Trends in size, land tenure, income, organization, and management of selected cattle ranches in southeastern Montana, 1924-48
by A Dale Saunders

A THESIS Submitted to the Graduate Committee in partial fulfillment of the requirements for the Degree of Master of Science in Agricultural Economics
Montana State University
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Abstract:
This is a study of the trends and changes that have taken place on twenty-one cattle ranches in southeastern Montana during the past twenty-five years. Some of the more important changes that have taken place during this time are: (1) The amount of controlled land used by the ranches has increased by 159%. The most important increase in size has come about through the purchase of more land, much of which was formerly owned in small uneconomical tracts by homesteaders.

(2) The era of free land and uncontrolled use of the Public Domain has come to an end. The ranchers have the firmest control over the land they use than at any other time in the history of cattle ranching in Montana.

(3) The ranchers appear to be more concerned with the way the range is used and stocking rates have been reduced.

(4) During the past twenty-five years there has been a shift from the marketing of three-year-old steers to the marketing of calves and yearlings. In 1924 the ranchers marketed 213 pounds of beef per animal unit of livestock run, by 1948 this had increased to 332 pounds of beef per animal unit of livestock run.

(5) Breeding practices have shifted from breeding on common range with other herds to breeding in private pastures. This change has helped increase the percentage of calf-crop.

(6) The amount of investment per animal unit in the past twenty-five years has nearly doubled, the chief factor causing this increase was a 155% increase in deeded land.

(7) The amount of debt per animal unit has decreased in the past twenty-five years by 37%. Only 26% of the ranchers had any debts in 1948 compared with 79% of the ranchers in 1924.

(8) During the period studied, inputs have increased by 130%, the major increases were in general supplies, taxes, and depreciation on buildings and machinery. The only input that showed a decrease during the period was interest paid on debts.

(9) The most profitable year for the ranchers during the study was 1948, and the least profitable was 1924. The most important factor accounting for the high income in 1948 was the favorable relationship between the prices of inputs and outputs.

TRENDS IN SIZE, LAND TENURE, INCOME, ORGANIZATION, AND MANAGEMENT OF SELECTED CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924 - 48

by

A. DALE SAUNDERS

A THESIS

Submitted to the Graduate Committee
in partial fulfillment of the requirements
for the Degree of Master of Science
in Agricultural Economics at
Montana State College

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ABSTRACT

This is a study of the trends and changes that have taken place on twenty-one cattle ranches in southeastern Montana during the past twenty-five years. Some of the more important changes that have taken place during this time are:

(1) The amount of controlled land used by the ranches has increased by 159%. The most important increase in size has come about through the purchase of more land, much of which was formerly owned in small uneconomical tracts by homesteaders.

(2) The era of free land and uncontrolled use of the Public Domain has come to an end. The ranchers have the firmest control over the land they use than at any other time in the history of cattle ranching in Montana.

(3) The ranchers appear to be more concerned with the way the range is used and stocking rates have been reduced.

(4) During the past twenty-five years there has been a shift from the marketing of three-year-old steers to the marketing of calves and yearlings. In 1924 the ranchers marketed 213 pounds of beef per animal unit of livestock run, by 1948 this had increased to 332 pounds of beef per animal unit of livestock run.

(5) Breeding practices have shifted from breeding on common range with other herds to breeding in private pastures. This change has helped increase the percentage of calf-crop.

(6) The amount of investment per animal unit in the past twenty-five years has nearly doubled, the chief factor causing this increase was a 155% increase in deeded land.

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(8) During the period studied, inputs have increased by 130%, the major increases were in general supplies, taxes, and depreciation on buildings and machinery. The only input that showed a decrease during the period was interest paid on debts.

(9) The most profitable year for the ranchers during the study was 1948, and the least profitable was 1924. The most important factor accounting for the high income in 1948 was the favorable relationship between the prices of inputs and outputs.

PART I. INTRODUCTION

The Area

The two-thirds of Montana that lies east of the Rocky Mountains is a part of the Northern Great Plains which composes a tenth of the land area within the United States. In addition to Montana the Northern Great Plains include the eastern third of Wyoming, the northeastern corner of Colorado, and the three quarters of the Dakotas and Nebraska which lies west of the ninety-eighth meridian.1/

The elevation of the Plains region of Montana varies from about two to four thousand feet. In general the land is rolling with rough and broken "badlands" areas being found near many of the larger streams and rivers. The soil types in the area show a considerable degree of variation though from a pedological standpoint they are generally young and unglaciated.2/

One of the outstanding characteristics of the area is the semi-arid and highly unpredictable climate. The temperature at Miles City has varied from a low of 49 below zero to a high of 111°F.3/ The average annual precipitation for the area is between 12-15 inches with about 70 percent of this coming in the growing season months of April 1 to September 30.4/

1/ Rogler, G.A., and Hortt, L.C., "The Northern Great Plains," Grass Yearbook of Agriculture, 1948, U.S.D.A., p. 477.

2/ Gieseker, L.F., Morris, E.R., Straborn, A.T., and Manifold, V.B., Soil Survey of The Northern Plains of Montana, Series 1929, No. 21, Bureau of Chemistry and Soils, U.S.D.A. in cooperation with the Montana Agricultural Experiment Station.

3/ Climate and Man, Yearbook of Agriculture, 1941, U.S.D.A., p. 995.

4/ Annual and Seasonal Precipitation at Six Representative Locations in Montana, Bul. 447, Montana Agricultural Experiment Station, November 1947, p. 14.

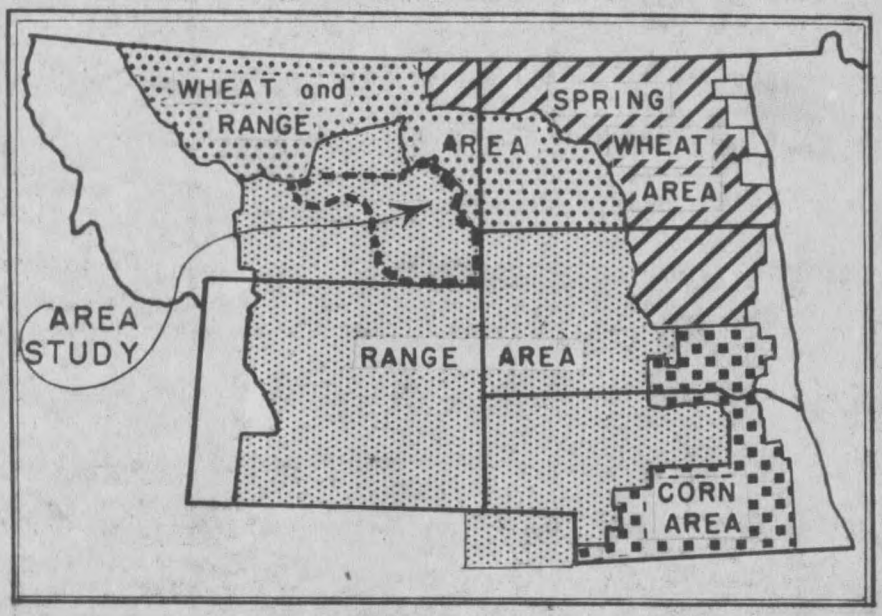

Figure 1.

Map of the Northern Great Plains showing the generalized types of farming areas and the location of the area of study.

Source: Grass, Yearbook of Agriculture, 1948, U. S. Department of Agriculture, Government Printing Office, Washington, D. C.

The important factor in regard to rainfall in the Northern Great Plains is that the annual precipitation varies around a critical point - that at which successful wheat production begins. In years of above average precipitation wheat yields are high but, in years of below average precipitation, wheat yields are reduced, sometimes to zero.5/ Another unique factor about the precipitation in the Northern Great Plains is that years of high and low precipitation do not tend to alternate, but instead tend to come in "bunches".6/ As shown in Figure 2, these groups of wet and dry years are sometimes as long as ten to eleven years.

Looking back to Figure 1, the northern half of the Plains region in Montana is generally devoted to small grain farming and livestock ranching. The southern part of the area is devoted mainly to range because climate, soil or topography makes crop production too risky. The principal species of native grasses found in this region are blue grama, western wheatgrass, needle-and-thread, Sandberg bluegrass, and the sedge niggerwool. The significance of grass as a crop in the range area is well stated by M. M. Kelso; "Grassland as range occupied some 85% of the land in 1944 and supplied about one-half of the nutrients needed by the livestock, which supplied about three-fourths of the gross agricultural income. Grassland as hay furnished about 30% of the feed required by the livestock."7/

5/ Clawson, Marion, "Sequence in Variation of Annual Precipitation in the Western United States," The Journal of Land and Public Utility Economics, August 1947, Vol. XXIII, No. 3, p. 273.

6/ Ibid, pp. 273 and 278-279.

7/ Kelso, M. M., "The Place of Grassland Farming," Grass, Yearbook of Agriculture, 1948, U.S.D.A., pp. 481 and 482.

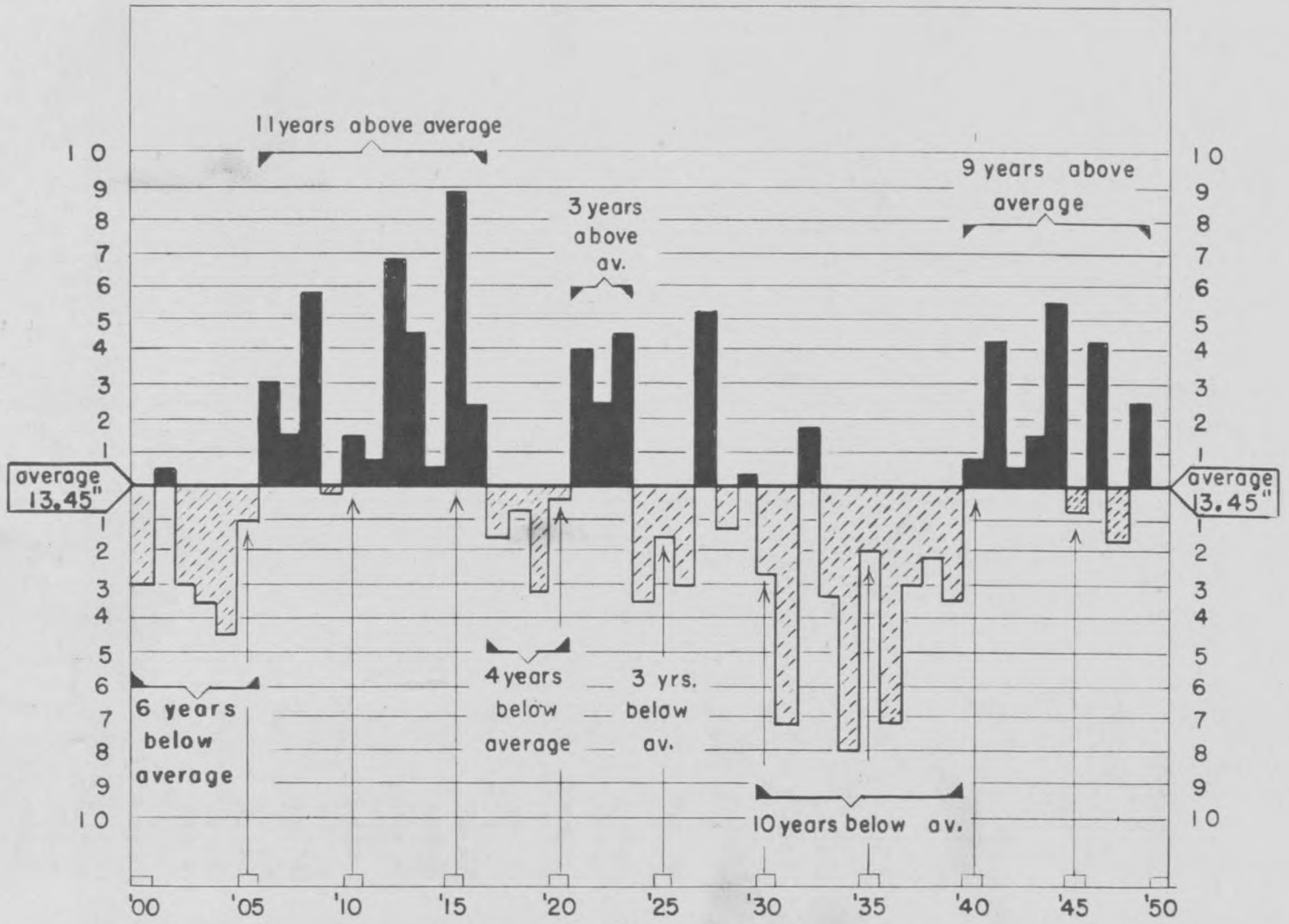

Figure 2.

Rainfall deviation from average at Miles City, Montana, 1900 - 1948.

Source: Annual and Seasonal Precipitation at Six Representative Locations in Montana, Bul. 447, November 1947, Montana Agricultural Experiment Station, Bozeman, Montana.

The Situation

The range livestock industry in the Plains region in southeastern Montana dates back to about 1880. At that time the range was "open" and the size of a man's ranch and the number of cattle he ran depended largely upon his ability to control his range and to deal with other men. Boundaries were indefinite and fences were a thing of the future. During this early period the principal type of cattle marketed from the area were grass fattened steers often run to an age of five to six years and weighing over twelve hundred pounds. The operation under this type of a set-up was a low cost one, and profits depended largely upon the volume of cattle run and sold, management was of secondary importance, hence the ranches were large in size.8/

As more people migrated West, attracted by the offer of free land and the idea of getting started in farming, the cattle industry was forced to change its ways. As the pressure on the land from the new settlers increased, and was brought to its peak during the homesteading days of the nineteen-tens and early twenties, the size of ranches were drastically reduced and more thought had to be given to management and the type of cattle being raised. Volume alone was no longer the key to success in ranching.

The ranchers who were using the range at the time of the onslaught of homesteaders and who managed to continue in operation did so on: (1) land purchased or leased from the Northern Pacific Railroad; (2) land they themselves were able to homestead, (quite often all of the hired help was filed

8/ Fletcher, R.S., Organization of the Range Cattle Business in Eastern Montana, Montana Agricultural Experiment Station, Bul. 265, June 1932.

as homesteaders;) (3) land controlled by controlling water - often the ranchers strung their homesteads out in tracts of forty acres along creeks or rivers; (4) lands that were not even attractive to homesteaders.

Since the establishment of the cattle ranching industry in Montana sometime around 1880, it has gone through a series of varying conditions. Unique among the varying conditions with which the industry has been faced, is that generally during the "bunches" of years when the rainfall was above average the prices for beef cattle was above average, and during the "bunches" of below average rainfall years, the prices of beef cattle was below average. This phenomenon has been observed from the records, but there is nothing to indicate a scientific reason for its occurrence.

During the past twenty-five years, the period with which this thesis is concerned, the cattle ranches in southeastern Montana have undergone three periods of varying conditions. The first period, from 1924 to 1930, was one of nearly normal conditions. The price of beef cattle was about ninety cents below average for the twenty-five year period and the rainfall was only .06 inches below the average for the twenty-five year period. The second period, which was from 1931-1939, was one of extreme hardship for most of the ranchers in the area. The price of beef cattle was off by about 40%, and rainfall was 25% below normal. The third period, 1940 to date, has been the best period known to the ranchers of Montana. Not only has the price of beef cattle been the highest for any nine year period in history but rainfall has also been well above average for the entire period.

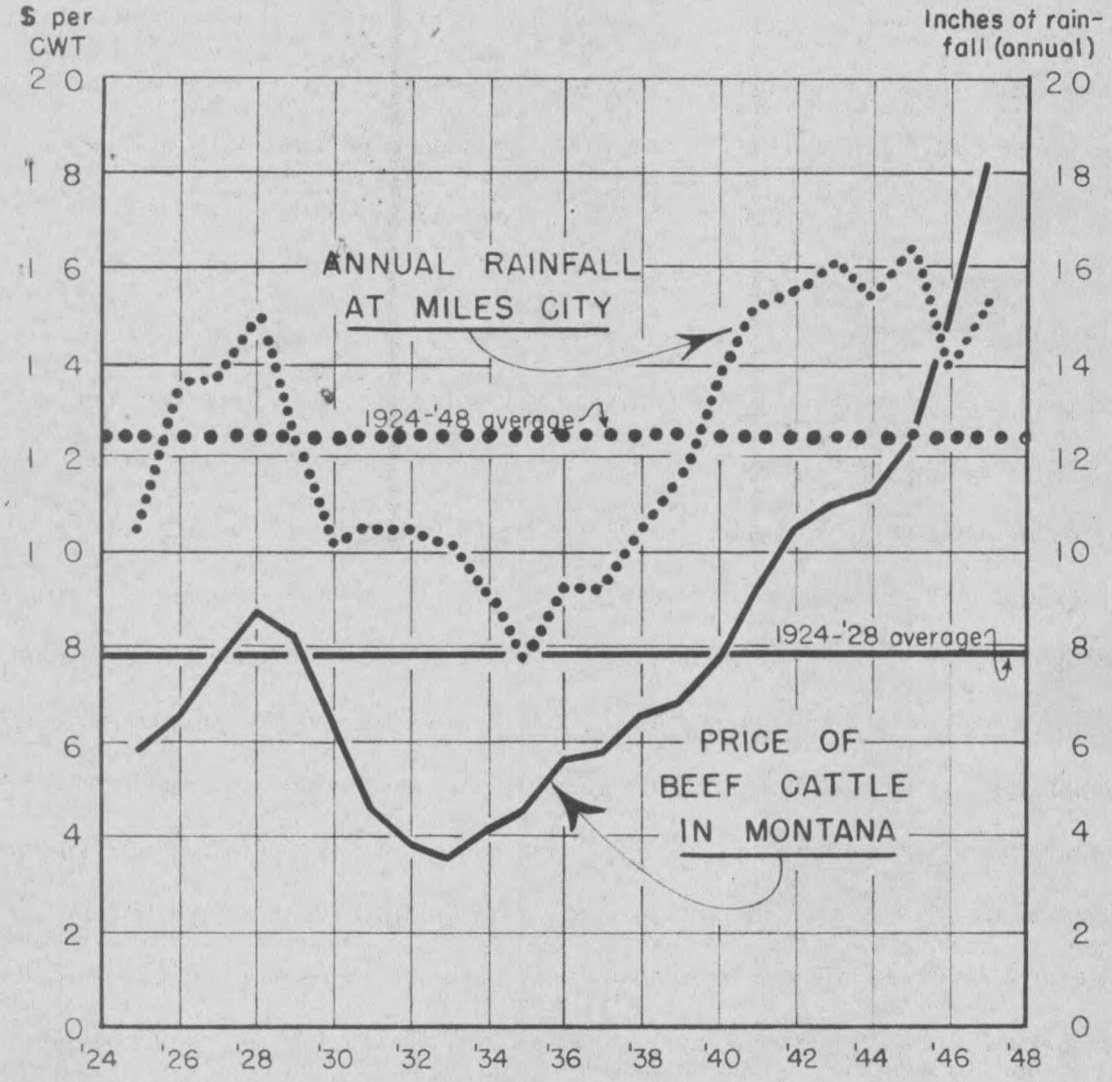

Figure 3.

A comparison of the prices received by ranchers, and the amount of annual rainfall in Miles City, Montana, 1924 - 1948.

Comparison is on a three year moving average. Source: Annual and Seasonal Precipitation at Six Representative Locations in Montana, Op. Cit. and Montana Farm and Ranch Prices, 1909-1948, Mimeographed Circular 51, April 1949, Montana Agricultural Experiment Station, Bozeman, Montana.

The twenty-five year period was also characterized by a number of changes in land tenure. A large amount of the public domain that was being used without title or cost came under the direct supervision of the Federal Government with the passing of the Taylor Grazing Act of 1934. Another important change was the large amount of land that went into the hands of the county for taxes during the thirties that has returned to private ownership under the stimulus of high incomes in recent years. Of still greater importance was the trend of many of the small land owners leaving the area, the units they left being added to neighboring farms and ranches; thus, some of the homesteading farmers were able to adapt to the conditions of the area by becoming stockman.

The Plains have always been affected with ever changing conditions, the weather usually being the most violent of the changes. The problem that naturally arises is how to achieve a system of operation that is flexible enough to cope with the ever changing conditions, and at the same time give the operator a fairly stable income.

The Purpose and Objectives

The purpose of this study is threefold: (1) To find and analyze the changes that have taken place in the cattle ranching industry in southeastern Montana in the past twenty-five years, and; (2) To determine in the light of these changes steps that might be taken to adjust to the varying conditions, and; (3) What the future is likely to hold for ranching in the area.

Specifically the objectives of this study are:

(1) To study trends and changes in the land tenure and size of the land base of the selected ranchers. Tenure will be considered

from the standpoint of: (a) land owned, (b) land leased - from whom (private persons or corporations, or from some government agency - federal, state, or local), (c) land used on an animal unit permit basis, (d) free land.9/

(2) To study the changes that have taken place in factors of production and management, and how these changes have affected costs, income and investments.

(3) To consider how the changes that have taken place will affect the future of cattle ranching in the area.

The Sample

The bases for this study are twenty-one ranches that are located in the Great Plains region of southeastern Montana. These particular ranches were used because there were complete business records available for either 1924 or 1929, 1940, and 1948.10/

These twenty-one ranches are located in Musselshell, Rosebud, Custer, Powder River, Carter, and Prairie counties. With the exception of a small area along the principal rivers, the whole region is devoted mainly to the grazing of livestock. Over 75% of the land in the area is classified

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9/ Free land refers to all land not owned by the user which he is using without charge. Public Domain was in this classification till after the passage of the Taylor Grazing Act in 1934.

10/ These records were taken in connection with ranching studies and surveys that have been made in the past. These surveys include: (1) The Northern Great Plains Survey of 1925, by the United States Department of Agriculture in cooperation with the Agricultural Experiment Stations of Montana, North Dakota, South Dakota, and Wyoming; (2) A similar study by the same group in 1928; (3) Montana Ranch Studies by M. H. Saunderson for the years 1929 to 1933; (4) Montana Ranch Study by G. H. Craig, 1940; and (5) A follow-up survey of this same group of ranches made in the spring of 1949 by Dr. M. M. Kelso and the author.

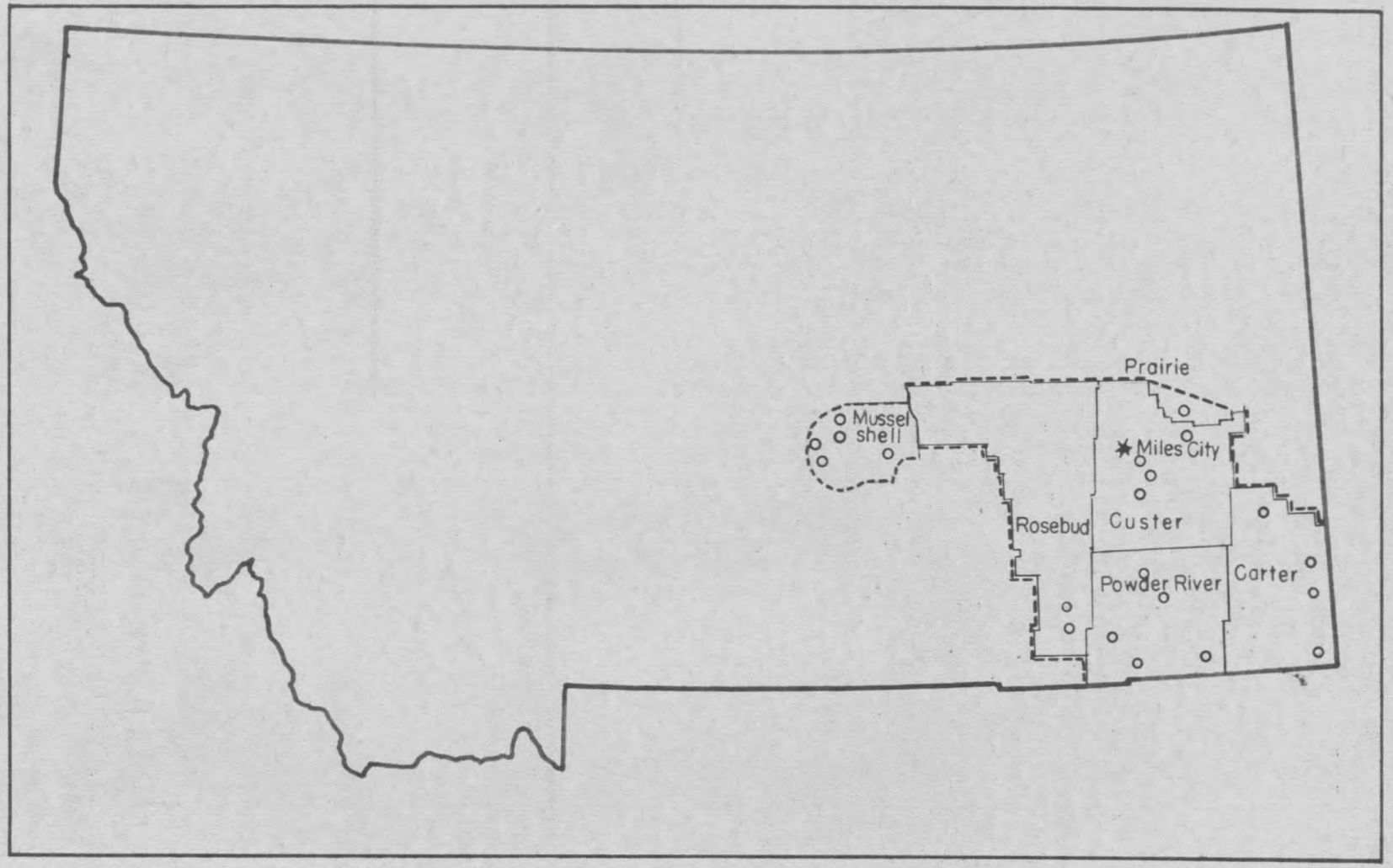

Figure 4.

Map of Montana showing the location of the twenty-one ranches studied.

as suitable for grazing land only. Farming on other than the irrigated land is of secondary importance except for the production of hay and some feed crops for winter feeding.[11] The number one source of income in the area is from range livestock. The income from beef cattle is greater than that from all other agricultural sources combined.[12]

These ranches were originally picked at large from ranches in the area that were greater than one hundred animal units in size and whose principal source of income was from the sale of beef cattle.[13] The ranches vary from one hundred to about fifteen hundred animal units in size. Due to economic and climatic factors, the size of these ranches, over the period of years, has fluctuated considerably both in the amount of land controlled and the number of cattle run. There have also been changes in ownership in some cases due to deaths and retirements, but in all cases these ranches represent the same basic original ranch units from which first records were taken in either 1924 or 1929.

Since it is the intent of this study to follow through the years the changes that have taken place on the same ranch units, and not compare

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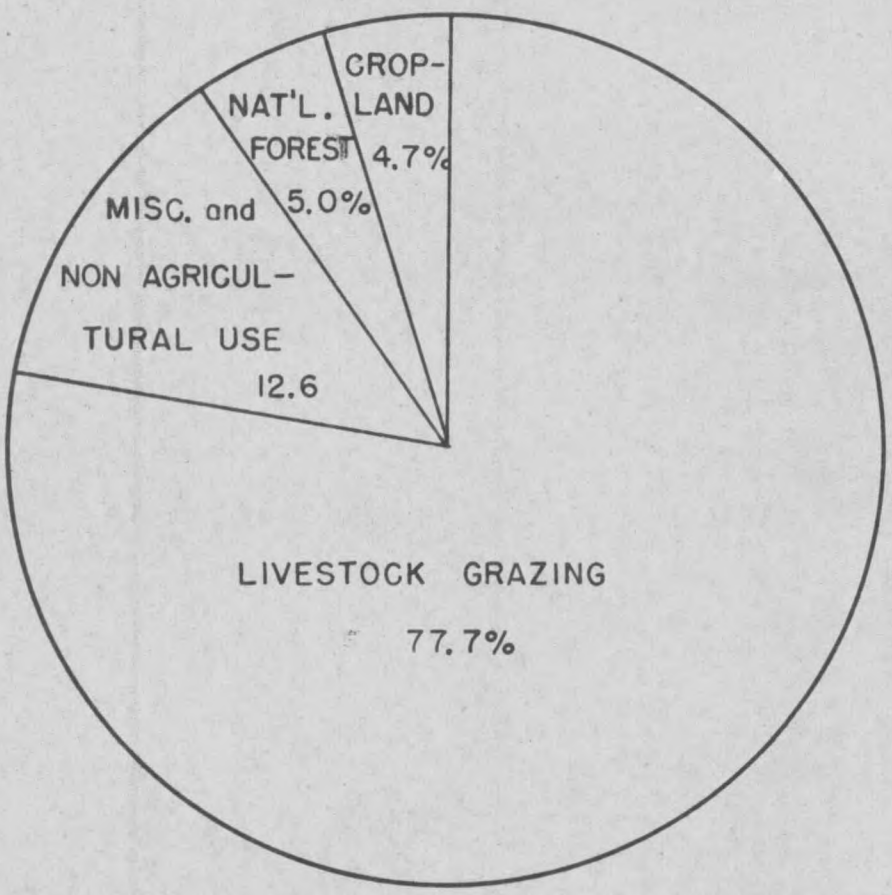
11/ Gilman, V.D., Types of Farming in Southeastern Montana, Bul. 287, April 1934, Montana Agricultural Experiment Station, p. 11.

12/ Compiled from, U.S. Census of Agriculture, 1945, Volume I, Part 27, U.S. Dept. of Commerce, Bureau of the Census, Washington, D.C.

13/ An animal unit is the equivalent of a 1,000-pound range cow with calf. A yearling is considered as being equivalent to 2/3 of an animal unit; a two-year-old .85; a three-year-old steer is one unit; bulls and horses 1 1/3 units each. Ewes are considered to be equivalent to .2 of a unit. These units represent the approximate relationship of different classes of cattle in annual range and feed requirements.

M.H. Saunderson and D.W. Chittenden, Cattle Ranching in Montana, Bul. 341, May 1937, Montana Agricultural Experiment Station, p. 9.

When animal units of grazing are spoken of in this thesis, a unit refers to one animal unit of grazing for a full twelve-month year.

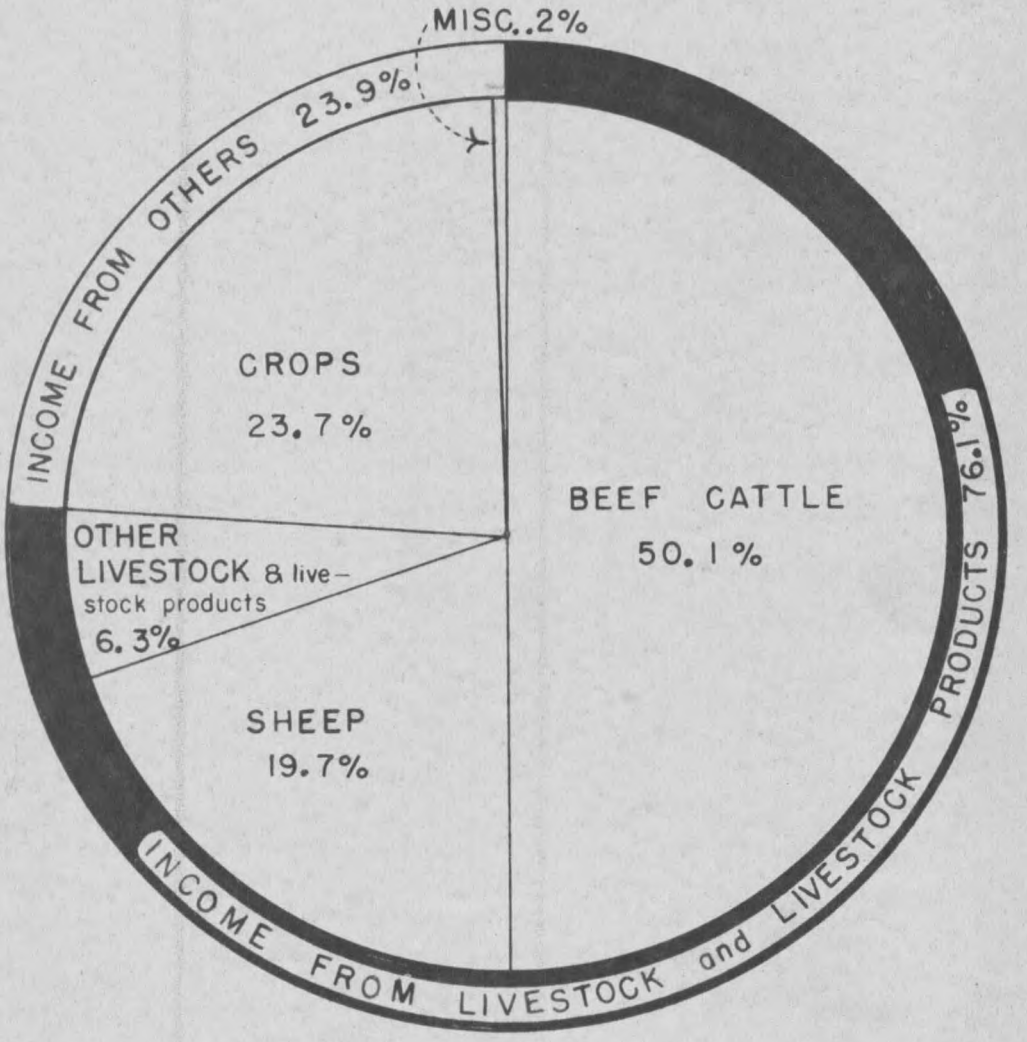


TOTAL LAND AREA: 12,165,120 ACRES

Figure 5.

Land use in 1944, in six counties in Southeastern Montana.

(Counties: Musselshell, Rosebud, Custer, Powder River, Carter and Prairie.) Source: United States Census of Agriculture, 1945.



TOTAL AGRICULTURAL INCOME: $16,351,635

Figure 6.

Sources of agricultural income in six counties in Southeastern Montana, in 1944.

(Counties: Musselshell, Rosebud, Custer, Powder River, Carter and Prairie.) Source: United States Census of Agriculture, 1945.

averages for the whole area, the number of cases making up the sample is relatively small. Because of the small number of ranches being studied it must be realized that reliability of the data from a statistical standpoint is limited when using it as a sample of the trends for the entire area. The average size of the ranches in the sample is also larger than the average for all ranches for more than a hundred animal units in the region.14/ Another factor of bias that may also be present is that most of these ranches have remained under the same ownership and have possibly been a little more successful in their long run management than the average ranch in the area.

Another difficulty involved in the analysis was that records were not always available in complete form in every year. In 1924 only fourteen ranch records were available while in 1929 there were only thirteen records taken on the twenty-one ranches. Complete records on all of the twenty-one ranches were available for 1940. In 1948, all twenty-one of the ranches were visited and some information was attained from each; however, full and complete records were not obtained in three cases. Because of the variations in the sample in the different years the exact averages given in this paper are not always absolutely accurate, but a careful study of the ranches from the information available indicates that these ranches did not differ sufficiently from the other ranches in any particular year to effect the general trends and changes that are the main concern of this study.

14/ In 1944, the average size cattle ranches in southeastern Montana, excluding all ranches under 100 animal units, was between 263 and 287 animal units. Data compiled from unpublished material on file with the Bureau of Agricultural Economics, at Montana State College, originally compiled from U. S. Census of Agriculture, 1945.

With these limitations in mind, by studying these ranches from a case history standpoint the sample is probably large enough to indicate the major changes that have occurred in the operation and management of cattle ranches in the area.

Method of Analysis

In this study, costs, investments, factors of production, land and land use have been computed in relation to animal units. This has been done to give the study a common denominator and to help in facilitating comparisons. Although it was originally planned to break the ranches up into various size groups, this was abandoned, because there were not enough cases contained in the smaller groups to give any significance at all to them. The information presented, unless otherwise specified, will represent an arithmetic average of the complete sample for the specified year.

PART II. SIZE AND LAND TENURE

Introduction

One of the biggest questions of management and stability that has always plagued the rancher in southeastern Montana is whether to lease or to own his range. The rancher who leases his land usually has lower cost of operation but is often in a state of uncertainty about his future operation. The man who owns his own range is much more certain of his future operations but is often faced with higher operating costs.15/

The other unique situation that most of the ranchers are faced with is that a large amount of the range land they use belongs to the Federal Government. The public ownership of land, utilized by private individuals for private profits, is practically unknown in any other type of agricultural enterprise in our country.

Increase in Land Area of Ranches

Since 1924, the amount of controlled land per ranch has been increasing. Table I shows that the average amount of land per ranch more than doubled between the 1924-29 period and 1940. By 1948 the size of the same ranches had again increased by an average of over 2,800 acres per ranch, (the difference between 1924 and 1929 is not significant as this difference was caused mainly by variations in the sample.) As important to the ranchers as the total increase in acreage is how this increase has come about.

15/ Kelso, M.M., Remarks Concerning the Public Grazing Land Question, made during the round table discussion of that problem at the meeting of the Montana Stockgrowers Association, Butte, Montana, May 23, 1947. Unpublished information in the Montana State College files.

TABLE I. THE AVERAGE SIZE AND LAND TENURE OF A SELECTED GROUP OF CATTLE RANCHES IN SOUTHEASTERN MONTANA IN 1924, 1929, 1940 and 1948

	Year			
	1924	1929	1940	1948
Total Acres	5772	5542	11914	14742
Deeded Acres	3962	3461	5532	9587
Leased Acres	1810	2081	6268	5121
Acres Leased From Private Owner	1492	1561	1357	777
Acres Leased From Public Owner 1/	318	520	4911	4344
Acres Used Free of Charge	2/	2/	114	34

1/ This does not include National Forest grazing that was secured by permit on a head basis but does include Federal and State grazing district land that was secured by permit on a per head basis. No acreage figures were available in the case of the Forest grazing, but acreage figures were attainable on the grazing districts.

2/ No acreage figures were available on free land in 1924 or 1929. This unaccounted acreage for free range represents part of the difference in amount of the total acres of land reported in 1929 and 1940.

Disappearance of Free Land

The figures for 1924 and 1929 of the total acreage are deceptive unless the use of the Public Domain and privately owned land used free of charge are considered. During this period a large part of the range used by the ranchers was composed of the Public Domain which belonged to the United States Government and upon which no deeds had ever been granted. Many of the cattlemen using the "open range" had very little if any idea of how much acreage their cattle were running over. Furthermore much of the grazing on the "open range" was done in common with other ranchers' cattle and sheep; therefore no figures as to the amount of free range used during this period were available. The only data available on the use of free range was the number of animal units and the length of time they were grazed on the open range. This was the most important reason for the comparatively smaller size of the ranches in 1924 and 1929.

In June of 1934, the Public Domain was closed to homesteading with the passage of the Taylor Grazing Act. With the passage of this act the free and open range practically disappeared. The land that had composed the Public Domain was turned over to the Grazing Service in the Department of the Interior. The Grazing Service in turn leases this land to the ranchers in the area who were using it before the Act was passed. Where the Public Domain laid in large tracts Federal grazing districts have been established and the range is usually leased on an animal unit basis. Where the Public Domain was broken up by a large number of private holdings, the land was usually leased on an acreage basis with some restriction

being placed on the use of the land. The passage of the Taylor Grazing Act largely explains the increase in the land leased from public ownership in 1940 and 1948 that was shown in Table I.

The free land that existed and was used in 1940 and 1948 was made up of small scattered tracts that were acquired by homesteading. The owners of these tracts have long since left the area but continue to pay the taxes on their land. These tracts are so situated that no one could use them economically other than the rancher whose land surrounds them. Because of this fact the rancher sees no need for leasing, and the owner of the tracts are usually unwilling to sell. About the only conceivable reason for the existence of these tracts is that the owner is holding them for speculative purposes, probably hoping that the land may be overlying a large pool of oil. In 1948 there were only two of these tracts left, both of 320 acres, in the group of ranches studied.

Increase in Deeded Land

The largest increase in total land was found in deeded acreage. As shown in Table II, 19 out of the 21 ranches showed a net increase on the average of 5921 acres each for the twenty-five year period. One of the ranches had a decrease of 460 acres, and one of the ranches, that was surrounded by National Forest, showed no change in deeded acreage. The latter ranch had a land base of 320 deeded acres, all the rest of the land used belonged to the National Forest. The ranch that showed a loss of 460 acres was forced to sell that tract in the drought and depression years. It has not increased in size since because there has never been any

TABLE II. CHANGES IN ACREAGE OF DEEDED LAND OWNED BY TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924 to 1948

Year	Changes in Amount of Deeded Land Owned				
	Increased		Decreased		No Change
	Number of Ranches	Average Number of Acres	Number of Ranches	Average Number of Acres	Number of Ranches
1924-29 to 1940	18	2657	2	875	1
1940 to 1948	17	4147	2	2278	2
1924-29 to 1948	19	5921	1	460	1

surrounding land to buy since 1939.

The two ranches that decreased in size during the 1940 to 1948 period did so as the result of the whole unit changing hands. In one case the ranch was divided between two sons, and in the other case the ranch was broken down to make it easier to sell. Both of the ranches that decreased in size between 1929 and 1940 did so as a result of the depression and drought. One of these ranches has since purchased back three times as much land as was lost.

The increased acreage of deeded lands has been through the purchase of lands from a number of sources. The chief source of these purchases has been from unsuccessful homesteaders.

The policy of the government to give 160 acres of land, later increased to 320 and finally to 640 acres, to any one who could exist on the tract for five years resulted in much needless maladjustment in the region. Considering the fact that 125 to 150 animal units of cattle are needed to yield a "minimum comfort" standard of living,[16] and that it takes from 35 to 40 acres of range land to support one animal unit in most places within the area[17] it is little wonder that the homesteaders soon went broke and had to sell out to some of the larger ranches already existing in the area. A few of the homesteaders were able to stay by buying out other homesteaders.

16/ Saunderson, M.H., Readjusting Montana's Agriculture, V. "Economic Changes in Montana's Range Livestock Production," Bul. 311, Feb. 1936, Montana Agricultural Experiment Station, p. 18.

17/ Ibid, p. 21.

Several of the ranches in the group being studied were started by homesteading, but at one time or another all but one of them have increased their holdings of deeded land by purchases from unsuccessful homesteaders. These purchases have been made either directly from the unsuccessful homesteader or in many cases from the county. Purchases from the county represent cases where the homesteader's tract went into the hands of the county for delinquent taxes, then was purchased by the successful ranchers in the area. Many of the ranchers were leasing this land from the county in 1940, but had purchased it by 1948. This is the main reason for the decrease in acreage leased from public ownership in 1948.

Another important source of land that accounted for the increase in deeded acreage on some of the ranches was land purchased from the Northern Pacific Railroad. At the time the railroad was built, the government gave the railroad alternate sections for forty miles on both sides of the right-of-way for its distance across Montana. Until the last two or three years much of the railroad land has been leased by the ranchers; since 1946 (for the first time in recent years) the railroad has sold a great deal of this land to the ranchers.

The sales of railroad lands largely accounts for the reduction in the amount of land leased from private owners in the period between 1940 and 1948. The rest of the reduction has been the result of buying small uneconomical tracts, usually from former homesteaders.

TABLE III. LAND USE FACTORS ON A SELECTED GROUP OF CATTLE RANCHES IN SOUTHEASTERN MONTANA 1/
1924, 1929, 1940, 1948

Land Use	Year			
	1924	1929	1940	1948
Total Number of Animal Units of Grazing 2/	462	351	319	428
Acres of Grazing Per Animal Unit 3/	25.9	26.4	50.6	40.7
Percentage of Land Used for Grazing	94%	93%	95%	96%
Acres of Hay Per Animal Unit	.46	.78	.77	.66
Acres of Crops Per Animal Unit	.70	.84	.85	.73
Percentage of Land Used for Crops	6%	7%	5%	4%
Percent of Land Used for Crops Other Than Hay	2.04%	.51%	.45%	.40%

1/ Based on twenty-one ranches located in Carter, Custer, Musselshell, Powder River, Prairie, and Rosebud Counties.

2/ An animal unit of grazing represents twelve months of grazing per year by one animal unit.

3/ In the case of the free range in 1924 and 1929, and the National Forest in all of the years, no acreage figures were available; however, data was available as to the number of animal units of grazing obtained from these sources, and these animal units have been deducted from the total animal units in figuring acres of grazing per animal unit.

Land Use - Grazing Land

In view of the large increase in acreage owned and controlled, the next important question to consider is - has there been any important changes in the use of the land by the ranchers?

The most noticeable change in land use during the period 1924-1948 is the decreased rate of stocking on the range land. As shown in Table III, in 1924-29 the rate of stocking, (after allowances for animal units 12 months of grazing on free land had been deducted), was about one animal unit to 26 acres. In 1940, the amount of grazing land per animal unit had almost doubled. In 1948, the rate was 40.7 acres per animal unit, a decrease from the 1940 rate but still an increase of 64% over the 1924-29 rate.

In considering the rate of stocking in 1924-29 two important factors should be considered. In the 1924-29 period, the figures given represent the stocking rate on the owned and leased lands only. The second factor to be remembered is that a large amount of grazing was done on the open range and in most cases the rancher had only a rather sketchy idea of how much grazing his stock did do on free land and an even fainter idea of the amount of land his stock were actually grazing. For these reasons the figures given for 1924 and 1929 are not fully accurate.

The important factor concerning grazing in the days of the open range was that most of the ranchers were trying to run more cattle than they had grass with which to feed them. This condition was brought about by the fact that ranchers had the tendency to run all the cattle on the

open range that they possibly could. The feeling generally was if they did not get the grass their neighbor would. The open range was usually used in the summer, then the cattle would be brought home to winter, and often the home ranch was far too small for the herd that was run on the Public Domain. Thus, heavy over-grazing on the controlled land was also common.

After the passage of the Taylor Grazing Act, the days of the open range were over. For the first time in the history of the ranching industry in Montana the ranchers were reasonably certain of how much grazing land they had for their own use. It is generally held by authorities on range management that this factor plus the occurrence of the severe drought in the thirties caused the ranchers to become more concerned over the use of their range lands and resulted in the doubling of the amount of land used per animal unit as shown in 1940.

The increased rate of stocking found in 1948 has resulted largely from the increased productivity of the range due to the above average precipitation. Indications are that the range is also more productive because of the decrease in over-grazing. The future stocking rate on most of the range will probably fall somewhere between the present rate and the rate in 1940.

Figure 7 shows the percentage of total animal units of grazing classified by the ownership of the land grazed for the selected group of ranchers. The most noticeable change that has occurred is the almost complete disappearance of free grazing which has dropped from 22.7 to

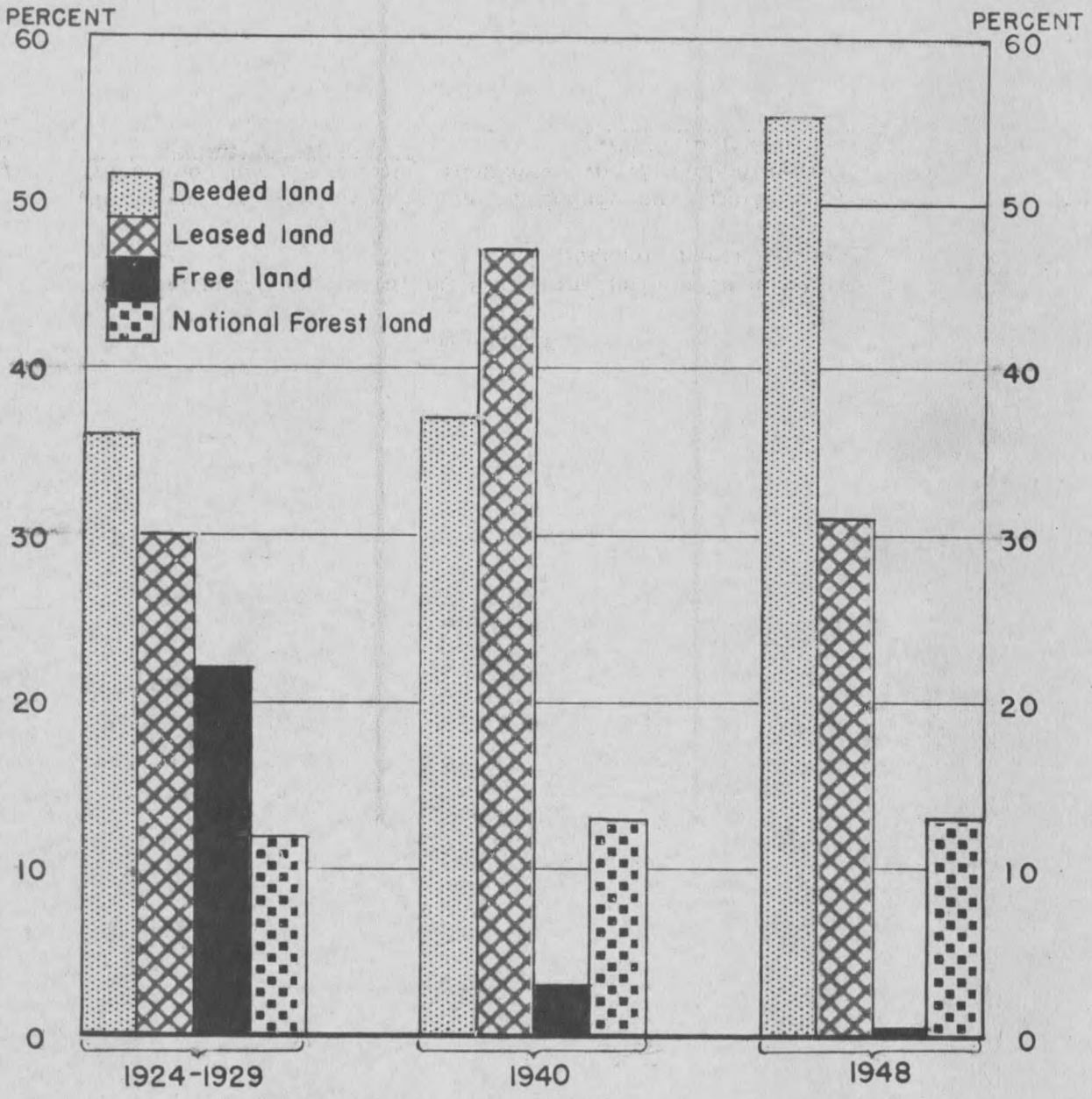


Figure 7.

Percentage of total animal units of grazing obtained from four different land sources by twenty-one cattle ranches in Southeastern Montana, in the years 1924-29, 1940 and 1948.

to 0.3%. The percentage of grazing from deeded land showed little change between 1924-29 and 1940; however, between 1940 and 1948 the amount of grazing obtained from the deeded land increased by 19%. The amount of grazing obtained from leased lands increased from 30% to 47% in 1940, and then dropped back down to 31%. The amount of grazing obtained from the National Forest has remained almost constant at 12-13%.

Land Use - Non-Grazing Land

The amount of controlled land used for crops in all the years covered by the study was of minor importance; 7% representing the highest amount of the total in any one year. During the period of the study the amount of land in crops varied from .7 to .85 of an acre per animal unit. The highest figure was recorded in 1940, this slight increase probably representing an attempt by the ranchers to rebuild their dwindled feed supplies; also, the number of animal units of stock run was the lowest in 1940. In all of the years studied hay was by far the most important crop raised. In 1924 a small amount of grain was raised for cash sale by a few of the ranchers; by 1948 only one of the ranchers raised any appreciable amount of grain for cash sale. It is often the practice among many of the ranchers to plant a small amount of wheat and oats each year. If the crop looks like it will yield very much it is thrashed but if the prospects are poor it is cut for hay. This is the usual extent of farming done other than haying.

The haying operations were generally of two types; (1) native or wild hay which is cut out of the swales and more moist spots on the

range, and (2) alfalfa and crested wheat grass, referred to as tame hay, which is grown on irrigated or dry land. Practically all of the hay raised was used for winter feeding on the home ranch; very little hay was ever sold.

In general all of the land used for crops was deeded land, except in the case of two ranches which were operating totally from leased land in 1924 and 1929.

Conclusions

During the past twenty-five years, the ranches in this study have greatly increased in acreage. The most important increase in size has come about through the purchase of more land, much of which was formerly owned in small tracts by homesteaders. The era of free land and uncontrolled use of the Public Domain has come to an end. The ranchers in the area have pretty definite control over most of the land they use for the first time in the history of cattle ranching in eastern Montana. Because the ranchers' land base has become more stable and fixed in quantity, the indications are that the ranchers have become more interested in the way their range resources are utilized. This has led to a large general reduction in the rate of stocking. This reduction has been made possible in many cases by the larger size of the ranches. The whole land tenure picture for the region appears more stable than at any time in the past.

PART III. ORGANIZATION AND MANAGEMENT

Type and Class of Livestock

As the ranches in this study are classified as cattle ranches it is not surprising to find that 83% or more of the animal units of livestock carried were cattle. For the first three years studied; 1924, 1929, and 1940, the proportion of cattle to other livestock was very constant at 84, 83, and 84% respectively. In 1948, the proportion of cattle to other livestock had sharply increased to 96%.

Although the proportion of cattle to total livestock was almost constant during the period from 1924 to 1940 there was a considerable change in the proportion of various classes of cattle. The most important change was in the proportion of non-breeding stock two years old and over. This class of cattle decreased from a high of 19% in 1924 to a low of 10% in 1940. This change was offset by an increase in the proportion of yearlings and breeding cows.

This shift in production is largely the result of three major changes: (1) An increase in the market demands for younger cattle, which will be discussed in detail a little later; (2) Increased fixed costs largely the result of changes in land tenure; and, (3) A greater degree of certainty and a reduction of risks in raising younger cattle brought about by a firmer control of the land used by the rancher. In the days of the open range, land was not considered as being a limiting factor of production. Although younger cattle could make more efficient utilization of the range, older steers were run because they required less attention and were more able to

TABLE IV. PERCENTAGE COMPOSITION OF LIVESTOCK FOR TWENTY-ONE SELECTED RANCHES IN SOUTHEASTERN MONTANA, 1924-48

Types and Class of Livestock	Year			
	1924	1929	1940	1948
	%	%	%	%
Breeding Cows	45	49	48	56
Bulls	2	4	3	3
Yearling Heifers	9	7	10	12
Yearling Steers	9	9	13	12
Non-Breeding Stock 2 year olds and over	19	14	10	13
All Cattle	84	83	84	96
Horses	16	15	10	4
Sheep	0	2	6	0 1/
Total Percentage of Livestock other than Cattle 2/	16	17	16	4
Total Livestock	100	100	100	100
Total Number of Animal Units of all Classes of Livestock Per Ranch	462	351	319	428

1/ Less than 0.5%.

2/ In none of the years did hogs amount to more than 0.2%; therefore they have been omitted.

shift for themselves. Under open range conditions the percentage of calf crop was often relatively small making the raising of older steers more profitable.[18] In many places little effort was made to feed the older steers in the winter months. Under those conditions it was often more profitable to run steers to three or sometimes four years of age rather than to sell calves or yearlings.

In 1948, due to a narrower margin between the prices of older steers and calves, and above average range vegetation productivity, a small increase in older stock was recorded. The narrower margin between older steers and calves was a carry-over from the days of war-time price control. The greatest increase however, 8% over 1940, was recorded in breeding cows. It is important to note that most of the increases made in the cattle classes were done at the cost of other livestock.

The second most important class of livestock in terms of animal units were horses. In the open range days, much of this area, particularly Custer County, was an important region in the production of horses. From a high of 16% in 1924 horses have steadily declined till in 1948 they represented only 4% of the livestock. In the 1920's horses accounted for over 30% of the livestock on five of the twenty-one ranches. In 1948 none of the ranches were making any effort to raise horses for commercial purposes. Ranchers who had been raising horses generally had two major

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18/ Vrooman, C.W., Chattaway, G.P., and Stewart, A., Cattle Ranching in Western Canada, Publication No. 778, February 1945, Dominion of Canada, Dept. of Agriculture, Ottawa, Canada, p. 65.

complaints about horses in 1948. The first was that there was "no longer any money in the business," and second that it was almost impossible to hire a man to break and work with horses.

Sheep on this particular group of ranches have never been a major enterprise; although, in 1940, one of the smaller ranches was devoted largely to sheep production. This particular operator had to sell out during the drought and was making his comeback with sheep. By 1948, this ranch had been sold to an Eastern real estate broker and was again in the production of cattle. The only sheep being raised by any of these ranches was a band of sixty ewes on one of the smallest ranches.

Hogs or other classes of livestock for other than home use have never been of any importance on any of the ranches studied.

Most of the ranches in the group were raising their own cattle from their own breeding herds. Only four of the ranches have ever made any practice of buying stocker cattle, and never have these stockers represented more than 10% of the total cattle for the entire group.

Type of Cattle Marketed

During the period from 1924 to 1948 the changes that have occurred in the cattle ranching industry in southeastern Montana are marketedly reflected in the size, age, and class of cattle marketed.

The most significant fact shown in Table V is that while the percentage of older cattle marketed was decreasing, the percentage of yearlings and calves had been increasing. It will be noted that over 40% of the cattle sold in 1924 and 1929 were steers two years old and over. By 1940, this class had been reduced to 11%, and by 1948, steers of two

TABLE V. PERCENTAGE COMPOSITION OF CATTLE MARKETED BY AGE CLASSES ON TWENTY-ONE RANCHES IN SOUTHEASTERN MONTANA, DURING FOUR DIFFERENT YEARS

Age - Class of Cattle Marketed	Year			
	1924	1929	1940	1948
	%	%	%	%
Cows	30	24	11	17
Heifers 1's	3	6	12	13
Heifers and Spayed Heifers 2's	0	0	10	4
Bulls	7	1	2	2
Calves	7	23	12	32
Steers 1's	14	5	42	26
Steers 2's	17	13	11	3
Steers 3's	22	10	0	3
Steers over 3's	6	18	0	0
All Cattle Marketed	100	100	100	100

years or more composed only 6% of the total cattle marketed. Yearling steers were by far the most important class of cattle sold from the area in 1940, and by 1948, calves had become the leading class of cattle marketed by the ranchers.

While the general long-run trend has been toward the marketing of younger cattle, there was some reversal of this trend during the war years when there was little margin in price favoring younger cattle, labor was scarce and the range was unusually productive because of above average rainfall. In talking with the ranchers during the spring of 1949, they often expressed their intentions of going back on to a cow - calf basis because they consider it less risky and more profitable in the long run. This largely explains the slight increase in the number of ranches selling three year old steers in 1948. However, it is important to note that calves made up the largest percentage of the number of cattle sold in 1948.

An interesting fact to note was that while there was a 20% increase in the number of calves sold, still less than half of the ranches were selling any calves. This was accounted for by the fact that larger ranches were the chief marketers of calves. One of the two ranches that was marketing three year old steers in 1948 was among the smaller ranches, (less than 225 animal units and 5,000 acres.) The operator of this ranch in order to increase his income with his limited facilities had intensified his operation by raising larger amounts of feed crops and doing considerably more feeding than was customary in the area. Although this means of intensification was helpful in increasing the operator's income, it is doubtful that he can compete economically with Corn-Belt feeders.

TABLE VI. PERCENTAGE BREAKDOWN OF RANCHES MARKETING VARIOUS AGE CLASSES OF CATTLE IN SOUTHEASTERN MONTANA, DURING FOUR DIFFERENT YEARS

Age - Class of Cattle Marketed	Year			
	1924	1929	1940	1948
	%	%	%	%
Cows	93	85	75	94
Heifers 1's	36	25	50	61
Heifers and Spayed Heifers 2's	0	0	5	17
Bulls	57	63	70	56
Calves	14	25	25	44
Steers 1's	36	25	80	72
Steers 2's	71	88	30	17
Steers 3's	79	75	0	12
Steers over 3's	21	50	0	0

A logical question at this juncture is: Why have the ranchers in the area turned to the marketing of younger cattle?

The answer to this question that was most often expressed by the ranchers themselves was, they could make more money on the younger cattle. The reasons for this were that younger cattle were more in demand, made faster gains and used less feed in making these gains. In the end this adds up to more pounds of saleable beef produced per unit of fixed cost. As shown in Figure 8, and Table VII a larger number of animal units of cattle were marketed, in relation to the total number of animal units run, in the years when the younger cattle were sold. In 1924 there were 213 pounds of beef sold per animal unit run while in 1948 this had increased to 332 pounds of beef sold per animal unit run.

Another reason often expressed was, because of the faster turnover there was less capital and therefore less risk involved with the younger cattle. Older steers were considered more risky because they involve a larger investment per head, and the return per pound of gain in relation to the amount of feed consumed decreases rapidly as the steer increases in size. Furthermore, ranchers in 1948 were fearful of future prices which might reduce the value of older cattle that had made their gains on high priced feed. While a study of Table V indicates that there has been some general decrease in the number of cows marketed in relation to other classes of cattle, a comparison of the number of ranches marketing cows in Table VI indicates that generally most of the ranches market some cows each year. Cows are usually marketed in accord with whether a ranch is

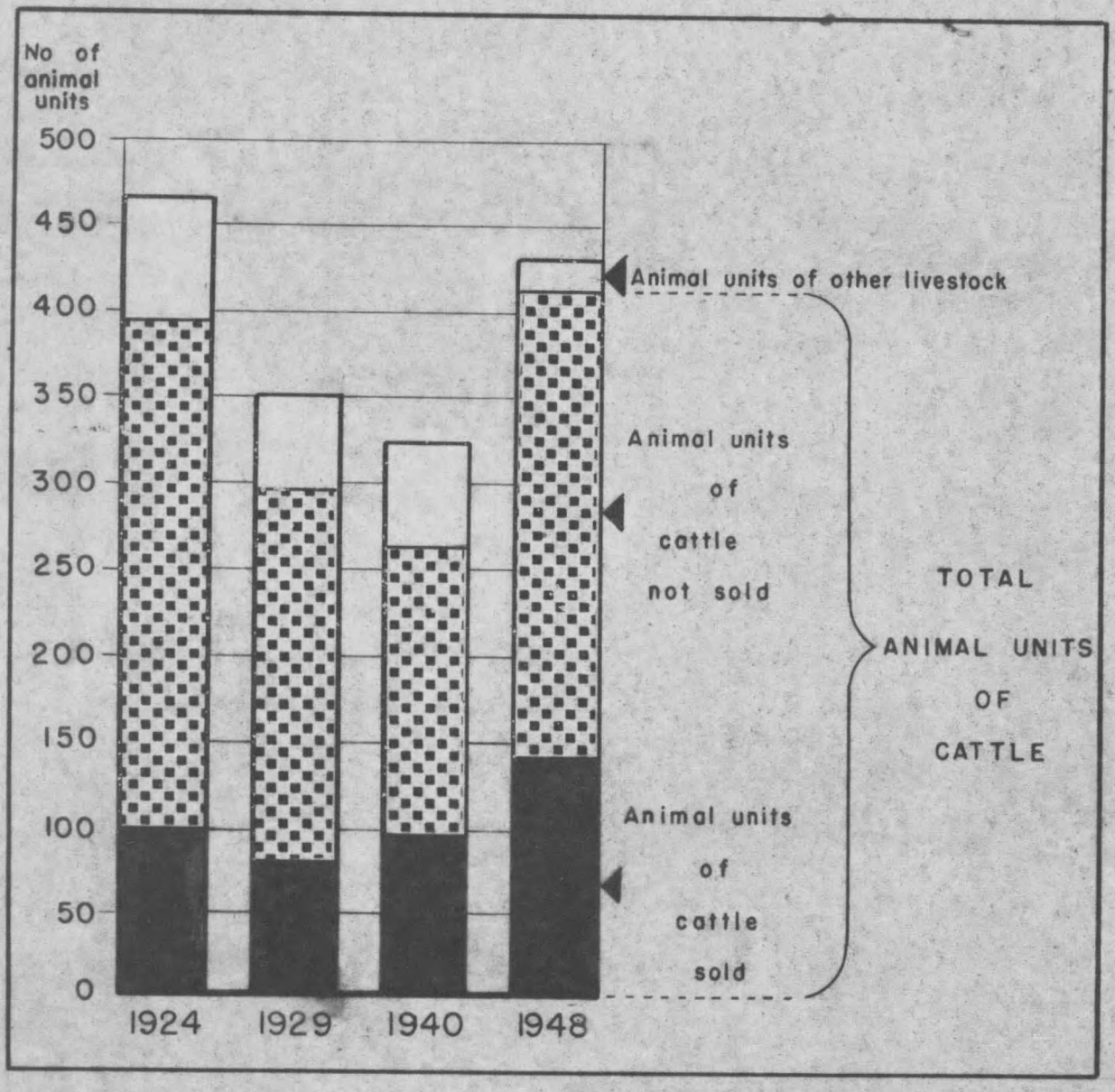

Figure 8.

A comparison of the animal units of cattle sold to the total animal units of livestock raised on twenty-one cattle ranches in Southeastern Montana in the years 1924, 1929, 1940 and 1948.

TABLE VII. RELATIONSHIP BETWEEN TOTAL LIVESTOCK RUN AND AMOUNT OF BEEF SOLD ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA DURING FOUR DIFFERENT YEARS

	Year			
	1924	1929	1940	1948
Total Animal Units of Livestock Run	462	351	319	428
Animal Units of Cattle Sold	102	78	98	142
Number of A.U.'s of Livestock Run per A.U. of Cattle Sold	4.53	4.50	3.26	3.01
Pounds of Beef Sold per Animal Unit of Livestock Run	213	1/	1/	332

1/ No figures were available on the pounds of beef sold in 1929 or 1940.

expanding or contracting total numbers, and as the cows get old or are culled out. The reason why a lower percentage of the ranchers marketed cows in 1940 was that the ranches were rebuilding their breeding herds after the reductions made due to the drought in the 1930's. There has been no appreciable change in the percentage of bulls sold during the period under study.

Aside from these ranch conditions that favor the marketing of younger cattle there are changes in the market for beef cattle. These changes are, namely: the changes in the consumers' demand for beef, and the development of the cattle feeding industry in the Corn-Belt.

Prior to the development of the larger cattle feeding industry in the Corn-Belt most of the cattle were shipped direct to the Eastern markets as "grass-fattened" beef. These cattle were usually very large in size and of considerable age by present day standards. With the rapid increase in the population of the Eastern cities, the trend toward more sedentary life, and smaller families, the consumers' demand shifted toward smaller, tenderer, less fatty cuts of beef. The result of this shift in demand was the building up of the cattle feeding industry in the Corn-Belt which specialized in the production of young grain finished cattle that have a small amount of fat intermingled in the lean, but do not have a heavy strip of waste fat around the outside of the lean meat.

The feeders prefer the younger type of cattle because they are better able to take advantage of the cheaper gains made possible by the natural growth and fattening qualities of younger animals. By feeding calves the feeder is able to turn out in nine months to a year's time a

fattened beef that can be sold to the Eastern trade as "baby beef." Baby beef is in heavy demand on the Eastern market and thus yields the highest price to the feeder, which is in return reflected back to the Western rancher in what he receives for his product.

With a decrease in the age of the cattle marketed, the natural expectation would be for an appreciable decline in the per head value. Although this has been true to some extent, it is important to note that there has not been an over-all decrease in the income of the ranchers even though fewer total cattle are run, because they are able to produce more pounds of higher priced beef per unit of land with the younger cattle.

A study of Table VIII shows that there is a close correlation between the average of the percentage of cattle in each class marketed and the percentage of returns realized for each class. The closest correlation was in the case of the yearlings and two year old steers. The calves showed the lowest rate of return per head marketed while the three year old steers showed the highest rate of return. The difference in the case of calves would be offset in the long run by the increased volume and more efficient utilization of the range resources. A comparison for the bulls would not be justifiable because a few of them were sold as pure-breds and this was not the case for any of the other classes.

Breeding Practices

There has been a considerable change in breeding practices on these ranches during the period of the study. In 1924 and 1929 when practically all of the ranchers were using either open range or forest grazing the practice was to turn the cows and the bulls out on common pasture

TABLE VIII. A COMPARISON OF THE PERCENTAGE COMPOSITION OF CATTLE MARKETED TO THE TOTAL VALUE OF THE VARIOUS AGE - CLASSES OF CATTLE MARKETED ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

Year		Age - Class of Cattle Marketed									
		Cows	Heifers 1's	Heifers and Spayed Heifers 2's	Bulls	Calves	Steers 1's	Steers 2's	Steers 3's	Steers over 3's	All Cattle Marketed
		%	%	%	%	%	%	%	%	%	%
1924	Number of Head	30	3	0	1	7	14	17	22	6	100
	Total Value	22	2	0	2	3	12	20	31	8	100
1929	Number of Head	24	6	0	1	23	5	13	10	18	100
	Total Value	20	4	0	1	12	5	17	14	27	100
1940	Number of Head	11	12	10	2	12	42	11	0	0	100
	Total Value	11	10	10	3	8	43	15	0	0	100
1948	Number of Head	17	13	4	2	32	26	3	3	0	100
	Total Value	20	6	12	3	20	29	4	6	0	100

during the breeding season. Since the cows and bulls of the various ranches using the range usually intermingled, the rancher never knew what bull bred what cow. Under this type of a set up some of the ranchers ran fewer bulls than they should, hoping for free service from their neighbors; while others ran more bulls than necessary in order to be sure their cows got bred. A good illustration of this was in 1929 when the extremes of the ratio of cows per bull varied from a high of 105 to 1 on one ranch to a low of ten to one on another ranch. Both the ranchers were breeding on the Public Domain in common with other herds. Despite these extremes the average ratio of cows per bull in four years studied only varied from 26 to 29 cows per bull and there was no significant trend in this variation.

In 1948, the only year for which accurate figures were available, only 27% of the ranchers were breeding in common pastures with other herds. Of the remaining ranchers all the rest were breeding in multiple bull pastures carrying only their own cattle. Three of the ranches had one or more single bull pastures; however two of these outfits were raising pure breds. Because most of the ranchers are breeding on their own private range, the quality of bulls used as indicated by their value has greatly increased. The rancher now knows that his own bulls are breeding his own cows, and therefore he is willing to spend more to get bulls of good quality.

Most of the ranchers in the past have followed the practice of breeding yearling heifers although they would have preferred to breed their heifers for the first time when they were two years old. The reason for the practice was that most of the ranchers felt that they could not provide

the facilities necessary to run the yearling heifers separate from the cow herd. In recent years more of the ranchers have gone to the breeding of two's; in 1948, 39% of the ranchers were no longer breeding yearlings.

Calf Crop

One of the most important factors affecting ranch income is the percentage of calf crop.19/ The percentage of calf crop among the ranches studied shows one sharp and distinct change. In 1924 and 1929 the average percentage of calf crop was 71 and 67 percent respectively, while in 1940 and 1948 it was 83 and 80 percent respectively. This very definite increase in calf crop was undoubtedly the result of the improved management and breeding practices studied above. In a study in North Dakota, Johnson found an increase of 12-14% in the 1944 calf crop when the cows were bred on private range over the calf crops of fifteen years before that were bred under open range conditions.20/

In view of the shift that most of the ranchers have made to the marketing of calves and yearlings, this increase in calf crop is very important. A ranch with a low calf crop (50-60%) can turn off more pounds of

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19/ Saunderson, M.H. and Chittenden, D.W., Cattle Ranching in Montana, Bul. 341, May 1937, Montana Agricultural Experiment Station, p. 20. The term calf-crop as used here refers to the percentage of calves weaned in proportion to the number of cows exposed to breeding.

20/ Johnson, M.B., Range Cattle Production in Western North Dakota, Bul. 347, July 1947, North Dakota Agricultural Experiment Station and Bureau of Agricultural Economics, United States Dept. of Agriculture, Cooperating, p. 41.

beef a year with a given number of animal units if it is selling three-year-old steers, than if selling calves. However, if the same ranch had a high calf crop (75% or more) it could produce a far greater quantity of beef per year with calves than with three-year-old steers.21/

Death Losses

The percentage of death losses for the ranches averaged 5.2% in 1924; 3.0% in 1929; 4.5% in 1940; and, 3.4% in 1948. A death loss of 3% is generally considered normal and unavoidable in spite of good management practices.22/ From the data collected there does not appear to be any significant trend in regard to death losses. Probably the most important factors affecting the amount of death loss are the weather, condition of the range, and the presence of some diseases or parasites that crop up at irregular intervals or come in cycles. The management on the part of the operator to deal with these factors has also been of great importance in reducing and preventing death losses.

Feeding Practices

On all of the ranches studied, grazing is the main source of feed. The feeding of hay or concentrates is practiced only in the winter and then only at times the stock cannot obtain sufficient feed by grazing. The length of the feeding period on most of the ranches is determined by the severity of the weather, and the condition of the winter range. As shown in Table IX, all of the feeding practices show considerable variation.

21/ Vrooman, C.W., Chattaway, G.P., and Stewart, A., Op. Cit., p. 65.

22/ Saunderson, M.H., and Chittenden, D.W., Op. Cit., p. 21.

TABLE IX. SOME FEEDING FACTORS ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

Feeding Factors	Year			
	1924	1929	1940	1948
Tons of Hay Fed per Animal Unit of Cattle	.51	.63	.50	.47
Percent of Ranchers Feeding Concentrates	57%	92%	85%	72%
Average Number of Days Fed	103	99	80	82
Tons of Hay Carried Over From Previous Year	71	152	327	200

The average length of the feeding period varied by over 20%. The amount of hay fed per animal unit of cattle tends to run about a half ton per year. Most of the ranchers fed some concentrates, either grain, or cotton or soybean cake. The amount of hay reserve carred over from one winter to the next showed considerable variation. Most of the ranchers try to keep at least one year's hay supply in reserve at all times.

Conclusions

In the last eight years the proportion of cattle to total livestock carried by the ranches has greatly increased; horses are no longer important as a secondary enterprise. During the twenty-five year period there has been a shift from the marketing of three year old steers to the marketing of calves and yearlings.

Breeding practices have largely changed from breeding on common range with other herds to breeding in private pastures. This change is reflected in the increase in the percentage of calf crop. No appreciable change was found in death losses. Little change was found in feeding practices; these usually being determined by variation in year to year conditions.

PART IV. INVESTMENT, COSTS AND INCOME

Method of Approach

In order to make the data in this section comparable from year to year, all financial factors have been placed on an animal unit basis. By using animal units as the common denominator, differences in totals due to the variation in size between individual ranches and between the average sizes for different years, are eliminated.

Because of the great amount of variation that is encountered due to fluctuations in prices during the twenty-five year period being studied, all cost, price, and investment factors have been computed on a price index basis.[23] By putting all costs, prices and investments in terms of the value of "1935-39 dollars," the value of the deflated figures is a good indication of the relative changes in inputs and outputs. The indexes used for prices received by ranchers are for the State of Montana.[24] Since no data was available for indexes of prices paid by Montana ranchers, national or regional averages had to be used. The main sources of these were Agricultural Statistics,[25] and other information published by the U. S. Department of Agriculture. Wherever actual prices are used they will be so labeled.

23/ 1935-39 = 100. See appendix for the indexes used.

24/ Halcrow, H.G. and Creer, P.J., Montana Farm and Ranch Prices 1909 - 1948, Mimeographed Circular 51, April 1949, Montana State College Agricultural Experiment Station.

25/ Agricultural Statistics, 1948, U.S. Department of Agriculture, Government Printing Office, Washington, D.C.

Investment

During the past twenty-five years (on the basis of value of "1935-39 dollars") the investment per animal unit has greatly increased. The investment per animal unit in 1924 was $104.34; by 1940, this had increased to $169.54. The amount of investment per animal unit in 1948 was nearly double that reported in 1924, and amounted to $202.18.

For this study the amount of the investment has been divided into four major classifications: namely, land and building, livestock, machinery and equipment, and feed and supplies.

In view of the greatly increased acreage of deeded land it is not surprising to find that the greatest increase in total investment has been in land and buildings. As shown in Table X, the investment per animal unit in 1948 in land and buildings was greater than the total investment in either 1924 or 1929.[26/] Not only has the investment in land and buildings made the greatest total increase in dollars, it has also increased proportionately in relation to the other investments. In 1924 land and buildings accounted for 49.2% of the total investment per animal unit; by 1940 this had risen to 54%; and in 1948 land and buildings accounted for 60.7% of the total investment. The variation between 1924 and 1929 is not significant as it is due mainly to variances in the sample.

26/ The value of land and building as shown in Table X may be a little low as the index number used for deflating was for all the farm and ranch real estate in Montana. It is generally held by the people who deal in real estate that the price of crop land (particularly wheat land) has increased at a faster rate than the price of grazing land since 1940. No index figures on the value of grazing land alone were available for Montana.

TABLE X. AVERAGE INVESTMENTS PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48, Adjusted to Index Basis (1935-39 = 100)

Investments	Year			
	1924	1929	1940	1948
	$	$	$	$
Land and Buildings 1/	51.38	45.92	91.51	122.74
Livestock 2/	48.27	41.35	57.98	61.83
Machinery and Equipment 1/	3.42	4.90	7.10	9.73
Feed and Supplies 1/	1.27	6.38	12.95	7.88
Total Investment	104.34	98.55	169.54	202.18

1/ Indexes derived from Agricultural Statistics, 1948, and other years, Op. Cit.

2/ Indexes used derived from Montana Farm and Ranch Prices 1909-48, Op. Cit.

The item of investment next in importance to land and buildings was livestock. Although, the value of the livestock per animal unit increased during the period of the study, the investment in livestock in relation to the other investments declined. The increase in the value per animal unit of livestock in 1940 and 1948 over that of 1924 and 1929 can be largely attributed to two causes. The first reason was that in 1940 and 1948 the percentage of cattle run in relation to horses increased, and the value per animal unit of cattle exceeded the value per animal unit of horses on the ranches being considered. The second factor is that following the days of the open range the ranchers spent more to secure the services of better quality bulls, and this upbreeding of their commercial stock has resulted in a higher value per head.27/

The value of the investment in feed and supplies has fluctuated more radically than any of the other categories of investment. This fluctuation has been chiefly on a year to year basis with no definite trend apparent. This year to year fluctuation was determined to a large extent by the weather, which in turn determines the amount of feed produced in any one year and the amount of feed carry-over from the previous year.

Although the amount of investment in machinery was relatively small in comparison with the investments in livestock, and real estate it was an important factor that has been increasing steadily during the last

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27/ The fact that upbreeding of cattle in southeastern Montana has resulted in a greater value per head than for the value per head for the entire state is based on unpublished information from the Montana State Statistician's office, B.A.E. This difference is greatest in the case of bulls, calves, and yearling heifers.

twenty-five years. This steady increase in investment in machinery becomes of greater importance when consideration is given to the cost of maintenance and depreciation. These additional costs are dealt with in Table XII and in the discussion on costs.

In the last two or three years there has been a tendency on the part of several of the ranchers to invest heavily in new machinery. In 1948 all but one of the ranches had at least one tractor (the only ranch without a tractor in 1948 purchased one in the spring of 1949.) Over sixty percent of the ranches had two or more tractors and all but two of the ranches had at least one truck in addition to the family automobile and other farm machinery. Because of the more intricate nature of modern tractor operated machinery, the investment in machinery has greatly increased over that used when horses were the primary source of power. Although the addition of this new machinery provides greater efficiencies in many ways, it also requires a greater cash outlay for operation, maintenance and repairs than did the use of horse-drawn implements. An interesting question for some future study would be: Has this greater investment in machinery proven to be economically feasible?

Debt

The long run trend among the ranchers is toward a reduction and complete liquidation of all debts. The loans were of usually one of two types: (1) Long term loans usually based on 5 to 35 year pay off; and, (2) Short term loans usually contracted for a year or less time. The long term loans were usually in the form of real estate loans, while the short term loans were chattel loans usually made on livestock. In 1924 there

were four loans that were personal loans, all of these were from private Eastern individuals. Since 1924 none of the loans have been from private parties.

The total amount of debt per animal unit has varied considerably from year to year. The main factors causing this variation are the price of beef cattle and the condition of the range. As shown in Table XI, the amount of debt per animal unit increased between 1929 and 1940, this being a period of low prices and poor range conditions. Since 1940 the amount of debt has rapidly decreased in spite of the large additional purchases of land. Of course, 1940-48 has been a period of high prices and favorable range conditions. The percentage of ranches with debts also decreased during the period from 1940 to 1948.

Table XI shows the amount of debt in cents in relation to the total dollars of investment. The amount of debt dropped between 1924 to 1929; was about the same from 1929 to 1940; and showed a 75% decline between 1940 to 1948. Considering the large increase in acreage owned per ranch this would indicate that most of the ranchers have not gone in debt to expand the size of their holdings. One factor to remember in considering the significance of these trends is that over 75% of these ranches have been in the hands of the same owner or family for over twenty years. Long time ownership is a factor that is usually considered conducive to low debts.

In 1948, only five ranches reported any debts; two of these ranches accounted for 88% of the total. The amount of debt on the other three ranches did not equal 15% of the value of their last year's cattle sales. The ranch having the largest debt (54% of the total debt for all

TABLE XI. AMOUNT OF DEBT IN ACTUAL DOLLARS PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

Debt Factors	Year			
	1924	1929	1940	1948
Amount of Debt	$23.00	$16.32	$21.64	$14.50
Interest Paid	$ 1.74	$ 1.03	$ 1.32	$ .51
Amount of Debt Per Dollar of Investment	$ .19	$ .12	$ .12	$ .03
Average Rate of Interest	7.59%	6.84%	6.08%	4.70%
Percentage of Ranchers Having Some Debt	79%	62%	86%	26%

of the ranches) had just finished making a series of costly improvements in hopes of selling out to some Easterner for a fancy price. The other ranch that was heavily in debt was owned by a man who purchased it two years ago and was trying to get started on very limited capital.

Rate of Interest Paid

The rate of interest paid on loans by the ranchers has been steadily decreasing. In 1929 the average rate of interest paid on a loan by the ranchers was 7.59%; by 1948 the interest rates on loans had dropped to the place where the average was 4.70%. In 1924 the most common rate of interest charged was 8% with the extremes being from 5 to 10%. In 1948, the most common rate of interest charged was 4½% with the variation being between 4 and 5½%.

The reduction in rates of interest charged for borrowed capital has been brought about largely by the patterns set by such lending organizations as the Federal Land Bank and the Production Credit Association. Another factor reducing interest rates is that as an area becomes more settled and established in cultural patterns the rate of interest charged on real estate loans generally tends to decline.

Another interesting factor to point out was that in the last twenty-five years the number of sources from which ranchers borrowed was reduced. In 1924 the ranchers had borrowed from a total of seven different types of lending agencies and private parties. In 1940, all of the loans were obtained from three types of lending agencies. In all the years up to 1948 the local banks had been the source of the largest percentage of the loans. In 1948 the Federal Land Bank was the principal lender both in

total amount loaned and number of loans.

Along with the trend toward a reduction of lending agencies there has been a tendency toward the consolidation of loans and although there was considerably less debt in 1940 than in 1924 the amount per loan was larger in 1940 than in 1924. In 1924 the average rancher who was in debt had borrowed from 2.54 different lenders while in 1940 the average was 1.38, and in 1948 only one of the five ranchers who had loans had borrowed from more than one lender.

Costs

For purposes of analysis the operating costs are in terms of 1935-39 dollars and the total operating costs have been broken down into seven categories. They are:

(1) Paid Labor: This includes all labor for which actual wages were paid in cash and also includes the cost of boarding any of the hired laborers to whom board was furnished in addition to wages. This does not include wages for the operator or unpaid family laborers, or the cost of their board.

(2) Feed, Salt and Minerals Purchased: This includes all feeds, salt, or minerals not produced on the ranch, and which are purchased.

(3) General Expenses: This includes all items such as gas, oil, fuel, small tools, hardware, day to day repairs and miscellaneous supplies that are purchased. This item does not include anything listed in any of the other categories; livestock purchases; or major building repairs and new construction which were depreciated

TABLE XII. AVERAGE OPERATING COSTS PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

(Computed on Index Basis of 1935-39 = 100) 1/

Operating Cost	Year			
	1924	1929	1940	1948
	$	$	$	$
Paid Labor 2/ 3/	1.26	2.46	2.88	1.87
Feed, Salt and Mineral Purchased 3/	.23	.43	.51	.96
General Expenses 3/ 4/	1.01	1.15	4.56	6.16
Leases 3/ 5/	.78	1.12	1.85	1.54
Taxes 3/	1.13	1.44	2.01	2.27
Depreciation on Buildings and Machinery 3/ 6/	.93	1.18	1.82	1.97
Interest Paid on Debt 7/	1.74	1.03	1.32	.51
Total Operating Costs	7.08	8.81	14.95	15.28

1/ See Appendix B, Table II for costs in actual dollars.

2/ Includes cost of boarding hired labor.

3/ Indexes used derived from Agricultural Statistics, 1948 and other years, Op. Cit.

4/ Includes purchases of gas, oil, small tools, hardware and other general supplies.

5/ Index on leases was computed by using half the index number for taxes and half the index for land value, as the cost of leases tend to vary in relation with these two factors. No exact index figures were available.

6/ Depreciation was figured by putting building and machinery values on a 1935-39 index basis and depreciating buildings at 4% per year, and machinery at 10% per year.

7/ Actual dollar figures were used here.

on a long time basis.

(4) Leases: This includes all cash leases or permits for use of land.

(5) Taxes: This applies to the taxes paid on all real estate or personal property used in the operation of the ranch, this does not include any income taxes.

(6) Depreciation: This includes all depreciation on real estate and machinery that is not considered as cash expenditure.

(7) Interest Paid on Debt: This includes all interest paid on debts which are incurred in the operation of the ranch; payments on the principal are not included. Interest figures are in actual dollars as no suitable means could be arrived at for putting interest paid on an index basis.

The operating cost on the ranches studied show a very definite upward trend. The total operating costs in each of the four years studied show an increase above the previous year studied. By 1948, the total operating cost was 118% greater than in 1924, the first year for which records were available.

Paid labor as a cost factor in the operation of the ranches increased in amount till it hit its peak in 1940 at $2.88 per animal unit; by 1948, the cost had declined to $1.87. In 1929 paid labor represented the largest single expenditure, it was the second most important expenditure in 1924 and 1940, but in 1948 labor as an expenditure in relation to the other seven cost factors had dropped to fourth place. The drop in the labor cost from 1940 to 1948 may be accounted for by two different factors:

TABLE XIII. TRENDS IN RELATIVE INPUTS OF VARIOUS PRODUCTION FACTORS (1924 represents the base year and equals 100%) 1/

Operating Costs	Year			
	1924	1929	1940	1948
	%	%	%	%
Paid Labor	100	195	228	148
Feed, Salt, and Mineral Purchased	100	186	222	417
General Expenses	100	114	451	610
Leases	100	144	237	197
Taxes	100	127	178	201
Depreciation on Buildings and Machinery	100	126	196	212
Interest Paid On Debt	100	59	76	29
Total Operating Costs (Weighted)	100	124	213	218

1/ Cost of input factors computed on index basis of 1935-39 = 100

(1) With the great increase in amount of labor saving machinery used by the rancher there followed a reduction in amount of labor used. (2) The size of the ranches have increased from 319 animal units to 428 animal units, and in accord with some studies made by Saunderson, the maximum efficiency in cattle ranch operation seems to be between 400 to 500 heads.[28]

The cost of feed, salt and mineral has shown a continous increase during the four years studied. The amount spent for feed in 1948 was 317% greater than in 1924. In spite of the increase in amount spent for feed, in relation to the other costs, feed has always been of small importance. In all but 1948 feed rated seventh (or last); in 1948 feed rated sixth among the seven cost items. A breakdown of expenditures in this category showed that roughly 60% of the total was spent for concentrates (soybean or cottonseed cake or pellets), 20% for salt and mineral, and 20% for grain and hay. This increased expenditure for feeds also indicates that the ranchers are becoming more conscious of the value of salt, minerals, and protein. There was over a 50% increase in the number of ranchers feeding salt and minerals between 1924 and 1948.

General expenses have shown the greatest overall increase of any of the seven expense items. The increase has been greatest both from the standpoint of dollars and cents and in relation to other expenses. In 1924, general expenses accounted for 14.3% of the total operating costs,

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28/ Saunderson, M.H., Some Materials Relating to Livestock and Land Valuation, unpublished mimeographed material found in the Montana State College Library, p. 16.

in 1940 this had risen to 30.7% and in 1948 general expenses represented 40.3% of the total operating cost. The total rise in dollars and cents per animal unit was $5.15 which accounts for 59% of the total rise in operating costs between 1924 to 1948. One of the largest single items of expense included in general expenses was for gas, fuel and oil (excluding that used for non-ranch business). The amount spent for gas, fuel and oil in 1948 was $1.25 per animal unit as compared with 17 cents in 1924, an increase greater than the entire amount of general expenses in 1924. Other major items of general expense have been machinery repairs, hardware and small tools.

The amount of money per animal unit spent for leases increased up until 1940 then dropped by 20% in 1948. Looking back at Figure 7, we find a definite correlation between the trends in cost per animal unit of leased grazing, and the actual amount of leased grazing. The reduction in leased grazing between 1940 and 1948 accounts for the reduction in cost of leases per animal unit. Another factor accounting for the variation in the amount paid for leases was that the number of acres of grazing per animal unit was highest in 1940 and showed the same pattern of year to year variation as was shown in amount paid for leases.

The amount of taxes paid per animal unit showed a consistent rise in each of the four years studied. In view of the increasing amount of investment per animal unit found at the beginning of the chapter this fact is not surprising. In addition to the increase in total investment the rate of the taxes also showed a rise. Between 1924 and 1948, the total investment per animal unit increased by 94% while the amount of taxes paid

TABLE XIV. PERCENTAGE BREAKDOWN OF THE AVERAGE OPERATING COSTS ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

(Computed on Index Basis of 1935-39 = 100)

Operating Cost	Year			
	1924	1929	1940	1948
	%	%	%	%
Paid Labor 1/	17.8	27.9	19.2	12.2
Feed, Salt and Mineral Purchased	3.2	4.8	3.4	6.3
General Expenses 2/	14.3	13.1	30.7	40.3
Leases	11.0	12.7	12.3	10.1
Taxes	15.9	16.4	13.5	14.9
Depreciation on Buildings and Machinery	13.2	13.4	12.1	12.9
Interest Paid on Debt 3/	24.6	11.7	8.8	3.3
Total	100.0	100.0	100.0	100.0

1/ Includes cost of boarding hired labor.

2/ Includes gas, oil, small tools, hardware, repairs and miscellaneous supplies.

3/ Based on actual costs; not indexed.

per animal unit increased 101%.

A comparison between the cost of leased grazing per animal unit and the cost of owned grazing per animal unit would be interesting to make at this point. Unfortunately however, in many of the records there has been no breakdown made between the personal property tax, and the real estate tax. Because of this an accurate comparison was not possible, but from the information available it would appear that the cost per animal unit of owned grazing was two to three times more expensive than an animal unit of leased grazing, if taxes, interest on debt, and returns to capital invested were taken into consideration.

The charge for depreciation has more than doubled in the past twenty-five years. The main factor responsible for this increase was the enlarged investment in machinery. As most of the buildings on the ranches have been there for twenty-five years or more, depreciation on the buildings was no longer the major item. On the other hand, at least fifty percent of the investment in machinery has been made within the past five years. Another important factor was with the increased acreage of deeded land there has been a large increase in fences. In 1948, fences accounted for about 18% of the depreciation charge.

The final item of cost to be considered was the interest paid on debt. This item of cost showed the greatest fluctuation of any cost item; in relation to other cost items. Interest on debt was the largest single item of cost in 1924 and the smallest one in 1948. As was seen earlier in the chapter, the amount of debt tends to fluctuate with economic conditions in general, the productivity of the range land (which is largely determined

by the amount of rainfall), and the number of years the ranch has been in the hands of the owner. These factors in turn were responsible for the amount of interest paid on the debt.

The operating costs on the ranches studied showed a definite upward trend. The total operating cost increased 24% between 1924 and 1929; 89% between 1929 and 1940; and, 5% between 1940 and 1948. The total increase in total operating costs between 1924 and 1948 was 118%. The great increase in operating costs occurred between 1924 and 1948, chiefly because of three main changes: (1) The almost complete disappearance of free land. (2) The change in type of cattle marketed. (3) The change from horse powered machinery to tractor powered machinery. Since the greatest change in these three factors occurred between 1929 and 1940, the rise in operating costs were the greatest during this period.

Income

Definitions of Various Types of Incomes

Because there are several different types of incomes that might be considered in evaluating a rancher's business, the types of incomes studied and discussed in this thesis are defined below:

(1) Gross Cash Income: This included all income derived from the sale of livestock, livestock products, or crops produced on the ranch. The only expense that has been deducted is that spent for the purchase of livestock for breeding or feeding purposes.

(2) Net Cash Income: This is the gross cash income minus operating expenses (expenses enumerated in the section on costs); it does not include any payment for the operator's or family labor

and management. Interest paid on land debts is included, but principal payments on loans are not. The net cash income represents the amount of cash the operator and his family will have to live on and pay off the principal of any debts he may have.

(3) Net Ranch Income: This is the net cash income plus or minus any change in inventories. The same set of prices was used for inventory valuations in both the opening and closing inventories in any one year, so that inventory changes are the result of variations in physical quantity and quality, and are not due to variations in prices. Net ranch income represents actual production of wealth, (excluding the value of items used in family living) produced by the ranch in any one year.

(4) Net Returns to Family Labor and Management: This is the net ranch income, minus a charge for return to capital investment. The charge for the return to capital investment is figured at the rate of interest that the same amount of capital as invested in real estate, livestock, and the ranch operation in general would return if loaned out at going rates of interest in any one year. The net return to family labor and management represents the amount of money earned by the operator and his family in return for their own labor and management in any one year.

(5) Net Return to Management: This is the net return to family labor and management minus a charge for the unpaid labor of the operator and his family. Labor charges have been made at the going rate paid for ranch labor in the respective years. Net

return to management represents above and beyond all expenses, earnings of the capital invested and unpaid labor. This return is often spoken of as the net profit or pure profit.

In this study, no allowances were made for home-grown and used products. It was realized that on the smaller ranches this was an important item, but on the larger ranches the value of this return was relatively small. A return for family living derived from the ranch was not figured because of lack of adequate information in the records on which this study was based. A study by E. E. Peterson, showed that on a typical Plains cattle ranch the value of family living derived from the ranch averaged $303 for the period of 1929 through 1945. 29/

The analysis of income that follows is on the basis of actual prices and has not been adjusted to an index basis. An analysis of income figured on a long time basis is considered separately in a section entitled "Net Income Computed on a 'Normal' Price Relationship Basis."

Gross Income

The primary source of income on all of the ranches studied, in all of the years was from the sale of beef cattle. Only in 1924 did the sales of beef cattle account for less than 90% of the total income. In 1924 the income by sources was made up as follows: beef cattle 85%, hogs 8%, and other sources (which included livestock products, horses, and crops)

29/ Peterson, E. E., Organization, Income, and Adjustments on a Typical Plains Cattle Ranch, unpublished manuscript, Montana State College, November 1945, p. 37.

accounted for 7% of the total income. In none of the other years studied since 1924 have hogs amounted to as much as .5% of the total income.

In 1929, beef cattle made up 95% of the total income with sheep accounting for about 1.5%, and all other sources 3.5%. In 1940, 91% of the income was from beef cattle, 4% from sheep, 2% from Government A.A.A. payments and the rest came from other sources. The income in 1948 was 96% from beef cattle, 2.5% from grain and alfalfa seed and the remaining 1.5% from other sources.

Two of the ranches in the past have had some additional income from the "dude" business. Although it is recognized that "dudes" made some difference in operations on these ranches, in this study, income from "dudes", or any other non-ranch enterprise or securities were not considered, and all expenses for "dudes" were deducted in figuring costs. This was necessary in order to measure all of the ranches on the same basis.

The rise in actual gross income shown in Table XV can largely be attributed to two principal factors. The first factor is the variation in prices received by the ranchers for the products they sold. The second factor is the increase in the number of animal units of beef cattle sold in relation to the number of animal units of livestock run. The increase in gross income per animal unit between 1924 and 1929, and then again between 1940 and 1948 were primarily caused by the first factor. The increase in gross income between the years 1929 and 1940 was primarily the result of the second factor.

The price of beef cattle was 52% higher in 1929 than in 1924. This increase in price is the primary cause of the increase in gross

TABLE XV. AVERAGE RANCH INCOME PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

(Actual Income)

	Year			
	1924	1929	1940	1948
	$	$	$	$
Gross Cash Income	13.61	26.14	31.55	76.92
Cash Expenses 1/	8.41	11.41	15.18	29.76
Net Cash Income	5.20	14.73	16.37	47.16
Net Inventory Change	.50	4.96	1.77	1.78
Net Ranch Income	5.70	19.69	18.14	48.94
Net Return to Capital Invested	6.94	8.24	9.89	22.14
Net Return to Family Labor and Management	-1.24	11.45	8.25	26.80
Unpaid Family Labor	2.19	2.77	3.57	6.29
Net Return to Management	- 3.43	8.68	4.68	20.51

1/ See Appendix B, Table II for break-down of total cash expenses.

income between 1924 to 1929, also of importance was the fact that there was a 3% increase in the number of animal units of beef cattle sold in relation to the total number of animal units of livestock run.

The price of beef cattle in 1940 was 18% lower than the price of beef cattle in 1929; however, the gross income per animal unit was $5.41 higher per animal unit in 1940 than in 1929. This rise in income was largely the result of an increase of over 12% in the number of animal units of cattle sold in relation to the number of animal units of livestock run, this factor was shown in Figure 8.

The increase in gross income from 1940 to 1948 has largely been the result of the fact that the price of cattle was 225% higher in 1948 than in 1940.

Changes and Trends in Net Income

The net cash income for the ranches followed the same pattern of increase that was found for the gross income. The greatest increase in net income was between 1940 and 1948. During this time the increase in gross income was 144% while total operating costs were up only 96%. Thus with such a favorable relationship between prices and costs, the net cash income was 188% greater in 1948 than in 1940.

The smallest increase in net income occurred between 1929 and 1940. During this period the costs increased by 33% while the gross income increased only 21%. The result was that increase in net income was only 11%. The increase in expense that occurred between 1929 and 1940, despite the fact that the dollar had 22% more purchasing power in 1940 than in 1929

was largely the result of two factors: (1) Higher land costs due to the disappearance of free land. (2) In a study made by Saunderson it was found that the expenses on ranches operating on a cow-calf basis would run about 50% higher than ranches selling three-year-old steers.30/ The difference in cost due to the age of cattle marketed in these two years would probably increase the costs of operation by 20 to 25%.

The increase in net cash income between 1924 and 1929 was 183%. This increase in net income is due to a large increase in gross income and a relatively small increase in operating costs.

Inventory increases were of relatively minor importance except in 1929 when a $4.96 inventory increase was recorded. A large percent of the inventory increase in each of the four years was in the production of feed crops. As a result of the large inventory increase in 1929, the net ranch income was greater in 1929 than in 1940. The lowest net ranch income was in 1924 and the highest in 1948.

As the net return to capital invested in 1924 was greater than the net ranch income, the returns to family labor and management in that year was a minus quantity. Due largely to the increase in investment per animal unit between 1929 and 1940 the net returns to family labor and management was 50% greater in 1929 than in 1940. The net return to family labor and management in 1948, even though the investment was double that of 1940, was 134% greater than in any of the other years studied.

30/ Saunderson, M.H., Some Materials Relating to Livestock and Land Valuation, Op. Cit., p. 3.

The return to management after all factors were considered shows that the most profitable year was 1948 and the least profitable was 1924. These extremes are largely the result of two factors: (1) Prices and (2) The relationship of the number of animal units of cattle sold to the number of animal units of livestock run. The year 1929 was more profitable than 1940 because prices were higher, expenses lower, and the amount of investment per animal unit was less.

Net Income Computed on a "Normal" Price Relationship Basis

When the information presented in Table XIV is placed on a long-time normal price relationship basis, (using as this basis the price level of 1935-39) as shown in Table XVI, a number of interesting factors are brought out:

(1) The high profits realized in 1948 were to a large extent the result of a favorable relationship between prices paid and prices received. This is illustrated by the fact that on the basis of 1935-39 dollars, that the net income in 1948 was lower than in any other year studied.

(2) Under a normal price situation (assuming that the 1935-39 period was a period of normal price relationships) the ranchers operating as they did in 1948 would have had a negative return to family labor and management.

These observations stimulate some questions which are unanswerable on the basis of this study but might be of interest in some future study:

(1) Can the ranchers despite their greatly increased investment

TABLE XVI. AVERAGE RANCH INCOME PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48

(Based on Index of 1935-39 = 100)

	Year			
	1924	1929	1940	1948
	$	$	$	$
Gross Cash Income	14.37	18.70	26.51	22.43
Cash Expense	6.67	8.65	14.98	15.33
Net Cash Income	7.70	10.05	11.53	7.10
Net Inventory Change	.53	4.28	1.49	.52
Net Ranch Income	8.23	14.33 14.78	13.02	7.62
Net Return to Capital Invested	4.65	4.74	8.11	10.76
Net Return to Family Labor and Management	3.58	9.59 10.04	4.91	-3.14
Unpaid Family Labor	1.55	1.81	3.83	1.71
Net Return to Management	2.03	7.78 8.23	1.08	-4.85

be able to cut operating costs sufficiently in the future to be able to operate profitably in a period of "normal" price relationships?

(2) Was the reason for low net income when figured on an index basis because the ranchers tended to put more inputs in their operations in order to make more profits when prices received increased faster than prices paid? Or was the reason that in times of high gross incomes the ranchers did not work as hard or try to maximize their efficiency? Or is the reason a combination of these factors?

Conclusions

On a long-time basis (base of the 1935-39 price level) the amount of investment per animal unit has risen 94% in the past twenty-five years. The chief factors increasing the amount of the investment were a 155% increase in the total acres of deeded land, and a 28% increase in the value of livestock per animal unit. During the same period of time the amount of debt per animal unit has decreased 37% and the amount of debt per dollar of investment has decreased from 19 cents in 1924 to 3 cents in 1948. The percentage of ranches having some debt increased from 79% in 1924 to a high of 86% in 1940, by 1948 only 26% of the ranchers had any debts. During the twenty-five year period, expenses have gone up 118%, the major increases were in general supplies, taxes and depreciation. The only expense item that showed a reduction was interest paid on debts.

On an actual dollar basis, the most profitable year by far was 1948, and the least profitable year was 1924. The net cash income was

higher in 1940 than in 1929, but due to a large increase in inventory in 1929, the net ranch income was larger in 1929 than in 1940. The most important factor accounting for large income in 1948 was that prices received were the highest in history, and prices paid had not risen as fast as the prices received.

PART V. SUMMARY AND FUTURE PROSPECTS

Critical Appraisal of the Study and Methods Used

The principal objective of this study was to find the changes that had taken place in cattle ranching in the Plains region of southeastern Montana since 1924 and the organization of these cattle ranches in 1948.

The method of approach was to follow up similar ranching studies that had been made in the past covering a series of twenty-one ranches located in the area. Each one of the ranches was visited and complete business records were obtained for the year 1948. On the basis of arithmetical averages the group of ranches were compared against similar records for the same ranches for the years 1940, 1929 and 1924. This method of analysis had some severe limitations, the sample was too small to be statistically reliable in all matters and the ranches constituting the sample were definitely above average in size and in all probability were better managed than the average of all ranches in the area.

Of what value is the study? In a paper appearing in the Journal of Farm Economics, E. O. Heady points out that the primary steps in solving problems in farm management are: (1) To formulate or establish the ideal or optimum. (2) Determine the extent and the reason why the existing state differs from the ideal or practical optimum. (3) Establish the appropriate means and provide the concrete quantitative data which serves as the basis of action for getting from the "existing" to the "optimum." 31/

31/ Heady, E.O., "Models in Farm Production Economics Research," Journal of Farm Economics, Vol. XXX, No. 2, May 1948, p. 207.

The work in this paper is of such a nature as to provide a better understanding and to serve as a basis for the "existing state," as outlined above, in connection with future study in ranch management in southeastern Montana.

The chief value of this study is more for a better understanding of cattle ranching in southeastern Montana, and as a basis for future study than as an end in itself or a solution of any specific problem.

Summary

During the past twenty-five years, bearing in mind the limitations of the data due to the small number composing the sample and the use of averages in analysis, the following changes and trends were apparent:

(1) The amount of controlled land used by the ranchers has increased by 159%. The most important increase in size has come about through the purchase of more land, much of which was formerly owned in small uneconomical tracts by homesteaders.

(2) The era of free land and uncontrolled use of the Public Domain has come to an end. The ranchers now have a firmer and more certain control over the land they use than at any other time in the history of the cattle ranching industry in Montana.

(3) With a more certain control of the range, the ranchers are more concerned with the way the range resources are utilized and have reduced their stocking rates.

(4) During the past twenty-five year period there has been a shift from the marketing of three year old steers to the marketing of calves and yearlings. In 1924 the ranchers marketed 213

pounds of beef per animal unit of livestock run; by 1948 this had increased to 332 pounds of beef per animal unit of livestock run.

(5) Breeding practices have shifted from breeding on common range with other herds to breeding in private pastures. This change has helped increase the percentage of calf crop.

(6) Little change was found in feeding practices; these usually being determined largely by year to year variations in the weather.

(7) Figured on the basis of constant prices at the 1935-39 level the amount of investment per animal unit has increased 94% in the past twenty-five years. The chief factors causing this increase were a 155% increase in deeded land, and a 28% increase in the value of livestock per animal unit.

(8) The amount of debt per animal unit has decreased by 37% in the last twenty-five years. Only 26% of the ranchers had any debts in 1948, this was the smallest percentage for any year of the study.

(9) Figured on the basis of the purchasing power of the dollar in 1935-39, the operating costs for each of the years studied were higher than for the previous year studied. During the entire period inputs increased by 118%, the major increases were in general supplies, taxes and depreciation on machinery and buildings. The only input item that showed a decrease for the period was interest paid on debts.

(10) The most profitable year for the ranchers during the study was 1948, and the least profitable was 1924. The most important factor accounting for the high income in 1948 was that prices received had risen faster than prices paid by the ranchers.

Prospective Changes and Problems for Future Study

One of the most important trends studied in this thesis was the trend toward the marketing of calves. While the trend toward a cow-calf basis of operation appears to be the most profitable at the present time during a period of favorable range conditions, from a long-run standpoint a cow-calf operation in the Plains is very vulnerable. The great weakness of this system is that during a series of drought years that are characteristic of the region, the only way that a rancher has to reduce his livestock numbers is to liquidate part of his breeding herd.32/ This is what happened to many of the ranchers who were operating on a cow-calf basis in the thirties. Ranchers who are running steers and spayed heifers in addition to their breeding herd are able to reduce stocking rates quickly without as seriously affecting their future earnings.

For these reasons some of the more far-sighted operators may shift to the marketing of long yearlings or possibly two year olds. A trend in this direction may quickly develop if the next couple of years should be below normal in rainfall.

Another factor that may cause a shift back to the marketing of older cattle is the rapidly increasing demand for more beef on the Pacific Coast caused by a rapidly expanding population there. This increase in

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32/ Johnson, M. B., Op. Cit.

demand has already been felt in some parts of Montana in the form of an increased demand for finished beef. Unlike cattle going East most of the cattle headed for the Coast must be finished and ready for slaughter as there is no great fattening area in the West like the Corn-Belt.

At the present time it does not appear that this demand will greatly affect the ranchers in southeastern Montana because most of the ranchers in the area have little or no source of home-grown feed aside from the range and a few hay meadows with which to finish cattle at a relatively young age. A reduction in the price of wheat relative to other grains, (mainly corn), and beef cattle, that would make the feeding of wheat to cattle more profitable would do much to encourage the finishing of more beef cattle in southeastern Montana for shipment to the Pacific Coast.

Another factor that could change the type of cattle produced in the area would be the development of the proposed irrigation projects on the Tongue and Powder Rivers. With the development of these proposed projects, and the securing of a reliable supply of home-grown feed, it would become possible to finish more the cattle in the area before shipping them to market.

Land Tenure and Use

Probably the most important change that has taken place in the last twenty-five years is the increasing control the rancher has over the range he uses. This control has resulted from two factors: (1) Use of the Public Domain has been placed on a lease or permit basis. (2) The ranches have more than doubled in the amount of deeded land.

The question of whether the ranches will tend to continue to increase in size in the future, and if so at what rate will they increase in size will depend to a large degree on what policies the government follows in the future administration of the range. If the government should decide to sell part of the Public Domain that is now being used under the Taylor Grazing Act, the acreage of deeded land on the ranches studied would tend to increase; there would probably be very little if any increase in animal units run if this should happen as the range is carrying about what it should at the present. If the government should continue to administer its range as it is doing at present little change would probably occur in use of the range except to vary livestock numbers in accord with climatic changes.

In regard to acquiring more deeded land other than from the federal government, the trend in the past twenty-five years will probably continue but at a very greatly reduced rate. Practically all of the small uneconomical homestead tracts that could be purchased have already fallen into the hands of the ranchers. The only remaining source of land that may be purchased is the possibility that many of the small ranches running less than a 150 animal unit may be forced out of business if another series of years when prices for beef begin to fall toward a more "normal" level. Approximately 75% of the ranches in southeastern Montana are of less than 150 animal units in size 33/ which is considered to be about the minimum size of ranch that is capable of yielding a "minimum comfort" standard of

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33/ Compiled from United States Census of Agriculture, 1945.

living.[34] Of course some of the ranches will probably combine with other units that are too small, and will form an economical unit; therefore not all of the smaller ranches that sell out will go to the larger already established ranches such as those that composed this study.

Future Net Income Expectation

One thing that appears certain is that the net income received by the ranchers in 1948 represents an all time high and will not continue at its present level. Prices received by the ranchers in the future will undoubtedly drop, but prices paid by the ranchers have a tendency to drop much more slowly. The squeezing action caused by this shift in price relationship will tend to remove much of the present day high net income.

A big question confronting the operators in the future will be how to meet the increased fixed costs brought on by increased investments in land and machinery in the face of falling prices. The answer to this question will be in a large degree up to the ingenuity of the managers in reducing their variable costs to the minimum and operating at their maximum possible efficiency. Some factors that will help them do this are that as a rule the ranchers are relatively free from debt at the present time. They have the firmest control over the land resources that they use since ranching was started in Montana, and due to a more conservative use of the range in the past ten years, the range is more productive than it has been for a good many years. While the exact value of these factors

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34/ Saunderson, M. H. Readjusting Montana's Agriculture, Op. Cit. p. 18.

are not known, and are practically impossible to measure, they do represent factors of reduced risks which have always plagued the ranchers in the past.

These possible future trends that have been discussed briefly here in the last few pages may create problems that will confront the rancher in the future. On the basis of this study, what will happen in the future and how these problems will be solved with the greatest benefit for the rancher and society is not answerable. These problems might well serve as the basis for future ranching studies.

APPENDIX A

TABLE I. INDEXES OF PRICES PAID AND RECEIVED BY MONTANA RANCHERS IN 1924, 1929, 1940, and 1948. (Base Period January 1935 - December 1939 = 100)

Item	Year			
	1924	1929	1940	1948
Items Sold[1/]				
Alfalfa Seed	95	117	80	182
Beef Cattle	89	191	123	348
Grain	125	108	73	244
Hay	109	126	58	189
Horses	77	78	88	90
Lamb	142	158	108	294
Sheep	175	189	114	221
Misc. Products	134	133	93	270
Investments and Purchases[2/]				
Equipment and Supplies	120	123	99	168
Farm Machinery	101	100	100	160
Feed	131	134	94	246
Interest Paid	131	118	98	91
Leases	132	131	100	153
Real Estate	144	135	102	190
Taxes	120	128	89	136
Wages	141	153	107	367

Source —
Data Compiled From: 1/ Halcrow, H. G., and Creer, P. J., Op. Cit.
2/ Agricultural Statistics, 1948, Op. Cit.

APPENDIX B

TABLE II. AVERAGE OPERATING COSTS PER ANIMAL UNIT ON TWENTY-ONE CATTLE RANCHES IN SOUTHEASTERN MONTANA, 1924-48 (Actual Costs)

Operating Costs	Year			
	1924	1929	1940	1948
Paid Labor 1/	1.79	3.77	3.08	6.87
Feed, Salt and Mineral Purchased	.30	.57	.48	2.40
General Expenses 2/	1.21	1.41	4.51	10.35
Leases	.93	1.47	1.85	2.35
Taxes	1.36	1.84	2.01	3.00
Depreciation on Buildings and Machinery	1.28	1.33	1.93	4.19
Interest Paid on Debt	1.74	1.03	1.32	.51
Total Operating Cost	8.41	11.42	15.18	29.67

1/ Includes cost of boarding hired labor.

2/ Includes purchases of gas, oil, small tools, hardware and other general supplies.

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ACKNOWLEDGMENTS

The author wishes to express his thanks and appreciation to Dr. M. M. Kelso for his assistance, counsel and encouragement throughout the study. Thanks is also due to Mr. Roy E. Huffman and Mr. Gene Payne for their suggestions and editing of the manuscript; to Dr. H.G. Halcrow for his suggestions and help on some of the technical problems, and to the generous cooperation of the ranchers who supplied the information that made this study possible. Recognition is also due to Mrs. Martha Rice for typing the manuscript.

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