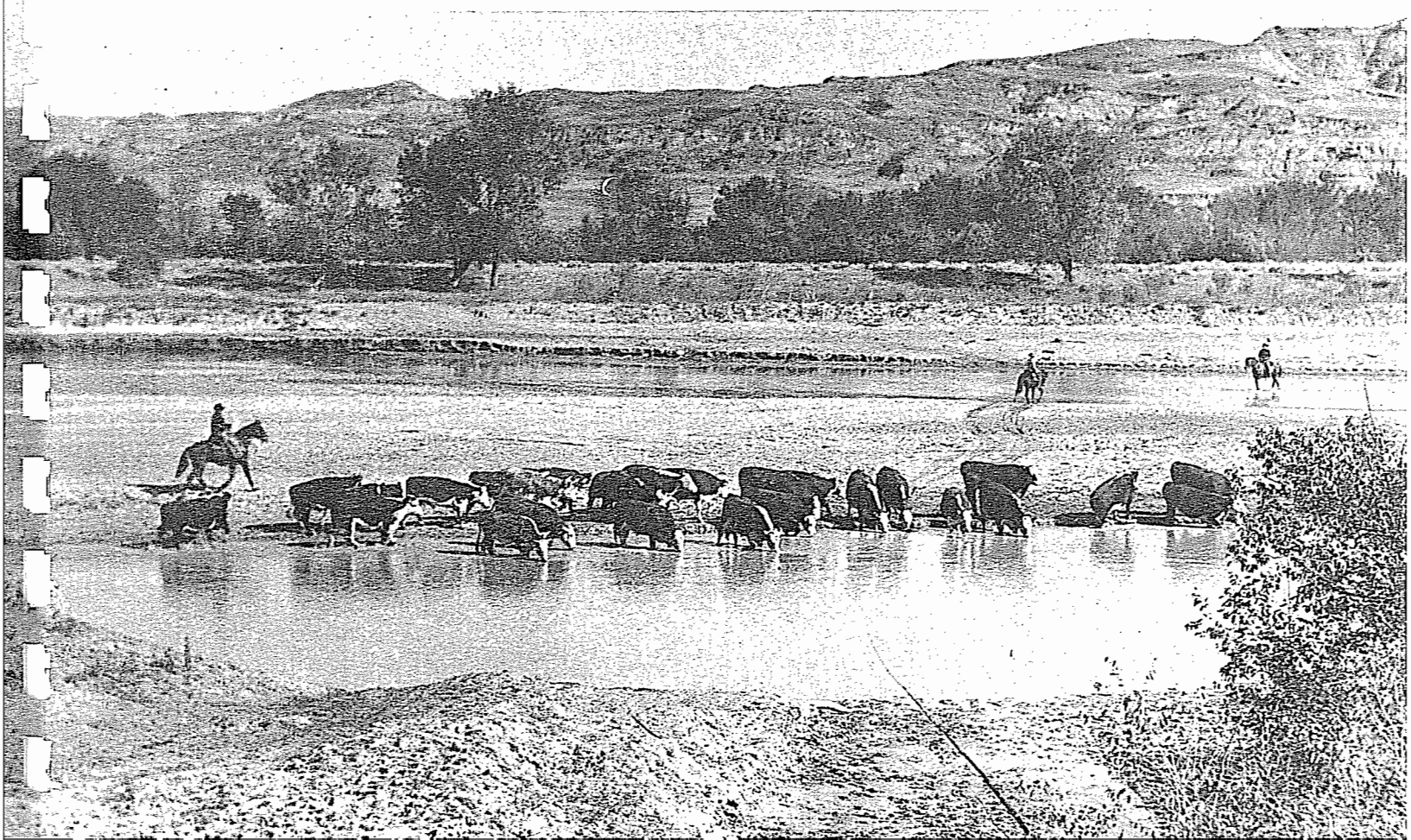
AGRICULTURAL ECONOMICS REPORT NO. 92 NOVEMBER 1972

Cattle Ranches Using Federal Land in Western North Dakota: RESOURCES, COSTS and RETURNS

F. LARRY LEISTRITZ

DEPARTMENT OF AGRICULTURAL ECONOMICS
NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
NORTH DAKOTA STATE UNIVERSITY
FARGO, NORTH DAKOTA



FOREWORD

This report represents a continuation of investigation of factors influencing the profitability of livestock production in North Dakota.

The author wishes to extend his appreciation to the ranchers who were interviewed. Without their help this study would not have been possible. Officers of local grazing associations also gave freely of their time in contributing to the completion of the study.

Appreciation is also extended to Mr. George A. Myles and Mr. Richard A. Ellison of the United States Forest Service who reviewed the manuscript and offered helpful suggestions. The author gratefully acknowledges the encouragement and valuable suggestions received from his colleagues in the Department of Agricultural Economics. Professors Edward V. Dunn and LeRoy W. Schaffner and Dr. Jerome E. Johnson provided assistance from the beginning of the study. The author, of course, assumes full responsibility for any errors.

TABLE OF CONTENTS

HIGHLIGHTS

The purpose of this study is to supply ranchers with information useful in decision making and to supply public policy-makers with a better understanding of the ranching industry. The study area includes the four western North Dakota counties--Billings, Golden Valley, McKenzie, and Slope--containing the Little Missouri National Grasslands. The basic data were obtained from a survey of ranchers using the Little Missouri National Grasslands. Sixty-two ranch operators were able to provide all the information requested. Ranches were stratified by size of cattle enterprise into three groups.

The ranches typically were organized as family operations, and the operator and his family provided most of the labor needed on the ranch.

Total investment per ranch ranged from an average of $100,588 for the group of small ranches to $324,627 for the group of large ranches. Land was the largest investment item for all three size groups.

Most operators planned to concentrate calving in April. The calf crop weaned average between 81 and 85 percent of the cow and heifer inventory on January 1. Calves were typically weaned in late October or November at average weights of 385 to 398 pounds.

Operators of large ranches engaged most frequently in pasture and hayland fertilization. A majority of ranchers in all three size groups winter-grazed part of their cow herds. Native hay and alfalfa hay harvested by loose staking were the predominant winter roughage feeds used.

Selling calves in the fall at weaning time was the most common marketing practice employed, followed by "backgrounding" calves through the winter and selling in early spring. Local auctions and order buyers were the marketing channels most frequently used, although operators of large ranches often sold direct to feeders.

Net cash ranch income was obtained by subtracting total cash costs from total receipts. Net cash ranch income ranged from $5,247 for medium-sized ranches to $9,095 for large ranches. Net ranch income, which is obtained by subtracting depreciation from net cash ranch income and adding inventory increase and value of home-used livestock, ranged from $2,599 for the small ranches to $6,039 for large ranches. Net ranch income in 1970 was not sufficient to provide a 6 percent return to the operator's investment for ranches of any size group.

Low returns on investment in ranching operations may not cause present ranchers to go out of business. On the average, currently active ranchers have a substantial net worth based in part on past increases in land values. Ranch income levels are generally adequate to meet current cash expenses and provide for a modest level of living. In addition, noneconomic factors may make ranching an attractive way of life. On the other hand, low returns in ranching will likely cause the number of individuals entering the ranching business to be less than the number leaving the business.

CATTLE RANCHES USING FEDERAL LAND IN WESTERN NORTH DAKOTA: RESOURCES, COSTS AND RETURNS

By

F. Larry Leistritz

INTRODUCTION

Beef cattle production accounts for an important share of North Dakota's agricultural income. In 1970, for example, sales of North Dakota cattle and calves produced receipts of $183 million, 27 percent of all receipts from sales of farm products.[1] Beef cattle are produced in all areas of North Dakota. However, the major cattle ranching area in the state is the area south and west of the Missouri River.

Federal rangelands are an important source of forage for stockmen in western North Dakota. These lands are administered primarily by the United States Forest Service as part of the National Grasslands Program. The largest of the three National Grasslands in North Dakota is the Little Missouri National Grassland, located in Billings, Golden Valley, McKenzie, and Slope counties.[2] This grassland encompassed about 1,033,000 acres and provided about 362,000 animal months of grazing in 1970.[3]

This report presents a description of the resources, production practices, costs, and returns of ranches using the Little Missouri National Grassland. The major source of data was a ranch survey conducted in the summer of 1971. The purpose of the report is to supply ranchers with information useful in decision making and to supply public policy-makers with a better understanding of the ranching industry.

The Study Area

The study area includes the four counties containing the Little Missouri National Grassland--Billings, Golden Valley, McKenzie, and Slope (see Figure 1). This area has long been an important ranching area, and in recent years the four counties have accounted for about 8 percent of the state's total cattle on farms (see Appendix Table 1).

---

[1]Price, J. R. and Fred R. Taylor, North Dakota Crop and Livestock Statistics, 1971, Statistical Reporting Service, USDA, and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, 1972, p. 66.

[2]The other two grasslands are the Cedar River National Grassland located in Grant and Sioux counties and the Sheyenne River National Grassland in Ransom and Richland counties.

[3]Unpublished data provided by Mr. William Evans, Forest Supervisor, Custer National Forest, Billings, Montana, 1971.

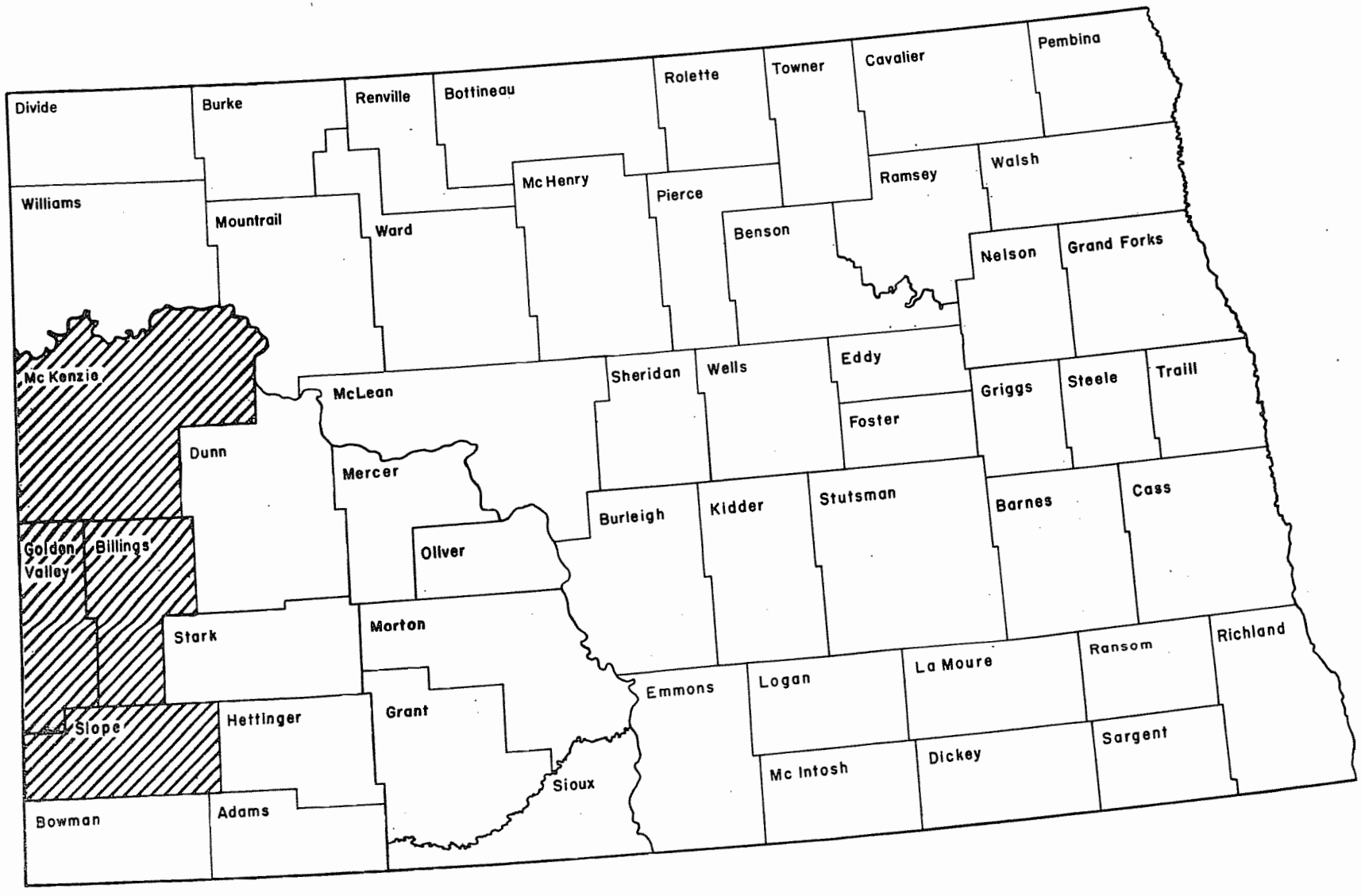


Figure 1. Counties Included in Study Area

Most of the study area lies in the basin of the Little Missouri River. The topography varies from gently rolling plains to rugged "badlands." The soils fall generally into the category of chestnut soils developed from sedimentary materials under semiarid grassland. Steeply sloping topography and alkalinity cause much land to be better suited to grazing than to crop production.

The climate is semiarid with short hot summers and long cold winters. The coldest month, January, has a long-term mean temperature of about 13 degrees.[4] The growing season (days with minimum temperature above 32 degrees) averages 120 to 129 days.[5] Average annual precipitation is about 14 inches; but it may vary greatly from year to year, and years with less than 10 inches have been recorded. The uncertainty created by variable precipitation poses severe management problems for ranchers.

The native rangelands of western North Dakota fall into the general category of mixed grass prairie. Important species of grasses include western wheat-grass (Agropyron smithii), needle-and-thread (Stipa comata), and blue grama grass (Bouteloua gracilis). Various sages (Artemisia) are found on some range sites.

Procedures and Definitions

The basic data were obtained from a survey of ranches using the Little Missouri National Grassland under Forest Service permit. In 1971, 472 ranchers were using the Little Missouri National Grassland. The ranches were stratified by the size of the cattle enterprise measured in animal units, and a random sample was drawn from each stratum.[6]

The stratified sample was a compromise between sampling in proportion to the number of ranches in a given stratum and sampling in proportion to the number of animal unit months of public land grazing used by ranchers in a given stratum. The sampling rate was highest in the stratum containing the largest ranches. Ranch operators selected were interviewed in the summer of 1971 to obtain information on ranch operation, receipts, and expenses for 1970. Sixty-two ranch operators were able to provide all the information requested. The sample included 13 percent of the ranches using the grassland.

---

[4]Price, J. R. and Fred R. Taylor, North Dakota Agricultural Statistics, 1970, Statistical Reporting Service, USDA, and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, 1971, p. 4.

[5]Ibid., p. 6.

[6]Animal units are a measure of the relative amounts of range forage consumed by various classes of livestock. The animal unit equivalents used in this study were: dry cow--1.0, mature bull--1.4, cow with calf--1.33, weaned calf--0.50, and yearling--0.67.

Description of Sample Selected

The 62 ranches were divided into three size groups according to their number of animal units. Table 1 shows the number and average size of ranches in each group.

TABLE 1. RANCH CHARACTERISTICS, RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Ranch Size Group I	Ranch Size Group II	Ranch Size Group III
Number of Ranches Surveyed	16	28	18
Animal Units Per Ranch:			
Group Limits	0 to 150	151 to 300	301 and greater
Average	97	203	430
Range	52 to 136	152 to 287	310 to 1,018
Number of Brood Cows Per Ranch, Average	64	132	286

Cattle Prices and Ranch Costs

The cost and return data used were for a single year, 1970. A comparison of prices paid and prices received by farm and ranch operators in 1970 with corresponding prices for other recent years is of interest to determine whether 1970 was financially favorable or unfavorable for ranchers.

Cattle prices received by North Dakota farmers and ranchers in recent years are shown in Figure 2. Cattle prices in 1970 were at the highest level since 1951, although even higher prices were recorded in 1971.

Prices paid by farmers and ranchers for production inputs have been increasing generally since 1950. The index of prices paid for all production inputs, wages, interest, and property taxes increased by 55 percent during the period 1950-1970 for the United States as a whole. Wages paid to hired workers more than doubled and prices paid for farm machinery increased by 94 percent. Feed was one of the few exceptions to the general trend of rising input prices with a price increase of only 3 percent from 1950 to 1970 (see Appendix Table 2). Corresponding prices for North Dakota are not available, but it is likely that North Dakota prices have followed the national trend quite closely.

Forage and Grain Yields

Yields of both forage and grain crops in the study area exhibit considerable year-to-year variability. Hence, yields obtained in 1970 should be compared with those obtained in other recent years.

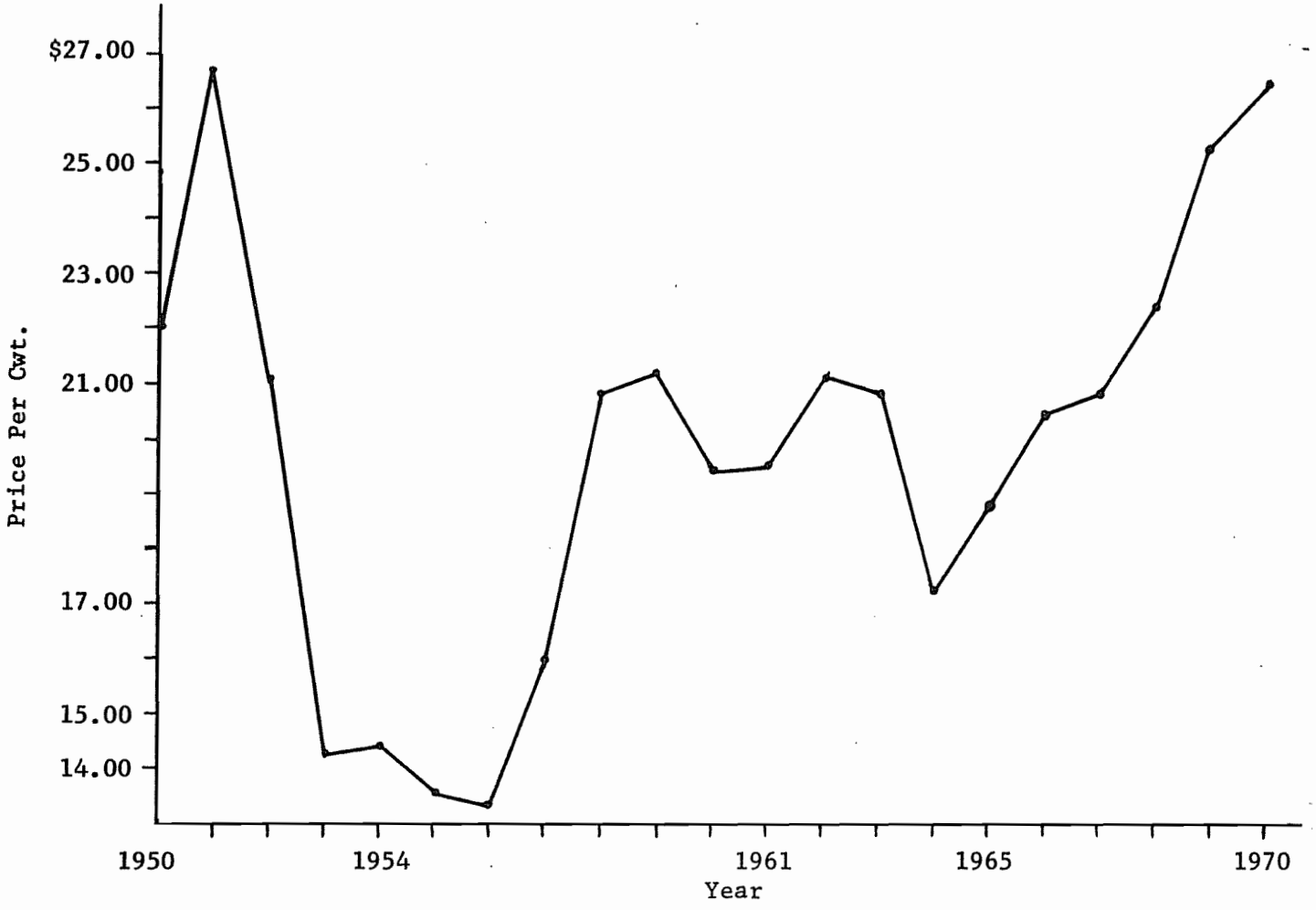


Figure 2. Prices Received for Beef Cattle, North Dakota, 1950-1970

SOURCE: Price, J. R., and Taylor, Fred R., Price Trends in North Dakota, 1950-1970, SRS, USDA, and Department of Agricultural Economics, North Dakota State University, 1971, p. 22.

Hay and pasture yields were higher than average in 1970. Appendix Table 3 shows the average hay yields in the study area for the period 1967-1971. Range forage yield information is not readily available, but range yields are thought generally to parallel those of hay crops.

Crop yields, on the other hand, were generally below average in 1970. Wheat is the most important grain crop produced in the study area. Wheat yields in the study area for the period 1967-1971 are shown in Appendix Table 4. Wheat yields in 1970 were below the five-year average in all counties of the study area.

RANCH RESOURCES AND ORGANIZATION

The ranches using the Little Missouri National Grassland in 1970 typically were organized as family operations. No labor was hired in 1970 on 23 of the 63 ranches studied, and only a few ranches employed full-time hired workers. The operator and his family provided most of the total labor required on all ranches surveyed.

Land Resources

Ranches using federal rangelands can be said to consist of two units--the headquarters unit and the grazing allotment. The headquarters unit (also sometimes called the commensurate property) is the privately owned and leased land which forms the base of the ranching operation and provides pasture and feed for the livestock when they are not on federal range.[7] The ranch operator may own all of his headquarters unit or may lease or rent part of it. State school lands leased by the rancher may be included in the headquarters unit. The makeup of the headquarters units of ranches using the Little Missouri National Grassland is presented in Table 2.

The small ranches (Group I) with an average of 718 acres of cropland per ranch had the highest proportion of cropland (53.3 percent). The cow herd on these small ranches averaged 64 head and could be regarded as a supplementary enterprise to grain farming on many units. Group II ranches averaged 132 brood cows and had less than half as much cropland per ranch as those in Group I. They could be described as small, specialized cattle operations. The bulk of the cropland on many of these ranches was used to grow feed for cattle.

Group III ranches averaged 430 animal units and 286 brood cows per ranch. They had a larger average acreage of cropland per ranch than either of the smaller size groups. They typically were specialized cattle operations. The bulk of the cropland on many Group III ranches was used to grow feed, with a few operators renting out a major portion of the cropland they owned.

---

[7] Privately owned land and federal land is often intermingled in western North Dakota. As a result, small amounts of federal land are sometimes used by individual ranchers for winter grazing. This land is termed "federal land on the headquarters" because it is managed as part of the rancher's headquarters unit.

TABLE 2. LAND RESOURCES, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	II	III
Cropland Owned	Acres	427	286	826
Cropland Rented	"	291	19	32
Total Cropland	"	718	305	858
Rangeland Owned[a]	"	409	1,491	2,754
Rangeland Rented[a]	"	218	363	535
Total Rangeland[a]	"	627	1,854	3,289
Total Land Operated[a]	"	1,345	2,159	4,147
Cropland as a Percent of Total Land	Percent	53.3	14.1	20.7
Rented Land as a Percent of Total	"	37.8	17.6	13.7
Animal Months of Grazing on National Grassland Allotment[b]	Number	479	1,194	2,048

[a]Includes land cut for hay. Does not include National Grasslands allotment.

[b]Animal months of grazing are computed using the Forest Service standard that any beef animal over six months of age grazing for one month is one billing AUM and any beef animal under six months is not counted. This measure is not the same as the animal unit equivalents defined on page 4.

The three groups of ranches differed substantially in the proportion of the headquarters unit which was rented. Ranchers in Group I rented 37.8 percent of the land in their headquarters units, whereas the ranchers in Group II rented only 17.6 percent, and those in Group III rented only 13.7 percent.

The grazing allotment constitutes the other major unit of the ranch using federal rangeland. The allotment is a block of predominantly federally owned land used by one or more ranchers. Because federal, state, and privately owned rangelands are often intermingled in a checkerboard pattern, state school lands and small tracts leased from private parties may be included in a National Grassland grazing allotment.

Grazing allotments are administered by district forest rangers in cooperation with local grazing associations. As is shown in Table 2, each group of ranches differs substantially in the average amount of grazing obtained from federal land. Grazing permits regulate the number of cattle a given rancher can pasture on the National Grassland. The size of permit or preference issued to a rancher depends, among other things, upon the size of his headquarters unit. That is, the headquarters unit must be capable of providing pasture and feed for the permitted number of livestock during the period when they are not on the grazing allotment.

Ranch Investment

Range livestock production is an enterprise requiring large investments in land, livestock, and equipment. Average investments for each group of ranches are shown in Table 3. Total investment per ranch ranged from $100,588 for Group I ranches to $324,627 for ranches in Group III. Land was a large investment item for all size groups, ranging from $55,380 for Group I to $149,454 for Group III ranches. Machinery and equipment represented about 15 percent of the total investment for Group I ranches, but was a smaller percentage item for Groups II and III. The large investment in machinery by Group I ranches is caused by their substantial cash grain enterprises.

TABLE 3. RANCH INVESTMENT, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group		
		I	II	III
Land[a]	Dollars	55,380	95,183	149,454
Buildings and Improvements[b]	"	8,898	14,674	41,629
Buildings[b,c]	"	5,711	5,731	15,939
Water Facilities[b,c]	"	1,511	4,801	14,719
Fences[b,c]	"	1,675	4,024	10,621
Machinery and Equipment[b]	"	14,940	12,932	25,761
Cattle[a]	"	20,765	49,887	106,662
Other Livestock[a]	"	606	806	1,471
Total Investment	"	100,588	173,342	324,627
Total Indebtedness	"	17,219	37,395	59,479
Operator Net Worth	"	83,369	135,947	265,148
Operator Net Worth as a Percentage of Total Investment	Percent	82.9	78.4	81.7

[a]Current market value estimated by ranch operators interviewed.

[b]Estimated replacement cost less depreciation.

[c]Do not sum to total because total includes miscellaneous improvements.

The majority of ranchers in all size groups reported loans outstanding at the end of 1970. Average indebtedness reported ranged from $17,219 for Group I ranches to $59,479 for Group III ranches.

Acquisition of Headquarters Unit

Most ranch operators interviewed began their ranching careers before 1950 (Table 4). The most popular means of entry into ranching, considering all groups, was through partnership with a relative. This means was followed closely by purchase from a nonrelative. Rental and purchase of land from relatives also were important means of acquiring the initial ranch unit. Most ranchers have rented or purchased additional land since acquiring initial units.

TABLE 4. RANCH OPERATOR CHARACTERISTICS, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	II	III
Year Operator Began Ranching:				
Before 1950	Percent	63	61	67
1950 to 1960	"	31	14	17
1961 to 1970	"	6	25	17
Initial Unit Acquired by:[a]				
Partnership with Relative	"	31	36	33
Rented from Relative	"	25	21	17
Purchased from Relative	"	13	25	22
Inherited	"	13	14	17
Rented from Nonrelative	"	6	14	22
Purchased from Nonrelative	"	31	25	39
Subsequent Acquisition of Land:[a]				
Purchased Additional Land	"	31	18	33
Rented Additional Land	"	63	57	55
Acquired No Additional Land	"	31	14	22
Age of Operator	Years	50	50	53

[a]Does not sum to 100 percent as more than one response applied to some operators.

RANCH MANAGEMENT PRACTICES

Ranchers were asked about their management practices. Of particular interest were breeding herd management, pasture and feed management, use of the grazing allotment, and marketing practices.

Breeding Herd Management

The Hereford breed was the most common breed of cattle on the ranches surveyed. Some ranchers have used crossbreeding, and the Hereford-Angus cross is quite common. Natural service is the predominant breeding method, and heifers are usually bred to calve as two-year olds.

April is when most calves are born. For all ranches, the calf crop weaned averaged between 81 and 85 percent of the number of cows and heifers on the ranch on January 1. Group II ranches had the highest average calf crop (Table 5). Calves usually are weaned in late October or November. Calf weaning weights averaged between 385 and 398 pounds (Table 5). Cow herds are culled annually and replaced at a rate of 12 to 15 percent. One bull is used for every 20 to 25 cows, with the exact number depending upon size of pasture and age and condition of bulls.

TABLE 5. RANCH MANAGEMENT PRACTICES, RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	Ranch Size Group II	Ranch Size Group III
Average Calf Crop	Percent	84	85	81
Range in Calf Crop	Percent	69-100	66- 98	71- 89
Average Calf Weaning Weight	Pounds	398	385	385
Range in Weaning Weight	Pounds	300-480	320-450	346-430
Most Important Factor Affecting Year-to-Year Changes in Herd Size:[a]				
Expected Cattle Prices	Percent	13	7	0
Carrying Capacity of Range	"	63	61	50
Available Winter Feed Supply	"	44	46	33
Credit Availability	"	0	7	5
Labor Availability	"	6	3	5
Last Year's Cattle Prices	"	0	0	0
No Response	"	0	0	5
Most Important Method of Adjusting to Variation in Grazing Capacity:[a]				
Buy or Sell Yearlings	"	13	21	11
Buy or Sell Calves	"	19	14	17
Culling Cows	"	44	50	50
Supplemental Feeding	"	19	43	28
Rent More Pasture	"	6	0	17

[a]Does not add to 100 percent because several operators listed two items as equally important.

Carrying capacity of the range was indicated as the most important factor affecting year-to-year changes in herd size by more than half of the ranchers interviewed. Winter feed supply also was indicated as an important consideration (Table 5). Ranchers usually adjust to changes in the carrying capacity of the range by varying the rate of culling the cow herd. Supplemental feeding was used by a substantial number of ranchers.

Pasture and Feed Management

Operators of large ranches appear to engage in pasture and hayland fertilization more frequently than those of the other two groups (see Table 6). Among Group III ranch operators, 33 percent fertilize some of their pasture-land and 67 percent fertilize hayland. Nitrogen fertilizer is used most commonly, but several ranchers reported using a nitrogen-phosphate mixture.

TABLE 6. RANCH MANAGEMENT PRACTICES, RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	II	III
Ranchers Who Apply Fertilizer on Pasture	Percent	19	11	33
Ranchers Who Apply Fertilizer on Hayland	"	19	46	67
Ranchers Who Normally Winter Graze Part or All of Their Cow Herd	"	63	64	94
Types of Roughage Used for Winter Feed:				
Native Hay	"	81	68	78
Alfalfa Hay	"	75	82	78
Tame-Grass Hay[a]	"	37	82	67
Straw	"	19	32	22
Oats Hay	"	13	11	5
Corn Silage	"	6	3	22
Hay Harvesting System:				
Bales Only	"	13	18	17
Loose Hay Only	"	37	46	44
Both	"	50	29	39
No Response	"	0	7	0
Average Number of Months Cow Herd is Fed Hay	Months	4.6	3.6	2.9

[a] Includes grass-alfalfa mixtures.

Winter feeding of the cow herd is an important consideration for all Northern Plains stockmen. Among the ranchers surveyed, more than half indicated they normally winter-graze their cow herd part of the winter. The length of the winter grazing season depends more upon the depth of snow accumulation than any other factor. Native hay, alfalfa, and tame-grass hay are the mainstays of the winter feeding program for most ranchers (Table 6). More than two-thirds of the ranchers in each size group used both native hay and alfalfa hay. Tame-grass hay (crested wheatgrass, bromegrass, and mixtures) was used frequently by Group II and Group III ranchers. Straw also was mentioned as an important winter feed by several ranchers.

Loose stacking, often with a tractor-loader and cage, was found to be the hay harvesting method most commonly used. Baling was used in combination with stacking on some ranches, but a few ranches (10 of 63) used baling as their sole hay harvesting method.

Use of Grazing Allotment

In each size group most ranchers had joined the grazing association prior to 1950 (see Table 7). They have had a number of years to determine how best to utilize their grazing allotment in combination with their headquarters unit.

TABLE 7. USE OF GRAZING ALLOTMENT, RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	II	III
Rancher Joined Grazing Association:				
Prior to 1950	Percent	56	53	61
1950 to 1960	"	25	18	17
Since 1960	"	19	25	17
No Response	"	0	3	5
Other Ranchers Whose Cattle Run With Yours:				
None	"	31	29	39
One or Two	"	25	0	5
Three to Five	"	31	21	17
More Than Five	"	13	43	28
No Response	"	0	7	11
Method of Moving Cattle to Allotment:[a]				
Truck	"	13	11	17
Trail	"	87	89	89
No Response	"	6	11	17
Method of Moving Cattle from Allotment:[a]				
Truck	"	13	7	22
Trail	"	87	89	89
No Response	"	6	11	17

[a]Does not add to 100 percent because some operators use more than one method.

Grazing allotments differ in the number of operators whose cattle run together in the same pasture. For all size groups, most ranchers ran their cattle in a pasture with those of at least one other operator. Individual allocations (pastures with only one rancher's cattle) were more common among Group III ranches.

Ranchers typically trail their cattle to the grazing allotment in the spring and back to the headquarters unit in the fall. When the distance between allotment and headquarters is substantial, some ranchers may truck part of their herd. However, only one rancher trucked all his cattle to and from the allotment. Some ranchers used a truck or trailer to move their bulls to the allotment pasture or to return them, but trailed the cow herd.

Marketing Practices

Most ranchers sell part or all of their calves soon after weaning in the fall; 61 percent follow this practice (see Table 8). The next most common practice is to keep some calves through the winter and sell them in early spring. This system, sometimes known as "backgrounding," was practiced by 31 percent of the ranchers. A marketing practice intermediate between the first two is to keep the calves after weaning for a short "preconditioning" period before selling them in early winter. This system was used by 27 percent of the ranchers. Nineteen percent of the ranchers held some calves through the winter, grazed them the following summer, and sold them as long yearlings in the fall.[8]

The marketing channel used by ranchers appears to depend upon the number and class of animals being sold. Local auctions were the most important outlet for all classes of livestock (i.e., calves, yearlings, and cull cows and bulls) for Group I and Group II ranches. Order buyers were the next most important outlet for calves and yearlings (see Table 8). Group III ranches made greater use of order buyers and direct sales to feeders in selling calves and yearlings, possibly because they were able to offer larger lots of cattle. Local auctions were the predominant outlet for cull cows and bulls.

RANCH RECEIPTS, EXPENSES, AND INCOME

Ranch Operating Receipts

Average operating receipts are presented in Table 9. Group I ranches received income from two important sources--beef cattle and crops. Sales of beef cattle accounted for 42.3 percent of total operating receipts of Group I ranches, while crop sales and government payments accounted for 26.9 percent and 27.5 percent, respectively. Beef cattle were the primary source of income for Group II ranches, accounting for 83.5 percent of total ranch operating receipts. Group III ranches received 84.9 percent of their receipts from beef cattle. Government payments accounted for another 8.7 percent.

---

[8]Because some operators followed more than one of the practices discussed, the percentages do not total 100 percent. Many operators followed the practice of selling part of their calves at weaning and holding the remainder either until spring or for a shorter "preconditioning" period.

TABLE 8. LIVESTOCK MARKETING PRACTICES, RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Unit	Ranch Size Group I	II	III
Marketing Practices:[a]				
Sell Calves in Fall at Weaning Time	Percent	63	57	67
Precondition Calves and Sell in Early Winter	"	13	25	44
Keep Calves Through Winter and Sell in Early Spring	"	37	39	11
Keep Calves Through Winter, Summer, and Sell as Long Yearlings	"	19	21	17
Market Used for Calves:[a]				
Local Auction	"	44	57	17
Order Buyer	"	37	32	39
Direct Sale to Feeder	"	6	14	39
Other[b]	"	6	7	11
Market Used for Yearlings:[a]				
Local Auction	"	56	57	50
Order Buyer	"	13	14	11
Direct Sale to Feeder	"	0	11	22
Other[b]	"	6	7	5
Market Used for Cull Cows and Bulls:[a]				
Local Auction	"	87	86	94
Order Buyer	"	6	0	5
Direct Sale to Feeder	"	0	0	0
Other[b]	"	13	11	17

[a]Does not add to 100 percent because some operators use more than one practice.

[b]Includes terminal markets and direct sales to local packers.

TABLE 9. OPERATING RECEIPTS PER RANCH, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Ranch Size Group I		II		III	
	Dollars	Percent	Dollars	Percent	Dollars	Percent
Sale of Beef Cattle	7,414	42.3	17,408	83.5	33,879	84.9
Sale of Other Livestock[a]	427	2.4	296	1.4	484	1.2
Sale of Crops	4,723	26.9	1,284	6.1	1,522	3.8
Custom Work Payments	119	0.6	88	0.4	529	1.3
Government Payments[b]	4,812	27.5	1,757	8.4	3,484	8.7
Total Ranch Receipts	17,495	100.0	20,833	100.0	39,898	100.0

[a]Includes sale of livestock products (milk, wool, etc.).

[b]Primarily wheat certificate and diversion payments.

Annual Ranch Operating Costs

Costs of operating a ranch can be divided into variable and fixed costs. Variable costs may be altered by changing the production level of the ranch. Fixed costs are incurred whether the ranch produces salable products or not.

Variable Operating Costs

The variable ranch costs are presented in Table 10. Livestock purchases were an important variable cost item for all size groups. It includes purchases of bulls and, for a few ranches, purchases of calves to be winter fed and/or summer grazed as yearlings. Repairs and gasoline and oil were major cost items on all ranches studied. They were especially important for Group I ranches because of their large cash cropping operations.

TABLE 10. VARIABLE OPERATING COSTS PER RANCH, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Ranch Size Group		
	I	II	III
		- Dollars -	
Gasoline and Oil	1,658	1,669	2,681
Repairs	1,190	1,597	2,863
Fertilizer, Seed, Spray	681	441	781
Custom Work Hired	640	729	1,021
Labor Hired	490	388	1,873
Livestock Purchased	1,603	2,930	5,231
Feed Purchased[a]	631	1,775	4,936
Grazing Fees	357	874	1,476
Pasture Rent	105	398	251
Other Land Rent	879	90	429
Veterinary[b]	119	290	641
Cattle Marketing[c]	79	255	444
Contract Hauling[d]	24	126	179
Other	62	80	142
TOTAL VARIABLE COSTS	8,518	11,642	22,948

[a]Includes purchases of bedding.

[b]Includes veterinary supplies and services.

[c]Includes hauling cattle to market.

[d]Other than hauling cattle to market.

Fixed Ranch Operating Costs

Fixed costs of ranch operation, shown in Table 11, are further divided into cash and noncash costs. Cash fixed costs, like variable costs, are "out-of-pocket" costs. The largest single category of cash fixed costs was interest paid on borrowed money. The high capital requirements of livestock ranching coupled with the high interest rates experienced in recent years have emphasized this cost to an increasing number of ranchers. Interest paid ranged from $1,583 on Group I ranches to $4,396 on Group III ranches. Property taxes and insurance were other major components of cash fixed costs.

TABLE 11. FIXED OPERATING COSTS PER RANCH, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Ranch Size Group		
	I	II	III
	- Dollars -		
Cash Fixed Costs:			
Interest Paid[a]	1,583	2,196	4,396
Taxes	586	863	1,768
Insurance	412	348	725
Licenses	79	58	85
Telephone	147	120	175
Electricity	315	324	459
Accounting	17	21	90
Association and Legal Fees	11	14	157
Total Cash Fixed Costs	3,150	3,944	7,855
Noncash Fixed Costs:			
Depreciation, Buildings and Improvements	868	1,075	3,236
Depreciation, Machinery and Equipment	3,649	2,672	4,468
Interest on Operator Net Worth @ 6%	5,002	8,157	15,909
Operator and Family Labor Allowance[b]	4,670	5,000	5,840
Total Noncash Fixed Costs	14,189	16,904	29,453
Total Fixed Costs	17,339	20,848	37,308

[a]Includes interest on operating capital which, strictly speaking, is a variable cost. Interest on operating capital was, however, a relatively small percentage of total interest paid for all three ranch groups.

[b]Operator labor valued at $1.60 per hour; family labor valued at $1.50 per hour. These are conservative valuations. It is not likely an adsentee ranch owner could hire qualified workers for these wages.

Noncash fixed costs often are overlooked by farm and ranch operators when they evaluate their businesses. These costs do not involve an annual cash outlay, but are either deferred or opportunity costs. Chief among the deferred costs is depreciation. Annual depreciation of machinery and buildings is not an "out-of-pocket" expense to the rancher every year, but at some future date the items of machinery, buildings, and equipment being depreciated will need to be replaced. A depreciation charge is included in the fixed costs of ranch operation to allocate the total replacement cost of machinery, buildings, and equipment over the useful life of these resources.

Depreciation was calculated by the straight-line method. The present values and period of remaining usefulness for buildings and equipment were obtained from respondents. Salvage value was assumed to be 10 percent of the present value, and depreciation was calculated by the formula:

$$\text{Annual Depreciation} = \frac{\text{Present Value - Salvage Value}}{\text{Useful Life}}$$

Total depreciation per ranch was least for Group II and greatest for Group III ranches. Group I ranchers typically maintained a substantial line of field machinery and had substantial machinery depreciation.

The interest charge on operator net worth shown in Table 11 is an opportunity cost. It represents a return on capital that could be obtained if the capital were employed in another investment. Considering rates of return available from bonds and other relatively secure investments in recent years, a 6 percent opportunity cost for the operator's capital was selected to represent the opportunity cost of capital.

Another opportunity cost of operating a ranch is the value of the operator's labor and management services. If a rancher were not engaged in raising cattle, he could devote his labor to other activities and receive compensation. The opportunity cost of operator labor may vary substantially among ranches depending upon his technical training and skills. On many ranches, family workers provide labor without compensation, so unpaid family labor is another noncash cost of ranch operation. The operator and family labor allowance shown in Table 11 was developed using values of $1.60 per hour for operator labor and $1.50 per hour for family labor.[9] These values for operator and family labor appear to be conservative considering the skills needed to operate a modern ranch.

---

[9]The hours of operator and family labor used in developing the labor charge were based on the estimates of the ranchers interviewed. The average amounts of operator and family labor used on the three groups of ranches were:

Size Group	Operator Labor	Family Labor
	- Hours Per Year -	
I	2,450	500
II	2,750	400
III	2,900	800

Net Income and Resource Returns

Net ranch income and resource returns are presented in Table 12. Net cash ranch income is obtained when total cash costs of ranch operation are subtracted from total receipts. It ranged from $5,247 on Group II ranches to $9,095 on Group III ranches. Net ranch income is obtained by adding the inventory increase and value of home-used livestock to net cash ranch income and subtracting depreciation. Net ranch income may be interpreted as the return to the ranch operator's investment, labor, and management. It ranges from $2,599 on Group I ranches to $6,039 on Group III ranches.

Net ranch income may be divided into return to operator labor and management and return to capital, but some rather arbitrary procedures are required. Return to operator labor and management is obtained by subtracting an imputed interest charge from net ranch income. In Table 12 an interest charge of 6 percent is charged for the operator's net worth. When the interest charge is subtracted from net ranch income, the return to labor and management is negative for all ranch sizes studied. Return to operator investment can be computed in similar fashion by subtracting the operator and family labor allowance from net ranch income. This residual return to operator investment is also negative for ranches in Size Groups I and II, but is positive for ranches in Group III.

Many ranch families had income from other sources in 1970. The amounts of income were typically small. Group I ranch families had the highest average income from other sources, an average of $1,910 per ranch. The sources of income were diverse. The family income from other sources is added to net cash ranch income to obtain the cash income available to meet family living expenses in 1970. This cash income varied from $5,613 for Group II ranches to $10,194 for Group III ranches. While this income may be used to meet living expenses in a given year, the rancher cannot "live off his depreciation" indefinitely.

To summarize the income situation of the ranches surveyed, net ranch income in 1970 was not sufficient to provide a 6 percent return to the operator's investment for any size group. Net ranch income of Groups I and II also was not sufficient to provide a return equal to the federal minimum wage for operator labor.[10] If depreciation is ignored as a ranch cost, all ranch size

---

[10]The negative returns to ranch operator labor and management for all size groups or, alternatively, to ranch operator investment for Groups I and II shown in Table 12 simply mean that ranch income in 1970 was not sufficient to provide the ranch operators surveyed with a return of 6 percent on their investment or a return approaching federal minimum wage standards for their labor. This conclusion would probably not be particularly startling to most ranch operators or to others familiar with the economics of range livestock production. The reader should bear in mind, however, that in computing the ranch operator's investment, the ranchland was valued at current market value. The majority of the operators surveyed began ranching before 1950, and many acquired some or all of their ranchland at prices considerably below current market values. Further, it should be noted that if net ranch income is to be compared to nonfarm family income, the net income of the ranches should be adjusted to include the rental value of the ranch homes and the value of home-produced food other than livestock.

TABLE 12. RANCH INCOME AND RESOURCE RETURNS, AVERAGES OF RANCHES USING LITTLE MISSOURI NATIONAL GRASSLAND, 1970

Item	Ranch Size Group I	II	III
		- Dollars -	
Ranch Operating Receipts	17,495	20,833	39,898
Variable Costs	8,518	11,642	22,948
Cash Fixed Costs	3,150	3,944	7,855
Total Cash Costs	11,668	15,586	30,803
Net Cash Ranch Income	5,827	5,247	9,095
Livestock Inventory Change	1,181	1,359	4,420
Home Used Livestock[a]	108	201	228
Depreciation	4,517	3,747	7,704
Net Ranch Income	2,599	3,060	6,039
Interest on Operator Net Worth[b]	5,002	8,157	15,909
Return to Operator Labor and Management	-2,403	-5,097	-9,870
Operator and Family Labor Allowance[c]	4,670	5,000	5,840
Return to Operator Investment	-2,071	-1,940	199
Return to Operator Investment (Percent)	-2.5%	-1.4%	0.1%
Other Family Income	1,910	366	1,099
Net Cash Income for Family Living[d]	7,737	5,613	10,194

[a]Prices used to estimate the value of home-used livestock were obtained from Crop and Livestock Statistics, 1970, Agricultural Statistics No. 23, Statistical Reporting Service, United States Department of Agriculture and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota, 1971, p. 69.

[b]Computed as 6 percent of average net worth from Table 3.

[c]Operator labor valued at $1.60 per hour. Family labor valued at $1.50 per hour.

[d]Net cash ranch income plus other family income.

groups had an income sufficient to support a modest level of living in 1970. However, depreciation cannot be ignored indefinitely because depreciable assets eventually wear out and require replacement.

CONCLUSIONS

Ranches using the Little Missouri National Grassland were not highly profitable operations in 1970. Some economies of size were evident as ranches with larger cow herds generally obtained a higher return on investment. However, even on the larger ranches, returns were not equal to those commonly obtained from nonagricultural investments.

The economic position of these ranches can be considered from two viewpoints; that of the established rancher and that of the individual entering the ranching business. The established rancher typically has acquired much of his land some years ago at prices considerably below those prevailing today. Thus, the established rancher typically has a favorable financial position with a substantial net worth although his current income is modest. If his current income provides an adequate level of living, the established rancher may feel little pressure to leave the industry. Age may dissuade many ranchers from considering other occupations, and there may be certain noneconomic factors which make ranching an attractive way of life.

On the other hand, the individual who is considering entering the ranching business faces the prospect of acquiring land and other resources at their current market values. The study shows that with an average level of management and the cost-price conditions prevailing in 1970, ranching does not provide resource returns competitive with those found in other segments of the economy. The phenomenon alternatively may be described as one of overpriced land. That is, ranchland is currently over priced relative to its income producing ability. Thus, while the cost and return situation may not force present ranchers out of business, it likely will dissuade many individuals from entering the industry and over time ranch numbers likely will decline.

APPENDIX

APPENDIX TABLE 1. ALL CATTLE ON FARMS, JANUARY 1, BY COUNTY

Year	County				Four-County Total	State Total	Four-County Total Area as a Percent of State Total
	Billings	Golden Valley	McKenzie	Slope			
1972	35,000	27,000	102,000	32,000	196,000	2,278,000	8.6
1971	32,000	25,000	97,000	29,000	183,000	2,190,000	8.4
1970	30,000	22,000	85,000	26,000	163,000	2,066,000	7.9
1969	30,000	24,000	79,000	28,000	161,000	2,025,000	8.0
1968	30,000	25,000	82,000	31,000	168,000	2,132,000	7.9
1967	31,000	29,000	82,000	33,000	175,000	2,292,000	7.6
1966	30,000	27,000	85,000	32,000	174,000	2,315,000	7.5
1965	30,000	27,000	86,000	32,000	175,000	2,411,000	7.3
1964	30,000	26,000	85,000	31,000	172,000	2,318,000	7.4
1963	28,000	21,000	72,000	28,000	149,000	2,088,000	7.1
1962	25,000	18,000	63,000	25,000	131,000	1,881,000	7.0
1961	25,000	18,000	62,000	25,000	130,000	1,881,000	6.9
1960	24,500	19,000	58,000	24,500	126,000	1,758,000	7.2
1959	25,500	20,000	63,000	25,000	133,500	1,794,000	7.4
1958	26,000	21,000	68,000	26,000	141,000	1,831,000	7.7
1957	26,000	22,000	76,000	27,000	151,000	1,948,000	7.8
1956	30,000	25,500	83,000	29,000	167,500	2,072,000	8.1
1955	30,500	22,500	78,000	27,700	158,700	1,973,000	8.0

SOURCE: Price, J. R. and Fred R. Taylor, North Dakota Agricultural Statistics, various issues, Statistical Reporting Service, USDA, and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota.

APPENDIX TABLE 2. PRICES PAID BY FARM OPERATORS, UNITED STATES ANNUAL AVERAGE, 1950-1970 (1950 = 100)

Year	Wages for Hired Farm Labor	Feed	Farm Machinery	Building and Fencing Material	Production Inputs, Interest, Taxes, and Wage Rates
1970	255	103	194	150	155
1969	238	98	184	149	148
1968	216	97	175	138	140
1967	199	101	167	130	135
1966	185	103	160	128	131
1965	171	99	154	125	126
1964	163	98	149	124	122
1963	159	99	146	125	122
1962	155	94	144	125	120
1961	151	93	141	125	118
1960	148	92	138	126	116
1959	144	95	134	126	116
1958	135	94	129	123	114
1957	131	96	123	123	110
1956	126	98	118	119	107
1955	121	100	113	114	106
1954	120	108	113	112	107
1953	121	108	112	113	107
1952	118	120	111	112	113
1951	111	112	108	111	111
1950	100	100	100	100	100

SOURCE: Statistical Reporting Service, Agricultural Prices, USDA, Washington, D.C., 1971, pp. 8-11.

APPENDIX TABLE 3. HAY YIELDS PER HARVESTED ACRE, AVERAGES OF FOUR WESTERN NORTH DAKOTA COUNTIES

County	Year				
	1971	1970	1969	1968	1967
			- Tons -		
Billings	1.15	1.24	1.01	0.87	0.99
Golden Valley	1.24	1.10	0.88	0.82	0.96
McKenzie	1.14	1.23	1.20	1.08	0.91
Slope	1.38	1.03	0.94	0.85	1.01

SOURCE: Price, J. R. and Fred R. Taylor, North Dakota Crop and Livestock Statistics, various issues, Statistical Reporting Service, USDA, and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota.

APPENDIX TABLE 4. YIELDS OF ALL WHEAT PER PLANTED ACRE, AVERAGES OF FOUR WESTERN NORTH DAKOTA COUNTIES

County	Year				
	1971	1970	1969	1968	1967
			- Bushels -		
Billings	24.7	19.9	22.0	20.9	18.5
Golden Valley	25.5	21.1	20.3	25.7	22.2
McKenzie	26.1	21.5	27.0	24.9	20.4
Slope	27.4	18.9	23.7	23.2	25.1

SOURCE: Price, J. R. and Fred R. Taylor, North Dakota Crop and Livestock Statistics, various issues, Statistical Reporting Service, USDA, and Department of Agricultural Economics, North Dakota State University, Fargo, North Dakota.