/4-9/27
1945							5056	168.5	7/2-9/19
1946							2040	68.0	8/3-9/23
1947							3983	132.8	4/30-9/30
1948							2987	99.6	6/22-10/4
1949							3127	104.2	7/2-9/27
1950							3276	109.2	6/6-9/5
1951							5106	170.2	N. A. ⁷
1952							2238	74.6	7/29-9/16
1953							1764	58.8	8/13-9/24
1954							840	28.0	6/24-7/8
1955							390	13.0	8/30-9/14
1960	465	15.5	4/26-5/27						
	114	3.8	5/27-6/15						
	2600	86.7	6/29-7/12						
	312	10.4	8/3-8/29						
	42	1.4	8/29-9/1						
TOTAL	3533	117.8		--	--		12846	428.2	
1961	1421	47.4	6/2-7/21						
TOTAL	1421	47.4		--	--		9792	326.5	
1962	338	11.3	5/3-5/29						
	100	3.3	7/27-8/6						
	803	26.8	8/6-10/18						
TOTAL	1241	41.4		--	--		11425	380.9	
1963	1000	33.3	5/2-5/27	135	4.5	5/2-5/29			
	145	4.8	5/29-6/27						
	468	15.6	6/27-8/5						
	119	4.0	8/5-8/22						
	486	16.2	8/22-10/15						
TOTAL	2218	73.9		135	4.5		17944	598.1	

APPENDIX TABLE 5 (Continued)

Year	Range 6 (2117 acres)			Range 7 (2143 acres)			Range 8 (160 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938	6578	219.2	8/18-11/4	5229	174.3	6/14-8/18	--	--	--
1939	8236	274.5	5/17-7/10	5873	195.7	4/13-5/16	--	--	--
1940	5679	189.3	4/17-7/10	4801	160.0	6/1-7/12	--	--	--
1941	6160	205.3	4/15-6/9	5519	183.9	8/2-9/19	120	4.0	11/1-12/1
1942	5236	174.5	6/10-7/24	6657	221.9	7/24-9/18	--	--	--
1943	4004	133.4	8/2-9/15	3792	126.4	6/22-8/2	--	--	--
1944	4983	166.1	8/11-9/26	5832	194.4	4/25-6/19	--	--	--
1945	5793	193.1	6/20-8/6	5902	196.7	5/1-6/19	700	23.3	9/18-9/24
1946	6035	201.1	5/1-6/20	6058	201.9	6/20-8/8	792	26.4	5/1-6/3
1947	6190	206.3	4/30-6/20	5828	194.2	8/13-9/29	1441	48.0	5/15-9/30
1948	6239	207.9	6/21-8/10	6750	225.0	8/11-10/4	560	18.7	6/21-8/11
1949	6050	201.6	7/19-9/7	5784	192.8	5/13-9/27	210	7.0	5/3-7/2
1950	5199	173.3	5/26-7/14	3120	104.0	7/15-9/5	--	--	--
1951	5064	168.8	6/1-9/12	4854	161.8	5/14-9/11	--	--	--
1952	1794	59.8	6/10-7/7	2787	92.9	5/13-9/16	--	--	--
1953	6897	229.9	5/8-9/28	2145	71.5	5/8-6/12	--	--	--
1954	3555	118.5	5/19-8/12	5202	173.4	5/7-9/12	--	--	--
1955	2802	93.4	5/9-9/20	3618	120.6	5/26-9/30	527	17.6	N. A.
1960	7544	251.5	7/13-8/23	4026	134.2	8/23-9/14	448	14.9	5/2-8/22
				4686	156.2	9/14-10/17			
TOTAL	7544	251.5		8712	290.4		448	14.9	
1961	4830	161.0	7/8-7/31	4704	156.8	7/31-8/24	252	8.4	7/31-9/11
TOTAL	4830	161.0		4704	156.8		252	8.4	
1962	6580	219.3	8/13-9/10	4935	164.5	9/10-10/1	999	33.3	7/27-8/13
	228	7.6	8/23-9/4	4767	158.9	10/1-10/22			
	174	5.8	9/4-9/10	1218	40.6	9/10-10/22			
TOTAL	6982	232.7		10920	364.0		999	33.3	
1963	9282	309.4	9/12-10/21	5174	172.5	5/1-5/27	430	14.3	8/6-9/18
TOTAL	9282	309.4		5174	172.5		430	14.3	

APPENDIX TABLE 5 (Continued)

Year	Range 9 (160 acres)			Range 10 (160 acres)			Range 11 (160 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938	--	--	--	--	--	--	--	--	--
1939	--	--	--	1034	34.5	8/10-8/21	--	--	--
1940	--	--	--	--	--	--	--	--	--
1941	120	4.0	11/1-12/1	120	4.0	11/1-12/1	120	4.0	11/1-12/1
1942	--	--	--	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--	--
1944	--	--	--	--	--	--	--	--	--
1945	700	23.3	9/18-9/24	580	19.3	5/2-9/18	580	19.3	5/2-9/18
1946	792	26.4	5/1-6/3	580	19.3	6/4-8/2	580	19.3	6/4-8/2
1947	1441	48.0	5/15-9/30	162	5.4	4/30-5/15	162	5.4	4/30-5/15
1948	560	18.7	6/21-8/11	583	19.4	8/12-10/4	583	19.4	8/12-10/4
1949	210	7.0	5/3-7/2	210	7.0	5/3-7/2	210	7.0	5/3-7/2
1950	--	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--	--
1952	--	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	--	--	--
1954	--	--	--	559	18.6	6/4-6/23	559	18.6	6/4-6/23
1955	527	17.6	N. A.	527	17.6	N. A.	527	17.6	N. A.
1960	448	14.9	5/2-8/22	448	14.9	5/2-8/22	448	14.9	5/2-8/22
TOTAL	448	14.9		448	14.9		448	14.9	
1961	252	8.4	7/31-9/11	252	8.4	7/31-9/11	252	8.4	7/31-9/11
TOTAL	252	8.4		252	8.4		252	8.4	
1962	999	33.3	7/27-8/13	999	33.3	7/27-8/13	998	33.3	7/27-8/13
TOTAL	999	33.3		999	33.3		998	33.3	
1963	90	3.0	5/3-5/9	90	3.0	5/3-5/9	90	3.0	5/3-5/9
	299	10.0	5/9-8/1	1092	36.4	5/9-8/1	1092	36.4	5/9-8/1
TOTAL	389	13.0		1182	39.4		1182	39.4	

APPENDIX TABLE 5 (Continued)

Year	Range 12 (160 acres)			Range 13 (160 acres)			Range 14 (160 acres)		
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM	Season
1938	--	--	--	--	--	--	--	--	--
1939	--	--	--	24	0.8	6/27-6/28	--	--	--
1940	192	6.4	8/10-9/15	193	6.4	8/10-9/15	--	--	--
1941	--	--	--	--	--	--	--	--	--
1942	--	--	--	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--	--
1944	554	18.5	8/2-9/26	554	18.5	8/2-9/26	--	--	--
1945	856	28.5	6/1-10/8	856	28.5	6/1-10/8	--	--	--
1946	966	32.2	4/25-8/19	966	32.2	4/25-8/19	--	--	--
1947	677	22.6	4/25-8/29	677	22.6	4/25-4/29	--	--	--
1948	1546	51.5	4/23-6/20	1546	51.5	4/23-6/20	--	--	--
1949	210	7.0	5/3-7/2	210	7.0	5/3-7/2	--	--	--
1950	--	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--	--
1952	--	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	--	--	--
1954	--	--	--	--	--	--	--	--	--
1955	527	17.6	N. A.	527	17.6	N. A.	--	--	--
1960	448	14.9	5/2-8/22	448	14.9	5/2-8/22	405	13.5	7/6-8/2
TOTAL	448	14.9		448	14.9		405	13.5	
1961	252	8.4	7/31-9/11	252	8.4	7/31-9/11	270	9.0	7/11-8/7
TOTAL	252	8.4		252	8.4		270	9.0	
1962	308	10.3	5/1-10/2	308	10.3	5/1-10/2	280	9.3	8/7-9/4
TOTAL	308	10.3		308	10.3		280	9.3	
1963	192	6.4	4/24-5/29	193	6.4	4/24-5/29	975	32.5	8/2-8/27
	26	0.9	5/29-6/11	26	0.9	5/29-6/11			
	177	5.9	8/5-10/15	178	5.9	8/5-10/15			
TOTAL	395	13.2		397	13.2		975	32.5	

APPENDIX TABLE 5 (Continued)

Year	Range 15 (50 acres) ⁸			Range 16 (150 acres) ⁹			Total (16,140 acres)	
	AUD	AUM	Season	AUD	AUM	Season	AUD	AUM
1938							23,589	786.2
1939							24,898	829.8
1940							24,714	823.8
1941							30,102	1003.2
1942							23,350	778.3
1943							15,898	529.8
1944							29,376	979.2
1945							36,197	1206.2
1946							38,933	1297.5
1947							41,715	1390.3
1948							47,039	1567.8
1949							37,280	1242.5
1950							25,629	854.3
1951							28,089	936.3
1952							24,501	816.7
1953							24,259	808.6
1954							21,050	701.6
1955							22,818	760.8
1960								
TOTAL							57,306	1910.1
1961								
TOTAL							41,627	1387.6
1962				135	4.5	5/14-5/17		
				2940	98.0	5/17-8/23		
TOTAL				3075	102.5		57,727	1924.3
1963	222	7.4	5/3-5/9	240	8.0	5/21-5/29		
	360	12.0	5/9-5/21	533	17.8	5/29-6/11		
	533	17.8	6/11-6/24	1148	38.3	6/24-7/22		
	410	13.7	7/22-8/1	240	8.0	8/1-8/9		
	13	0.4	6/11-6/24	192	6.4	8/9-8/15		
	10	0.3	7/22-8/11	420	14.0	8/15-8/29		
				63	2.1	9/3-9/10		
				13	0.4	5/29-6/11		
				28	0.9	6/24-7/22		
TOTAL	1548	51.6		2877	95.9		60,527	2017.5

FOOTNOTES FOR APPENDIX TABLE 5

- ¹ Data were not available for any of the four years from 1956 through 1959.
- ² AUD: Animal Unit Days equals the number of animal units times the number of days the animal units were grazing on the range.

One cow and one calf	= one animal unit
One yearling	= one animal unit
One bull	= one animal unit
- ³ AUM: Animal Unit Month = Animal Unit Days divided by 30.
- ⁴ Range 3 was divided into two parts in 1958. Data for the respective parts are recorded after 1960. The total utilization of the two parts is recorded under Total Range 3.
- ⁵ All hyphens indicate that cattle did not graze on the indicated range during this year.
- ⁶ Range 5 was divided into five parts in 1958-1959. Data for the respective parts are recorded after 1960. The total utilization of the five parts are recorded under Total Range 5.
- ⁷ N.A.: Not available.
- ⁸ Data were available in 1963 only.
- ⁹ Data were available only in 1962 and 1963.

APPENDIX TABLE 6

Estimated Pounds of Forage Utilized for Each Range Unit on the Squaw Butte Range
and Livestock Experiment Station, Burns, Oregon. 1938-1963¹

Year	Range 1 (2145 acres)				Range 2 (2237 acres)			
	AUM ²	A/AUM ³	# Forage ⁴	# Forage/A ⁵	AUM	A/AUM	# Forage	# Forage/A
1938	198.5	10.8	158,800	74.0	194.2	11.5	155,360	69.5
1939	138.3	15.5	110,640	51.6	90.6	24.7	72,480	32.4
1940	192.2	11.2	153,760	71.7	122.8	18.2	98,240	43.9
1941	207.9	10.3	166,320	77.5	147.9	15.1	118,320	52.9
1942	155.9	13.8	124,720	58.1	152.0	14.7	121,600	54.4
1943	162.2	13.2	129,760	60.5	107.8	20.8	86,240	38.6
1944	178.4	12.0	142,720	66.5	175.2	12.8	140,160	62.7
1945	168.6	12.7	134,880	62.9	192.1	11.6	153,680	68.7
1946	184.5	11.6	147,600	68.6	195.7	11.4	156,560	70.0
1947	215.7	9.9	172,560	80.4	210.3	10.6	168,240	75.2
1948	198.3	10.8	158,640	74.0	212.1	10.5	169,680	75.9
1949	193.6	11.1	154,880	72.2	198.9	11.2	159,120	71.1
1950	83.2	25.8	66,560	31.0	113.0	19.8	90,400	40.4
1951	166.7	12.9	133,360	62.2	123.8	18.1	99,040	44.3
1952	175.7	12.2	140,560	65.5	185.0	12.1	148,000	66.2
1953	145.5	14.7	116,400	54.3	54.5	41.0	43,600	19.5
1954	107.2	20.0	85,760	40.0	63.9	35.0	51,120	22.9
1955	84.4	25.4	67,520	31.5	133.6	16.7	106,880	47.8
1960	104.3	20.6	83,440	38.9	54.3	41.2	43,440	19.4
1961	117.6	18.2	94,080	43.9	103.3	21.7	82,640	36.9
1962	156.7	13.7	125,360	58.4	154.9	14.4	123,920	55.4
1963	-- ⁶	--	--	--	104.7	21.4	83,760	37.4

APPENDIX TABLE 6 (Continued)

Year	Range 3-I ⁷ (1705 acres)				Range 3-II (371 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938								
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								
1954								
1955								
1960	54.4	31.3	43,520	25.5	19.0	19.5	15,200	41.0
1961	140.5	12.1	112,400	65.9	70.0	5.3	56,000	150.9
1962	83.7	20.4	66,960	39.3	89.8	4.1	71,840	193.6
1963	107.2	15.9	85,760	50.3	79.5	4.7	63,600	171.4

APPENDIX TABLE 6 (Continued)

Year	Total Range 3 (2076 acres)				Range 4 (2137 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938	--	--	--	--	--	--	--	--
1939	28.2	73.6	22,560	10.9	67.2	31.8	53,760	25.2
1940	43.9	47.3	35,120	16.9	33.4	64.0	26,720	12.5
1941	55.9	37.1	44,720	21.5	120.0	17.8	96,000	44.9
1942	74.0	28.1	59,200	28.5	--	--	--	--
1943	--	--	--	--	--	--	--	--
1944	80.0	26.0	64,000	30.8	3.5	610.6	2,800	1.3
1945	145.0	14.3	11,600	5.6	--	--	--	--
1946	60.7	34.2	48,560	23.4	229.8	9.3	183,840	86.0
1947	92.4	22.5	73,920	35.6	186.6	11.5	149,280	69.9
1948	252.5	8.2	202,000	97.3	193.2	11.1	154,560	72.3
1949	98.6	21.1	78,880	38.0	210.8	10.1	168,640	78.9
1950	126.6	16.4	101,280	48.8	145.0	14.7	116,000	54.3
1951	72.0	28.8	57,600	27.7	73.0	29.3	58,400	27.3
1952	120.9	17.2	96,720	46.6	107.8	19.8	86,240	40.4
1953	74.8	27.8	59,840	28.8	173.6	12.3	138,880	65.0
1954	92.8	22.4	74,240	35.8	80.6	26.5	64,480	30.2
1955	122.9	16.9	98,320	47.4	87.3	24.5	69,840	32.7
1960	73.4	28.3	58,720	28.3	605.1	3.5	484,080	226.5
1961	210.5	9.9	168,400	81.1	252.5	8.5	202,000	94.5
1962	173.5	12.0	138,800	66.9	196.0	10.9	156,800	73.4
1963	186.7	11.1	149,360	71.9	333.6	6.4	266,880	124.9

APPENDIX TABLE 6 (Continued)

	Range 5 South ⁸ (421 acres)				Range 5 East (537 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938								
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								
1954								
1955								
1960	57.8	7.3	46,240	109.8	126.3	4.3	101,040	188.2
1961	--	--	--	--	139.5	3.8	111,600	207.8
1962	86.3	4.9	69,040	164.0	126.6	4.2	101,280	188.6
1963	116.7	3.6	93,360	221.8	177.5	3.0	142,000	264.4

APPENDIX TABLE 6 (Continued)

Year	Range 5 West (326 acres)				Range 5 North (592 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938								
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								
1954								
1955								
1960	126.3	2.6	101,040	309.9	117.8	5.0	94,240	159.2
1961	139.6	2.3	111,680	342.6	47.4	12.5	37,920	64.1
1962	126.6	2.6	101,280	310.7	41.4	14.3	33,120	55.9
1963	225.5	1.4	180,400	553.4	73.9	8.0	59,120	99.9

APPENDIX TABLE 6 (Continued)

Year	Range 5 Horse Pasture (209 acres)				Total Range 5 (2085 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938					--	--	--	--
1939					--	--	--	--
1940					69.4	30.0	55,520	26.6
1941					66.3	31.4	53,040	25.4
1942					--	--	--	--
1943					--	--	--	--
1944					144.6	14.4	115,680	55.5
1945					168.5	12.4	134,800	64.7
1946					68.0	30.7	54,400	26.1
1947					132.8	15.7	106,240	51.0
1948					99.6	20.9	79,680	38.2
1949					104.2	20.0	83,360	40.0
1950					109.2	19.1	87,360	41.9
1951					170.2	12.3	136,160	65.3
1952					74.6	27.9	59,680	28.6
1953					58.8	35.5	47,040	22.6
1954					28.0	74.5	22,400	10.7
1955					13.0	160.4	10,400	5.0
1960	--	--	--	--	428.2	4.9	342,560	164.3
1961	--	--	--	--	326.5	6.4	261,200	125.3
1962	--	--	--	--	380.9	5.5	304,720	146.1
1963	4.5	46.4	3,600	17.2	598.1	3.5	478,480	229.5

APPENDIX TABLE 6 (Continued)

Year	Range 6 (2117 acres)				Range 7 (2143 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938	219.2	9.7	175,360	82.8	174.3	12.3	139,440	65.1
1939	274.5	7.7	219,600	103.7	195.7	11.0	156,560	73.1
1940	189.3	11.2	151,440	71.5	160.0	13.4	128,000	59.7
1941	205.3	10.3	164,240	77.6	183.9	11.7	147,120	68.7
1942	174.5	12.1	139,600	65.9	221.9	9.7	177,520	82.8
1943	133.4	15.9	106,720	50.4	126.4	17.0	101,120	47.2
1944	166.1	12.7	132,880	62.8	194.4	11.0	155,520	72.6
1945	193.1	11.0	154,480	73.0	196.7	10.9	157,360	73.4
1946	201.1	10.5	160,880	76.0	201.9	10.6	161,520	75.4
1947	206.3	10.3	165,040	78.0	194.2	11.0	155,360	72.5
1948	207.9	10.2	166,320	78.6	225.0	9.5	180,000	84.0
1949	201.6	10.5	161,280	76.2	192.8	11.1	154,240	72.0
1950	173.3	12.2	138,640	65.5	104.0	20.6	83,200	38.8
1951	168.8	12.5	135,040	63.8	161.8	13.2	129,440	60.4
1952	59.8	35.4	47,840	22.6	92.9	23.1	74,320	34.7
1953	229.9	9.2	183,920	86.9	71.5	30.0	57,200	26.7
1954	118.5	17.9	94,800	44.8	173.4	12.4	138,720	64.7
1955	93.4	22.7	74,720	35.3	120.6	17.8	96,480	45.0
1960	251.5	8.4	201,200	95.0	290.4	7.4	232,320	108.4
1961	161.0	13.1	128,800	60.8	156.8	13.7	125,440	58.5
1962	232.7	9.1	186,160	87.9	364.0	5.9	291,200	135.9
1963	309.4	6.8	247,520	116.9	172.5	12.4	138,000	64.4

APPENDIX TABLE 6 (Continued)

Year	Range 8 (160 acres)				Range 9 (160 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938	--	--	--	--	--	--	--	--
1939	--	--	--	--	--	--	--	--
1940	--	--	--	--	--	--	--	--
1941	4.0	40.0	3,200	20.0	4.0	40.0	3,200	20.0
1942	--	--	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--
1944	--	--	--	--	--	--	--	--
1945	23.0	6.9	18,640	116.5	23.3	6.9	18,640	116.5
1946	26.4	6.1	21,120	132.0	26.4	6.1	21,120	132.0
1947	48.0	3.3	38,400	240.0	48.0	3.3	38,400	240.0
1948	18.7	8.6	14,960	93.5	18.7	8.6	14,960	93.5
1949	7.0	22.9	5,600	35.0	7.0	22.9	5,600	35.0
1950	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--
1952	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	--	--
1954	--	--	--	--	--	--	--	--
1955	17.6	9.1	14,080	88.0	17.6	9.1	14,080	88.0
1960	14.9	10.7	11,920	74.5	14.9	10.7	11,920	74.5
1961	8.4	19.4	6,720	42.0	8.4	19.0	6,720	42.0
1962	33.3	4.8	26,640	166.5	33.3	4.8	26,640	166.5
1963	14.3	11.2	11,440	71.5	13.0	12.3	10,400	65.0

APPENDIX TABLE 6 (Continued)

Year	Range 10 (160 acres)				Range 11 (160 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938	--	--	--	--	--	--	--	--
1939	34.5	4.6	27,600	172.5	--	--	--	--
1940	--	--	--	--	6.4	25.0	5,120	23.0
1941	4.0	40.0	3,200	20.0	4.0	40.0	3,200	20.0
1942	--	--	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--
1944	--	--	--	--	--	--	--	--
1945	19.3	8.3	15,440	96.5	19.3	8.3	15,440	96.5
1946	19.3	8.3	15,440	96.5	19.3	8.3	15,440	96.5
1947	5.4	29.6	4,320	27.0	5.4	29.6	4,320	27.0
1948	19.4	8.2	15,520	97.0	19.4	8.2	15,520	97.0
1949	7.0	22.9	5,600	35.0	7.0	22.9	5,600	35.0
1950	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--
1952	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	--	--
1954	18.6	8.6	14,880	93.0	18.6	8.6	14,880	93.0
1955	17.6	9.1	14,080	88.0	17.6	9.1	14,080	88.0
1960	14.9	10.7	11,920	74.5	14.9	10.7	11,920	74.5
1961	8.4	19.0	6,720	42.0	8.4	19.0	6,720	42.0
1962	33.3	4.8	26,640	166.5	33.3	4.8	26,640	166.5
1963	39.4	4.1	31,520	197.0	39.4	4.1	31,520	197.0

APPENDIX TABLE 6 (Continued)

Year	Range 12 (160 acres)				Range 13 (160 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938	--	--	--	--	--	--	--	--
1939	--	--	--	--	0.8	200.0	640	4.0
1940	6.4	25.0	5,120	32.0	6.4	25.0	5,120	32.0
1941	--	--	--	--	--	--	--	--
1942	--	--	--	--	--	--	--	--
1943	--	--	--	--	--	--	--	--
1944	18.5	8.6	14,800	92.5	18.5	8.6	14,800	92.5
1945	28.5	5.6	22,800	142.5	28.5	5.6	22,800	142.5
1946	32.2	5.0	25,760	161.0	32.2	5.0	25,760	161.0
1947	22.6	7.1	18,080	113.0	22.6	7.1	18,080	113.0
1948	51.5	3.1	41,200	257.5	51.5	3.1	41,200	257.5
1949	7.0	22.9	5,600	35.0	7.0	22.9	5,600	35.0
1950	--	--	--	--	--	--	--	--
1951	--	--	--	--	--	--	--	--
1952	--	--	--	--	--	--	--	--
1953	--	--	--	--	--	--	--	--
1954	--	--	--	--	--	--	--	--
1955	17.6	9.1	14,080	88.0	17.6	9.1	14,080	88.0
1960	14.9	10.7	11,920	74.5	14.9	10.7	11,920	74.5
1961	8.4	19.0	6,720	42.0	8.4	19.0	6,720	42.0
1962	10.3	15.5	8,240	51.5	10.3	15.5	8,240	51.5
1963	13.2	12.1	10,560	66.0	13.2	12.1	10,560	66.0

APPENDIX TABLE 6 (Continued)

Year	Range 14 (40 acres)				Range 15 ⁹ (50 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938								
1939								
1940								
1941								
1942								
1943								
1944								
1945								
1946								
1947								
1948								
1949								
1950								
1951								
1952								
1953								
1954								
1955								
1960	13.5	3.0	10,800	270.0				
1961	9.0	4.4	7,200	180.0				
1962	9.3	4.3	7,440	186.0				
1963	32.5	1.2	26,000	650.0	51.6	1.0	41,280	825.6

APPENDIX TABLE 6 (Continued)

Year	Range 16 ¹⁰ (150 acres)				Total Squaw Butte Range (16,140 acres)			
	AUM	A/AUM	# Forage	# Forage/A	AUM	A/AUM	# Forage	# Forage/A
1938					786.2	20.5	628,960	39.0
1939					829.8	19.4	663,840	41.1
1940					823.8	19.6	659,040	40.8
1941					1,003.2	16.1	802,560	49.7
1942					778.3	20.7	622,640	38.6
1943					529.8	30.5	423,840	26.3
1944					979.2	16.5	783,360	48.5
1945					1,206.2	13.4	964,960	59.8
1946					1,297.5	12.4	1,038,000	64.3
1947					1,390.3	11.6	1,112,240	68.9
1948					1,567.8	10.3	1,254,240	77.7
1949					1,242.5	13.0	994,000	61.6
1950					854.3	18.9	683,440	42.3
1951					936.3	17.2	749,040	46.4
1952					816.7	19.8	653,360	40.5
1953					808.6	20.0	646,880	40.1
1954					701.6	23.0	561,280	34.8
1955					706.8	22.8	565,440	35.0
1960					1,910.1	8.4	1,528,080	94.7
1961					1,387.6	11.6	1,110,080	68.8
1962	102.5	1.5	82,000	546.7	1,924.3	8.4	1,539,440	95.4
1963	95.9	1.6	76,720	511.5	2,017.5	8.0	1,614,000	100.0

FOOTNOTES FOR APPENDIX TABLE 6

- ¹ Data were not available for any of the four years from 1956 through 1959.
- ² Animal Unit Months of utilization from Appendix Table 5.
- ³ Acres per Animal Unit Month.
- ⁴ Pounds of forage utilized, assuming 800 pounds of forage is equivalent to one Animal Unit Month.
- ⁵ Estimated pounds of forage utilized per acre.
- ⁶ All hyphens indicate that cattle did not graze on the indicated range during this year.
- ⁷ Range three was divided into two parts in 1958. Data for the respective parts are recorded after 1960. The total utilization of the two parts is recorded under Total Range 3.
- ⁸ Range five was divided into five parts in 1958-1959. Data for the respective parts are recorded after 1960. The total utilization of the five parts are recorded under Total Range 5.
- ⁹ Data were available in 1963 only.
- ¹⁰ Data were available only in 1962 and 1963.

APPENDIX TABLE 7

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch A
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
1960 truck	1962	3,999	999	3,000	8	--	--	--	188	375	--	--	3,999	3,811
Safe	1962	228	28	200	40	--	--	--	5	5	--	--	228	223
Desk	1962	209	29	180	10	--	--	--	18	18	--	--	209	191
Adding machine	1959	120	30	90	10	9	9	9	9	9	111	102	93	84
Catepillar	1952	4,913	500	4,413	10	3,528	441	441	--	--	1,385	944	503	503
2 drills	1952	1,250	110	1,140	10	912	114	114	--	--	338	224	110	110
Combine	1957	10,110	1,044	9,066	5	3,626	1,813	1,813	1,814	--	6,484	4,671	2,858	1,044
2 plows	1958	1,900	220	1,680	5	552	336	336	336	120	1,348	1,012	676	340
Swather	1962	2,977	277	2,700	10	--	--	--	135	270	--	--	2,977	2,842
Cultivator	1962	960	160	800	10	--	--	--	60	80	--	--	960	900
Auto (50%)	1962	4,822	2,901	1,921	5	--	--	--	200	384	--	--	4,822	4,622
Chafe unit	1962	1,595	95	1,500	10	--	--	--	20	150	--	--	1,595	1,575
Combine	1962	5,581	581	5,000	10	--	--	--	80	500	--	--	5,581	5,501
Trailer	1963	272	--	272	10	--	--	--	--	27	--	--	--	272
Tractor	1963	6,080	580	5,500	10	--	--	--	--	360	--	--	--	6,080
Willys Jeep	1963	3,375	675	2,700	5	--	--	--	--	180	--	--	--	3,375
Land plane	1963	1,272	272	1,000	10	--	--	--	--	50	--	--	--	1,272
Saddle	1963	140	--	140	10	--	--	--	--	7	--	--	--	140
Straw dump	1961	1,565	265	1,300	10	--	--	130	130	130	--	1,565	1,435	1,305
1962 pickup	1961	2,335	835	1,500	5	--	--	300	300	300	--	2,335	2,035	1,735
1961 IHC Scout	1961	1,955	755	1,200	5	--	--	240	240	240	--	1,955	1,715	1,475
IHC truck	1961	9,800	1,800	8,000	10	--	--	800	800	800	--	9,800	9,000	8,200
TD 14 (used)	1961	3,200	1,200	2,000	5	--	--	400	400	400	--	3,200	2,800	2,400
Farm hand loader	1961	1,260	260	1,000	10	--	--	100	100	100	--	1,260	1,160	1,060
Combine	1961	6,000	2,000	4,000	5	--	--	800	800	800	--	6,000	5,200	4,400
Tractor	1958	3,500	300	3,200	5	1,280	640	640	640	--	2,220	1,580	940	300
Chopper	1958	1,070	102	968	5	388	194	194	192	--	682	488	294	102
Baler	1959	2,300	500	1,800	10	180	180	180	180	180	2,120	1,940	1,760	1,580
Jeep	1958	3,692	434	3,258	5	1,304	652	652	650	--	2,388	1,736	1,084	434
D-6 caterpillar and equipment	1960	27,223	5,400	21,823	10	--	2,182	2,182	2,182	2,182	27,223	25,041	22,859	20,677

APPENDIX TABLE 7 (Continued)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Jeep pickup	1960	1,200	300	900	5	--	180	180	180	180	1,200	1,020	840	660
Tractor	1961	3,000	1,000	2,000	5	--	--	400	400	400	--	3,000	2,600	2,200
Barn	1955	7,000	--	7,000	20	1,750	350	350	350	350	5,250	4,900	4,550	4,200
Dwelling #3	1955	14,000	1,650	12,350	30	2,060	412	412	412	412	11,940	11,528	11,116	10,704
Garage	1955	500	--	500	20	125	25	25	25	25	375	350	325	300
Poultry house	1955	1,000	--	1,000	20	250	50	50	50	50	750	700	650	600
Shop	1955	1,500	280	1,220	10	610	122	122	122	122	890	768	646	524
Dwelling #2	1955	6,000	600	5,400	20	1,350	270	270	270	270	4,650	4,380	4,110	3,840
Horse barn	1955	1,500	280	1,220	10	610	122	122	122	122	890	768	646	524
Grainary	1955	2,500	--	2,500	20	625	125	125	125	125	1,875	1,750	1,625	1,500
Stack shed	1955	5,000	--	5,000	20	1,250	250	250	250	250	3,750	3,500	3,250	3,000
Irr. head gates	1955	500	--	500	10	250	50	50	50	50	250	200	150	100
4.75 mi. w. w. fence	1955	1,895	--	1,895	10	950	190	190	190	190	945	755	565	375
19.2 mi. b. w. fence	1957	5,760	--	5,760	10	1,728	576	576	576	576	4,032	3,456	2,880	2,304
Machine shed	1955	1,000	200	800	10	400	80	80	80	80	600	520	440	360
Dwelling #4	1957	2,000	190	1,810	20	270	90	90	90	90	1,730	1,640	1,550	1,460
Barn #4	1957	2,000	--	2,000	8	750	250	250	250	250	1,250	1,000	750	500
Barn improvements	1963	1,160	--	1,160	20	--	--	--	--	20	--	--	--	1,160
Dwelling	1960	17,500	15,700	1,800	30	--	60	60	60	60	17,500	17,440	17,380	17,320
Machine shed	1960	4,500	500	4,000	20	--	200	200	200	200	4,500	4,300	4,100	3,900
Grain storage	1961	14,345	--	14,345	40	--	--	359	359	359	--	14,345	13,986	13,627
TOTAL		207,563	43,052	164,511		24,757	9,963	13,492	13,640	11,848	106,676	140,173	147,052	145,711
Machinery & Eqpt.		117,903	23,652	94,251		11,779	6,741	9,911	10,059	8,247	45,499	67,873	78,333	79,413
Buildings & Impvmt.		89,660	19,400	70,260		12,978	3,222	3,581	3,581	3,601	61,177	72,300	68,719	66,298
TOTAL		207,563	43,052	164,511		24,757	9,963	13,492	13,640	11,848	106,676	140,173	147,052	145,711

APPENDIX TABLE 8

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 1
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
1940 tractor	1940	900	140	760	10	760	--	--	--	--	140	140	140	140
2-way plow	1940	200	40	160	10	160	--	--	--	--	40	40	40	40
7' disc	1940	200	95	105	10	105	--	--	--	--	95	95	95	95
Buck rake	1940	200	--	200	10	200	--	--	--	--	--	--	--	--
Manure spreader	1941	200	88	112	10	112	--	--	--	--	88	88	88	88
Spring tooth harrow	1942	54	16	38	10	38	--	--	--	--	16	16	16	16
Feed cutter	1946	450	155	295	10	295	--	--	--	--	155	155	155	155
Wagon	1947	250	92	158	10	158	--	--	--	--	92	92	92	92
Gas welder	1947	108	20	88	10	88	--	--	--	--	20	20	20	20
1948 tractor	1957	894	334	560	5	336	112	112	--	--	558	446	334	334
A. tractor	1949	2,590	400	2,190	10	2,190	--	--	--	--	400	400	400	400
Hay stacker	1949	883	100	783	10	783	--	--	--	--	100	100	100	100
Wagon	1950	437	50	387	10	387	--	--	--	--	50	50	50	50
Drill press	1951	376	50	326	10	297	29	--	--	--	79	50	50	50
1952 Buck rake	1953	1,000	100	900	10	630	90	90	90	--	370	280	190	100
50 tractor	1953	2,632	400	2,232	10	1,561	223	223	223	--	1,071	848	625	402
7' mower	1953	331	50	281	10	196	28	28	28	--	135	107	79	51
8' fertilizer spreader	1953	237	37	200	10	140	20	20	20	--	97	77	57	37
D-2 caterpillar tractor & dozer blade	1955	8,096	1,050	7,046	10	3,525	705	705	705	705	4,571	3,866	3,161	2,456
Pumps	1955	277	--	277	10	140	28	28	28	28	137	109	81	53
Grain drill (1/2 int.)	1956	325	--	325	10	64	32	32	32	32	261	229	197	165
Oil tank	1956	60	--	60	10	24	6	6	6	6	36	30	24	18
Sprayer	1957	226	--	226	10	69	23	23	23	23	157	134	111	88

APPENDIX TABLE 8 (Continued)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
21' rake	1958	885	--	885	10	176	88	88	88	88	709	621	533	445
Irrigation pump	1958	2,000	--	2,000	10	400	200	200	200	200	1,600	1,400	1,200	1,000
Grapple fork	1958	177	--	177	10	36	18	18	18	18	141	123	105	87
Farm building	1958	1,520	--	1,520	10	304	152	152	152	152	1,216	1,064	912	760
Mower	1959	440	--	440	10	44	44	44	44	44	396	352	308	264
Electric welder	1960	299	--	299	10	--	30	30	30	30	299	269	239	209
1950 Dodge truck	1960	810	--	810	5	--	162	162	162	162	810	648	486	324
Hoist	1960	50	--	50	5	--	10	10	10	10	50	40	30	20
2-way plow	1961	667	67	600	5	--	--	120	120	120	--	667	547	427
Irrigation pump	1961	115	--	115	5	--	--	23	23	23	--	115	92	69
Chain saw	1961	234	34	200	5	--	--	40	40	40	--	234	194	154
Hitch	1961	143	23	120	5	--	--	24	24	24	--	143	119	95
Water trough	1961	60	--	60	10	--	--	6	6	6	--	60	54	48
Head box	1961	758	--	758	20	--	--	38	38	38	--	758	720	682
2 1/2 yd. carry all (1/2 int.)	1962	580	150	430	10	--	--	--	43	43	--	--	580	537
Space heater	1962	205	--	205	20	--	--	--	20	20	--	--	205	185
Panel fence	1962	313	--	313	10	--	--	--	31	31	--	--	313	282
Tractor 2010	1963	3,702	760	2,942	10	--	--	--	--	294	--	--	--	3,702
Farm shop	1963	6,994	1,000	5,994	20	--	--	--	--	300	--	--	--	6,994
Misc. small tools	--	<u>216</u>	--	<u>216</u>	10	<u>216</u>	--	--	--	--	--	--	--	--
TOTAL		41,094	5,251	35,843		13,434	2,000	2,222	2,204	2,437	13,889	13,866	12,742	21,234
Machinery & Eqpt.		32,580	4,251	28,329		13,130	1,848	2,070	2,052	1,985	12,673	12,802	11,830	13,480
Buildings & Impvmt.		<u>8,514</u>	<u>1,000</u>	<u>7,514</u>		<u>304</u>	<u>152</u>	<u>152</u>	<u>152</u>	<u>452</u>	<u>1,216</u>	<u>1,064</u>	<u>912</u>	<u>7,754</u>
TOTAL		41,094	5,251	35,843		13,434	2,000	2,222	2,204	2,437	13,889	13,866	12,742	21,234

APPENDIX TABLE 9

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 2
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Ditcher	1952	100	--	100	10	80	10	10	--	--	20	10	--	--
Hay rake	1953	740	--	740	10	518	74	74	74	--	222	148	74	--
Auto	1958	1,500	--	1,500	5	600	300	300	300	--	900	600	300	--
Tractor	1959	3,400	--	3,400	10	340	340	340	340	340	3,060	2,720	2,380	2,040
Auto (3/4 cost)	1959	2,850	--	2,850	5	570	570	570	570	570	2,280	1,710	1,140	570
Weeder	1959	150	--	150	5	30	30	30	30	30	120	90	60	30
Tractor	1959	500	--	500	5	100	100	100	100	100	400	300	200	100
Tractor	1959	500	--	500	5	100	100	100	100	100	400	300	200	100
Mower	1960	420	--	420	10	--	42	42	42	42	420	378	336	294
Metal stack pen	1960	350	--	350	10	--	35	35	35	35	350	315	280	245
Generator	1960	225	--	225	5	--	45	45	45	45	225	180	135	90
Farm hand stack mover	1960	2,380	--	2,380	10	--	238	238	238	238	2,380	2,142	1,904	1,666
Farm hand loader	1961	1,072	--	1,072	10	--	--	107	107	107	--	1,072	965	858
Truck	1961	450	--	450	5	--	--	90	90	90	--	450	360	270
Auto (50%)	1961	2,131	--	2,131	10	--	--	213	213	213	--	2,131	1,918	1,705
Hay rake	1962	310	--	310	10	--	--	--	31	31	--	--	310	279
Post driver	1962	354	--	354	10	--	--	--	35	35	--	--	354	319
Pickup	1962	1,187	--	1,187	10	--	--	--	119	119	--	--	1,187	1,068
2 feed racks	1962	700	--	700	10	--	--	--	70	70	--	--	700	630
Tractor	1963	2,200	--	2,200	5	--	--	--	--	440	--	--	--	2,200
Farm shop	1960	600	--	600	10	--	60	60	60	60	600	540	480	420
Garage	1962	600	--	600	10	--	--	--	60	60	--	--	600	540
Beef barn	1948	3,000	--	3,000	20	1,800	150	150	150	150	1,200	1,050	900	750
Corral	1960	1,200	--	1,200	10	--	120	120	120	120	1,200	1,080	960	840
1 3/4 mi. fence	1963	840	--	840	10	--	--	--	--	84	--	--	--	840
TOTAL		27,759		27,759		4,138	2,214	2,624	2,929	3,079	13,777	15,216	15,743	15,854
Machinery & Eqt.		21,519		21,519		2,338	1,884	2,294	2,539	2,605	10,777	12,546	12,803	12,464
Buildings & Impvmt.		6,240		6,240		1,800	330	330	390	474	3,000	2,670	2,940	3,390
TOTAL		27,759		27,759		4,138	2,214	2,624	2,929	3,079	13,777	15,216	15,743	15,854

APPENDIX TABLE 10

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 3
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Disc	1948	200	--	200	10	200	--	--	--	--	--	--	--	--
Mower	1948	200	--	200	10	200	--	--	--	--	--	--	--	--
Rake	1948	200	--	200	10	200	--	--	--	--	--	--	--	--
Wagon	1948	200	--	200	10	200	--	--	--	--	--	--	--	--
Rod weeder	1951	200	10	190	10	171	19	--	--	--	29	10	10	10
Fertilizer spreader	1952	187	--	187	10	152	19	16	--	--	35	16	--	--
Tractor	1952	5,017	117	4,900	10	3,920	490	490	--	Traded	1,097	607	117	--
Grain drill	1952	799	39	760	10	608	76	76	--	--	191	115	39	39
4-bottom plow	1952	695	55	640	10	512	64	64	--	--	183	119	55	55
Grain elevator	1953	175	25	150	10	105	15	15	15	--	70	55	40	25
Manure spreader	1954	400	10	390	10	234	39	39	39	39	166	127	88	49
Grain auger	1954	112	--	112	10	66	11	11	11	11	46	35	24	13
Combine	1954	5,800	500	5,300	10	3,180	530	530	530	530	2,620	2,090	1,560	1,030
1953 Ford 1 1/2 T. truck	1955	2,212	112	2,100	5	2,100	--	--	--	--	112	112	112	112
Skill saw	1955	108	--	108	10	55	11	11	11	11	53	42	31	20
Rotary hoe	1955	150	10	140	10	70	14	14	14	Traded	80	66	52	--
Platform scales	1954	500	25	475	10	288	48	48	48	48	212	164	116	68
Rock picker	1956	425	25	400	10	160	40	40	40	40	265	225	185	145
Farm building	1956	4,653	153	4,500	15	1,200	300	300	300	300	3,453	3,153	2,853	2,553
Farm building	1959	2,335	--	2,335	15	156	156	156	156	156	2,179	2,023	1,867	1,711
Loader	1957	575	25	550	10	165	55	55	55	55	410	355	300	245
Harrow	1957	132	12	120	10	36	12	12	12	12	96	84	72	60
Chopper	1957	495	25	470	10	141	47	47	47	47	354	307	260	213
Harrow	1957	158	18	140	10	42	14	14	14	14	116	102	88	74
Hammermill	1958	150	--	150	10	30	15	15	15	15	120	105	90	75

APPENDIX TABLE 10 (Continued)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Scales	1958	390	--	390	10	78	39	39	39	39	312	273	234	195
Separator	1958	105	--	105	10	20	10	10	10	10	85	75	65	55
Tenant house	1959	3,000	--	3,000	20	150	150	150	150	150	2,850	2,700	2,550	2,400
Grapple fork	1960	260	--	260	10	--	26	26	26	26	260	234	208	182
1956 pickup	1960	1,595	295	1,300	4	--	325	325	325	325	1,595	1,270	945	620
Forage harvester	1961	100	--	100	5	--	--	20	20	20	--	100	80	60
Post hole digger	1961	44	--	44	5	--	--	9	9	9	--	44	35	26
Tractor	1961	300	--	300	5	--	--	60	60	60	--	300	240	180
Hay stacker	1961	550	50	500	5	--	--	100	100	100	--	550	450	350
Tractor	1961	3,096	446	2,650	5	--	--	530	530	530	--	3,096	2,566	2,036
Ditcher	1962	50	--	50	3	--	--	--	17	17	--	--	50	33
Calf feeder	1963	325	25	300	3	--	--	--	--	100	--	--	--	325
Well	1963	10,185	--	10,185	20	--	--	--	--	509	--	--	--	10,185
Tractor	1963	5,200	500	4,700	8	--	--	--	--	588	--	--	--	5,200
Wind rower	1963	<u>4,135</u>	<u>135</u>	<u>4,000</u>	8	--	--	--	--	500	--	--	--	<u>4,135</u>
TOTAL		55,413	2,612	52,801		14,439	2,525	3,222	2,593	4,261	16,989	18,554	15,382	32,479
Machinery & Eqpt.		35,240	2,459	32,781		12,933	1,919	2,616	1,987	3,146	8,507	10,678	8,112	15,630
Buildings & Imprvmts.		<u>20,173</u>	<u>153</u>	<u>20,020</u>		<u>1,506</u>	<u>606</u>	<u>606</u>	<u>606</u>	<u>1,115</u>	<u>8,482</u>	<u>7,876</u>	<u>7,270</u>	<u>16,849</u>
TOTAL		55,413	2,612	52,801		14,439	2,525	3,222	2,593	4,261	16,989	18,554	15,382	32,479

APPENDIX TABLE 11

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 4
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Plow	1951	600	--	600	10	540	60	--	--	--	60	--	--	--
Fertilizer spreader	1952	305	--	305	10	244	30	31	--	--	61	31	--	--
Stubble beater	1957	100	--	100	10	30	10	10	10	10	70	60	50	40
Cultipacker	1957	89	--	89	10	27	9	9	9	9	62	53	44	35
Weed sprayer	1957	136	--	136	10	42	14	14	14	14	94	80	66	52
Grain drill	1958	225	--	225	10	44	22	22	22	22	181	159	137	115
Hay elevator	1958	80	--	80	10	16	8	8	8	8	64	56	48	40
Water pump	1952	47	--	47	10	40	7	--	--	--	7	--	--	--
Weed bag	1957	138	--	138	10	42	14	14	14	14	96	82	68	54
12' combine	1951	1,076	--	1,076	10	972	104	--	--	--	104	--	--	--
Side delivery rake	1954	143	--	143	10	84	14	14	14	14	59	45	31	17
Cultivator	1954	125	--	125	10	72	12	12	12	12	53	41	29	17
Hay baler	1954	745	--	745	10	444	74	74	74	74	301	227	153	79
Tractor	1956	1,000	--	1,000	10	400	100	100	100	100	600	500	400	300
Disc	1956	450	--	450	10	180	45	45	45	45	270	225	180	135
Scraper	1956	15	--	15	10	6	1	2	1	2	9	8	6	5
Mower	1957	190	--	190	10	57	19	19	19	19	133	114	95	76
Barn	1955	2,000	--	2,000	33 1/3	300	60	60	60	60	1,700	1,640	1,580	1,520
3 machine sheds	1955	2,000	--	2,000	33 1/3	300	60	60	60	60	1,700	1,640	1,580	1,520
Grainary	1955	500	--	500	33 1/3	75	15	15	15	15	425	410	395	380
Hog house	1955	500	--	500	33 1/3	75	15	15	15	15	425	410	395	380
Trailer	1955	50	--	50	10	25	5	5	5	5	25	20	15	10
Machine shop	1955	300	--	300	33 1/3	45	9	9	9	9	255	246	237	228
Chicken house	1955	300	--	300	33 1/3	45	9	9	9	9	255	246	237	228
G. M. C. truck	1958	1,975	--	1,975	10	396	198	198	198	198	1,579	1,381	1,183	985
Back fill blade	1960	102	--	102	5	--	20	20	20	20	102	82	62	42

APPENDIX TABLE 11 (Continued)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Feed rake	1955	400	--	400	10	200	40	40	40	40	200	160	120	80
Pickup	1961	1,102	--	1,102	5	--	--	220	220	220	--	1,102	882	662
Wagon	1961	50	--	50	5	--	--	10	10	10	--	50	40	30
Water pump	1962	131	--	131	5	--	--	--	26	26	--	--	131	105
Tractor	1963	750	--	750	5	--	--	--	--	150	--	--	--	750
Plow	1963	125	--	125	5	--	--	--	--	25	--	--	--	125
Mower	1963	100	--	100	5	--	--	--	--	20	--	--	--	100
Combine	1963	550	--	550	5	--	--	--	--	110	--	--	--	550
Tractor	1963	650	--	650	5	--	--	--	--	130	--	--	--	650
4-sect. harrow	1963	68	--	68	5	--	--	--	--	14	--	--	--	68
Cultivator	1963	<u>188</u>	--	<u>188</u>	5	--	--	--	--	<u>38</u>	--	--	--	<u>188</u>
TOTAL		17,305	--	17,305		4,701	974	1,034	1,029	1,516	8,890	9,068	8,164	9,566
Machinery & Eqpt.		11,705	--	11,705		3,861	806	866	861	1,348	4,130	4,476	3,740	5,310
Buildings & Imprvmts.		<u>5,600</u>	--	<u>5,600</u>		<u>840</u>	<u>168</u>	<u>168</u>	<u>168</u>	<u>168</u>	<u>4,760</u>	<u>4,592</u>	<u>4,424</u>	<u>4,256</u>
TOTAL		17,305	--	17,305		4,701	974	1,034	1,029	1,516	8,890	9,068	8,164	9,566

APPENDIX TABLE 12

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 5
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Farm building	1950	5,500	--	5,500	20	2,750	275	275	275	275	2,750	2,475	2,200	1,925
Misc. machinery	1956	350	--	350	10	140	35	35	35	35	210	175	140	105
Tractor 300	1957	3,000	--	3,000	10	900	300	300	300	300	2,100	1,800	1,500	1,200
Mower, disc & plow	1958	740	--	740	10	148	74	74	74	74	592	518	444	370
Rake	1959	580	--	580	10	58	58	58	58	58	522	464	406	348
Jeep	1959	1,500	--	1,500	5	300	300	300	300	300	1,200	900	600	300
Farm building	1962	1,000	--	1,000	20	--	--	--	50	50	--	--	1,000	950
Fencing	1962	1,000	--	1,000	20	--	--	--	50	50	--	--	1,000	950
Grain storage and hog house	1942	1,500	--	1,500	20	1,350	75	75	--	--	150	75	--	--
Beef barn	1956	800	--	800	20	160	40	40	40	40	640	600	560	520
Milk house	1942	300	--	300	20	270	15	15	--	--	30	15	--	--
Chicken house	1956	500	--	500	20	100	25	25	25	25	400	375	350	325
Machine shed	1952	<u>1,750</u>	--	<u>1,750</u>	20	<u>704</u>	<u>88</u>	<u>88</u>	<u>88</u>	<u>88</u>	<u>1,046</u>	<u>958</u>	<u>870</u>	<u>782</u>
TOTAL		18,520	--	18,520		6,880	1,285	1,285	1,295	1,295	9,640	8,355	9,070	7,775
Machinery & Eqpt.		6,170	--	6,170		1,546	767	767	767	767	4,624	3,857	3,090	2,323
Buildings & Imprvmnts.		<u>12,350</u>	--	<u>12,350</u>		<u>5,334</u>	<u>518</u>	<u>518</u>	<u>528</u>	<u>528</u>	<u>5,016</u>	<u>4,498</u>	<u>5,980</u>	<u>5,452</u>
TOTAL		18,520	--	18,520		6,880	1,285	1,285	1,295	1,295	9,640	8,355	9,070	7,775

APPENDIX TABLE 13

Depreciation Schedule and Inventory Value of Machinery and Equipment, and Buildings and Improvements for Ranch Number 6
1960-1963 (In Dollars)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Irrigation pipe	1959	100	18	82	10	8	8	8	8	Sold	92	84	76	Sold
Acetylene welder	1959	300	40	260	10	26	26	26	26	26	274	248	222	196
Saddle	1960	270	70	200	10	--	20	20	20	20	270	250	230	210
Hay elevator	1961	125	25	100	10	--	--	10	10	10	--	125	115	105
1958 Pickup	1961	1,182	182	1,000	10	--	--	100	100	100	--	1,182	1,082	982
Chevrolet (50%)	1961	4,050	2,250	1,800	5	--	--	360	360	360	--	4,050	3,690	3,330
Cat & dozer blade	1961	2,000	500	1,500	7	--	--	214	214	214	--	2,000	1,786	1,572
30 mi. of fence	1956	6,000	--	6,000	15	1,600	400	400	400	400	4,400	4,000	3,600	3,200
20 mi. of fence	1961	6,000	--	6,000	15	--	--	400	400	400	--	6,000	5,600	5,200
Cattle chutes	1963	395	--	395	10	--	--	--	--	40	--	--	--	395
Hay shed	1963	725	--	725	20	--	--	--	--	36	--	--	--	725
Auto (50%)	1962	1,045	345	700	3	--	--	--	233	233	--	--	1,045	812
Ford 4x4	1963	2,815	815	2,000	5	--	--	--	--	400	--	--	--	2,815
Truck	1957	4,020	508	3,512	5	2,106	702	702	--	--	1,914	1,212	510	510
Hay mower	1957	312	--	312	5	186	62	62	--	--	126	64	--	--
Spreader	1955	350	--	350	5	350	--	--	--	--	--	--	--	--
Irrigation sprinkler	1956	2,000	360	1,640	10	656	164	164	164	164	1,344	1,180	1,016	852
Irrigation pump	1956	300	--	300	5	240	60	--	--	Sold	60	--	--	Sold
Chain saw	1956	160	--	160	5	128	32	--	--	--	32	--	--	--
Misc. hand tools	1954	500	--	500	5	500	--	--	--	--	--	--	--	--
Barn #1	1956	2,000	--	2,000	20	400	100	100	100	100	1,600	1,500	1,400	1,300
Barn #2	1956	1,500	--	1,500	20	300	75	75	75	75	1,200	1,121	1,050	975
Stock shed	1956	2,000	--	2,000	20	400	100	100	100	100	1,600	1,500	1,400	1,300
Poultry house	1956	500	--	500	20	100	25	25	25	25	400	375	350	325

APPENDIX TABLE 13 (Continued)

Description	Purchase Date	Purchase Cost	Salvage Value	Adjusted Cost	Life	Depreciation Charged					Value In			
						Prior to 1960	In 1960	In 1961	In 1962	In 1963	1960	1961	1962	1963
Dwelling (10% off)	1956	5,000	4,500	500	20	100	25	25	25	25	4,900	4,875	4,850	4,825
Saddle	1958	230	--	230	10	46	23	23	23	23	184	161	138	115
3 saddles	1958	300	--	300	10	60	30	30	30	30	240	210	180	150
Hay mower	1961	125	--	125	5	--	--	25	Sold	--	--	125	Sold	--
Tractor	1957	2,830	450	2,380	10	714	238	238	Sold	--	2,166	1,878	Sold	--
Hay baler	1961	<u>2,100</u>	<u>345</u>	<u>1,755</u>	10	--	--	176	Sold	--	--	<u>2,100</u>	Sold	--
TOTAL		49,234	10,408	38,826		7,920	2,090	3,283	2,313	2,781	20,802	34,240	28,340	29,894
Machinery & Eqpt.		25,509	5,908	19,601		5,020	1,365	2,158	1,188	1,620	6,702	14,869	10,090	12,044
Buildings		11,725	4,500	7,225		1,300	325	325	325	361	9,700	9,371	9,050	9,450
Fence		<u>12,000</u>	--	<u>12,000</u>		<u>1,600</u>	<u>400</u>	<u>800</u>	<u>800</u>	<u>800</u>	<u>4,400</u>	<u>10,000</u>	<u>9,200</u>	<u>8,400</u>
TOTAL		49,234	10,408	38,826		7,920	2,090	3,283	2,313	2,781	20,802	34,240	28,340	29,894