

PUBLICATION No. 778  
TECHNICAL BULLETIN 55

ISSUED FEBRUARY, 1946

DOMINION OF CANADA—DEPARTMENT OF AGRICULTURE

# CATTLE RANCHING IN WESTERN CANADA

\*

C. W. VROOMAN, G. D. CHATTAWAY

and

ANDREW STEWART

\*

MARKETING SERVICE—ECONOMICS DIVISION  
IN CO-OPERATION WITH EXPERIMENTAL FARMS SERVICE



Published by authority of the Hon. JAMES G. GARDINER, Minister of Agriculture,  
Ottawa, Canada

630.4  
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P 778  
1946  
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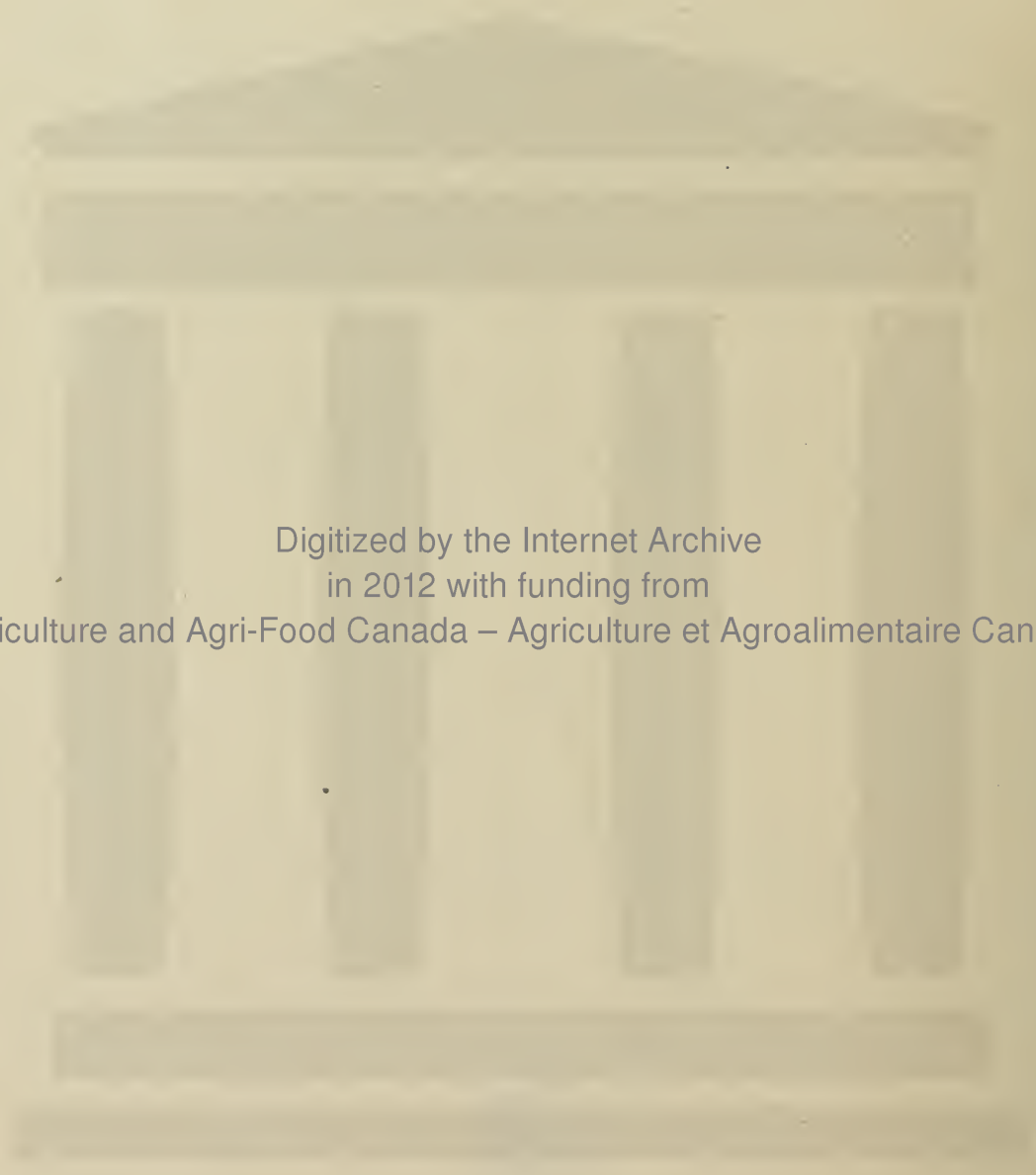
ANDREW STEWART



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## FOREWORD

This study of the problems of ranch management and organization was begun in 1939. It was designed to cover a three-year period. The wisdom of this policy is evident when ranch receipts and expenditures during the first year of the study are compared with those of the second and third years. The final analysis of the data was delayed by the outbreak of war and subsequent shortage of experienced staff to finish the analytical work.

The project was a co-operative undertaking throughout. The Experimental Farms Service and the Economics Division of the Marketing Service each assigned technical and clerical staff to this work. The assistance of Miss Maxine Macleay, J. Proskie, G. C. Elliott, G. L. Burton and D. W. Bowie is gratefully acknowledged by the authors.

While the University of Alberta was not formally a co-operating agency, the staff of the Department of Political Economy and the Animal Husbandry Department were freely consulted in respect to methodology and technical details of the ranching business.

During the course of the study, a preliminary report entitled "Cattle Ranching in Western Canada" was issued in 1941. In addition, in each of the three years in which the study was carried on, reports were made to individual ranchers which were intended as a guide to ranchers in improvement in management methods.



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# Cattle Ranching in Western Canada

C. W. VROOMAN<sup>1</sup>, G. D. CHATTAWAY<sup>2</sup>, AND ANDREW STEWART<sup>3</sup>

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## PART I

### GENERAL CHARACTERISTICS OF CATTLE RANCHING

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#### The Ranching Areas of Western Canada

Range cattle production tends to be located in areas which are distant from market, and in which rough topography, infertile soil, or unfavourable and variable weather conditions make crop production unprofitable. Under these conditions cattle can convert native vegetation and bulky feed materials into a concentrated product, beef, and can be driven from the remoteness of the range to shipping points.

**Principal Ranching Regions and Zones.**—In Western Canada there are three principal regions in which the native grasslands are utilized through the grazing of livestock on a relatively extensive scale, under the system of organization commonly referred to as ranching. These three regions are the Great Plains of Saskatchewan and Alberta, the Foothills of the Rocky Mountains and the Montane and Inter-Montane areas of the British Columbia interior. Sufficient differences in physical characteristics exist to justify dividing the Great Plains region into three zones, namely, the Shortgrass, Cypress Hills, and Northern Prairie; and the British Columbia region into two zones, namely, Kamloops-Nicola and Cariboo-Chilcotin. The location of these zones is indicated in Figure 1; their physical characteristics are summarized in Table 1.

**The Great Plains Region.**—The Great Plains region lies mainly within the brown and dark brown soil belts of the two western Prairie Provinces. Within these belts 15,560,000 acres have been classified as unsuitable for cultivation, and a further 16,890,000 acres described as marginal for cultivation.<sup>4</sup> Therefore within this area there is, roughly, a minimum of 15,000,000 acres, and a probable maximum of 32,000,000 acres available as grazing land.

**The Shortgrass Zone.**—The Shortgrass Plains extend from the black soil zone on the west to the dark brown soils on the east, from the International Boundary on the south to township 29 on the north, exclusive of the Cypress Hills. Nearly all the land described as unsuitable or marginal for cultivation within the Great Plains region lies within this zone.

Throughout the zone, level to undulating plains ranging in altitude from 2,000 feet in the east to 3,200 feet in the west are broken occasionally by hills and cut deeply by watercourses. Coulees and draws often give rise to eroded, steeply sloping "bad-lands". Drainage and run-off are generally rapid but there are numerous localities of poor drainage where alkali areas have been formed.

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<sup>4</sup> Mackintosh, W. A. *Prairie Settlement: The Geographical Setting*. Canadian Frontiers of Settlement, Vol. 1. Appendix on Soils, J. D. Newton. 1934.



The soils fall within the brown soil belt with the exception of a fringe of dark brown soil on the western boundary, which is chiefly a grain farming area. A few ranches are located on the dark brown soil because of inferior soil type or rough topography. Loams and sandy loams predominate in the Shortgrass Zone with certain small areas being purely sand. In the southern portion 1,500,000 acres are classed as "blow-out" loam.<sup>1</sup>

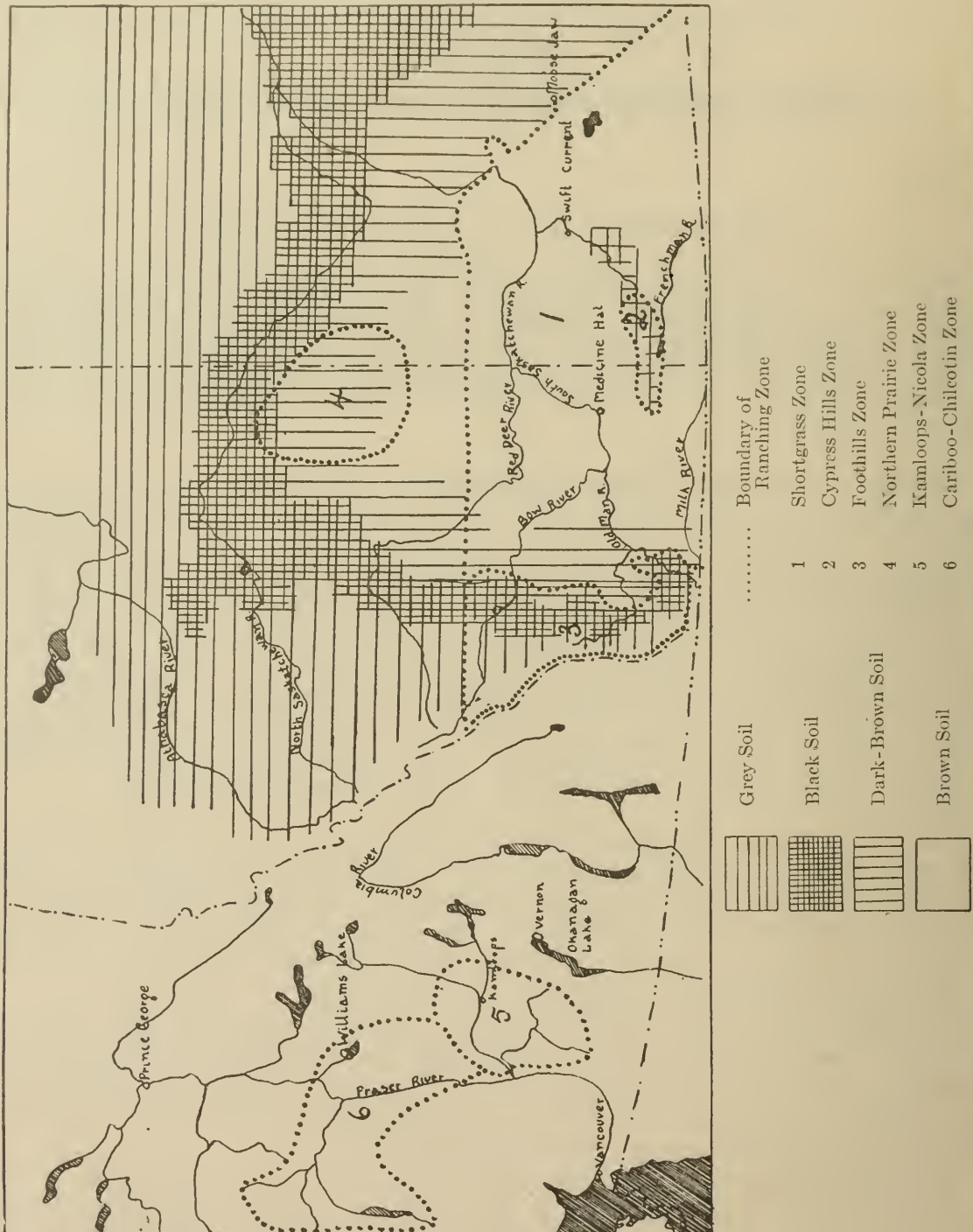


Fig. 1.—Cattle Ranching Zones in Saskatchewan, Alberta and the Soil Zones in Saskatchewan and Alberta.

The climate is typically arid or semi-arid. Spring and summer rain-fall follow the northeastward retreat of the polar front occurring first in the southwest and later toward the north and east. Average annual precipitation varies from 10 to 16 inches with about one-half falling during the months of April to July, inclusive.

<sup>1</sup> Ibid.

TABLE 1.—PHYSICAL CHARACTERISTICS OF RANCHING ZONES

Zone	Soil	Topography	Climate	Cover	Relative Carrying Capacity
Shortgrass.....	Mainly brown soils.	Level to rolling.	Arid to semi-arid, 10-15 inches precipitation.	Shallow-feeding low-growing grasses.	Low to medium.
Cypress Hills.....	Dark brown and shallow black.	Hilly.....	Semi-arid to sub-humid, 15-19 inches precipitation.	Mainly tall, close-growing grasses. Poplar and willow bluffs.	Medium.
Northern Prairie.	Mainly dark brown.	Level to rolling.	Semi-arid.....	Mixed associations. Heavier growth than Shortgrass.	Medium.
Foothills.....	Shallow black and black.	Hilly.....	Semi-arid to sub-humid.	Mainly tall, close-growing grasses. Poplar and willow bluffs.	Medium to high.
Kamloops-Nicola.	Unclassified-mixed.	Mountainous....	Arid to sub-humid.	Open bunch grass to sub-alpine.	Low to medium.
Cariboo-Chilcotin.	Unclassified-mixed.	Rough and rocky plateau.	Semi-arid to sub-humid.	Mainly timber grass.	Low to medium.

Evaporation during the summer season is high, averaging more than 30 inches from a free-water surface in the driest sections. This rate of evaporation results not only from the relatively high summer temperatures but also from the prevalence of strong, dry Chinook winds blowing in from the southwest. The Chinooks lose their velocity and dryness as they proceed northeasterly until their effect is felt only occasionally in the eastern half of the zone. Winter temperatures and depth of snow are strongly modified by these warm Chinook winds.

Water supply is a limiting factor in the utilization of grazing lands in the Shortgrass Zone. There are very few springs. Rivers are far apart and do not supply much of the stock water required in summer as ranges adjacent to rivers are usually saved for winter grazing. Most of the creeks run only in the early part of the summer and may even then be dry during drouth years. Sloughs and small lakes formed by surface run-off are important sources of water until they dry up toward fall. Consequently much reliance is placed upon wells, dams and dug-outs.

Two types of vegetative cover<sup>1</sup> occur in the Shortgrass Zone. The most important, and occupying the greatest area, is the type known as shortgrass prairie (blue grama-speargrass association).<sup>2</sup> Within this type blue grama occupies the greater basal area but seldom produces more than one-third of the total yield. The second type of vegetative cover, growing in the moister regions, is known as mixed-prairie with short-awned porcupine grass and wheatgrasses being dominant. Mixed-prairie plant associations are taller growing and heavier yielding than shortgrass associations.

The carrying capacity<sup>3</sup> of the shortgrass prairie type ranges from 3.6 to 8.0 acres per cow month, averaging 4.7 acres; that of the mixed-prairie ranges from 1.8 to 6.0 acres with an average of 2.8 acres per cow month. When the yields of native grasses are as low as those of the shortgrass prairie, crop production without irrigation is extremely hazardous particularly on the light soils. As a consequence crop production for feed is seriously limited. Wheat yields better than oats under these conditions and is favoured as a chance

<sup>1</sup> and <sup>3</sup> Clarke, S. E., J. B. Campbell and J. A. Campbell. An Ecological and Grazing Capacity Study of the Native Grass Pastures. Canada, Dept. Agr., Ottawa, Tech. Bull. 44. 1942.

<sup>2</sup> For botanical names of grasses, see Appendix I.



cash crop because even in case of failure as a grain crop a certain amount of winter feed is obtained. Spring and fall rye are also commonly grown with a similar alternative use.

The chief characteristic of the climate in the Shortgrass Zone is its variability which has a direct effect upon the vegetative cover, crop yields and grazing capacity. At Medicine Hat, rainfall has ranged from a minimum of 6.4 inches to a maximum of 25.3 inches with an average variation from the mean of 38 per cent. In those sectors where mean temperatures are high and the rate of evaporation also high, the variation in rainfall makes crop production unprofitable and lowers the long-run grazing capacity of the range. Unreliability of rainfall also affects the year-round grazing capacity of the ranch because of its limiting effect on the production and availability of winter feed. In some cases there is ample summer range, but feed production must be sufficient to ensure wintering of the cattle required to utilize it fully. In other cases there may be winter range available, but occasionally snowfall conditions make the grass unobtainable and then winter feeding is necessary. Thus in either of these situations, if feed production is curtailed, full utilization of the range may not be obtained.

*The Cypress Hills Zone.*—About 40 miles north of the International Boundary, and straddling the provincial boundary line between Saskatchewan and Alberta are the Cypress Hills. The ranching section of this area lies in a zone approximately 70 miles long and 20 miles wide.

This unglaciated plateau has deep valleys cutting through the rolling uplands which, with the added effect of erosion, makes it a rough broken country. Willows, poplars and spruce grow extensively. In the valleys the soils are deep and black. On the ridges, which rise as high as 4,800 feet, gravel and rock outcrops are found, and a small area of grey soil exists.

In general, the climate is sub-humid with annual precipitation varying locally from 15 to 19 inches, increasing with the elevation. Contrary to expectations deep snow is a smaller problem on the northern slopes as Chinooks are more effective there. Supplies of water for stock are adequate to enable the full utilization of the range.

The vegetation<sup>1</sup> consists mainly of mixed-prairie and sub-montane mixed-prairie associations. The latter is characterized by the dominance of rough fescue with oatgrasses adding to the cover, particularly at higher altitudes. Wheatgrasses also are important forage producers in the sub-montane type. The grazing capacity of this type range from 0.8 acres per cow month to 3.5 acres averaging 1.7 acres, or more than two and one-half times the capacity of the shortgrass prairie type of range.

While frost precludes almost entirely the raising of grains on the upper bench lands, the yields of hay are relatively constant; but on the lighter soils of the lower slopes conditions of extreme variability similar to the Shortgrass Zone exist. The area as a whole, however, has fairly consistent weather conditions and winter feeding is practised regularly.

*The Northern Prairie Zone.*—This is an area of about 6,300 square miles (90 by 70 miles) situated along the Saskatchewan-Alberta boundary line, mainly on the Alberta side, and nearly in the geographical centre of the area covered by the two provinces. It contains a wide variation of soil types both brown and dark brown, ranging from sand to clay. The level to rolling topography is dotted by numerous lakes, sloughs and creeks which provide fairly adequate water supplies. Although the climate is semi-arid over most of the area evaporation is much less than on the plains to the south. Winters are prolonged and the snow usually lies on the ground throughout the winter.

<sup>1</sup> Ibid.

The vegetation is mainly of the mixed-prairie type but merges into the sub-montane. Bluffs of willow and poplar are common, particularly in the valleys and on the northern slopes. There is a range from 1·8 to 3·5 acres per cow month in grazing capacity. Cultivated crops are grown extensively on the better soils and, along with slough hays, provide sufficient winter feed. While climatic variability does affect range and feed production in this area, it does so to a lesser degree than in the Shortgrass Zone.

**The Foothills Region.**—This area consists of the rolling hills which fringe the eastern side of the Rocky Mountains from the International Boundary to the Peace River. North of the Bow River cattle ranching has never attained much importance because of inferior soils, heavy bush and timber, and deep winter snows.

**The Foothills Zone.**—This zone consists almost entirely of the area lying to the south of the Bow River and within the shallow black and black soil belts. It contains around 3,000,000 acres of grazing land, approximately one-half of which lies within the Forest Reserves and National Parks. At a general level of over 3,000 feet, broad valleys, having deep black soil, are bordered by ranges of steeply rolling hills. Many of these hills are broadly rounded, providing bench lands often suitable for cultivation or for native hay fields. The soils on the ridges are lighter loams with gravel and rock outcrops common.

The climate is generally sub-humid with an annual precipitation ranging from 15 to 19 inches, moderate summer temperatures, and a low rate of evaporation. In winter, although snowfall is often heavy and is retained on the brush covered northern slopes, strong Chinook winds continually sweep clear the more open southern slopes and make available valuable winter pasturage. Ample stock water is provided by dependable springs and creeks, and consequently complete utilization of the range is possible.

The vegetation<sup>1</sup> is of the sub-montane mixed-prairie type with rough fescue, Parry's oatgrass, and Junegrass providing a goodly proportion of the cover. Willow brush is often extremely dense on northern slopes and in some valleys. Poplar bluffs are scattered throughout while conifers are found on the shallow, gravelly soils at the higher elevations. Grazing capacity varies from 0·8 to 3·5 acres per cow month although in isolated localities it may go as low as 5·0 acres per cow month because of the density of brush or timber.

The relatively assured moisture conditions along with the rich soil give satisfactory crop and forage yields which eliminate the hazard of winter feed supply found in the Shortgrass areas. Brome, timothy and grain hays, as well as native hays of both bottomland and upland varieties yield well. At the lower altitudes wheat matures as a satisfactory cash crop, although seasonal irregularity of snow and frost often affects the grade. In addition contiguous farming districts provide considerable stubble and cover-crop grazing, adding materially to the productive capacities of the zone.

**The Montane and Semi-Montane Region.**—This region in the interior of British Columbia contains some 10,000,000 acres of grazing lands<sup>2</sup> that are being utilized at present plus a considerable area not now being used. Precipitation in this area increases directly as the distance from the Coast Range mountains. In addition precipitation also increases directly with the altitude and so similar conditions of vegetation are found at comparable altitudes when the points considered are approximately the same distance from the Coastal Range. Also conditions at points far from these mountains are comparable to those found at higher altitudes near the mountains.

<sup>1</sup> Ibid.

<sup>2</sup> Report of Dominion Range Experiment Sub-Station, Kamloops. Unpublished.



*The Kamloops-Nicola Zone.*—The boundaries of this area may be defined as the watershed of the Thompson River as far north as Barriere and east to Little Shuswap, and the watershed of the Nicola River and its tributaries. The elevations of Kamloops and Nicola Lakes, which may be taken as the low points of the area, are 1,137 and 2,045 feet, respectively, while the heights of land dividing these watersheds rise to 6,000 and 7,000 feet for some peaks and ridges. Consequently the area may be termed distinctly mountainous although several high plateaux temper this roughness in small degree.

The distinguishing features of this zone are the open grassland valleys where, under arid and semi-arid conditions, on light porous soils, are found the blue-bunch wheatgrass and speargrass ranges. At an altitude of about 2,200 feet dark brown soils are encountered. Here grasses are more abundant with Junegrass and downy brome becoming important. Above 2,800 feet there occur the upper grasslands where Columbia speargrass and Kentucky bluegrass are dominant. The montane forest at 3,000 to 4,200 feet consists of an area where the tree stand of Douglas fir, aspen, lodgepole and yellow pine is relatively open. The ground cover is chiefly pinegrass with lesser amounts of dwarf sedge, rough aster and timber vetch. Above this, the sub-alpine forest with a thicker tree stand of Englemann spruce, sub-alpine fir and lodgepole pine, has a ground cover mainly of blueberry, mosses and lichens. The range at an elevation over 5,100 feet is used little by cattle.

Ranch headquarters are usually established in the valley bottoms where alfalfa, as the main hay crop, is grown under irrigation. In a few localities grain crops are grown under dry farming conditions. While snow generally is not deep or long-lasting on the lower ranges the scarcity of these open grasslands makes considerable winter feeding a necessity if full utilization of the forested summer ranges is to be attained. Stock-water is adequate as would be expected in such a mountainous area where creeks, lakes and springs abound. Grazing capacity<sup>1</sup> varies from 5.0 acres per cow month or less in the lower grasslands to 3.0 acres in the upper grasslands.

*The Cariboo-Chilcotin Zone.*—The boundaries of this zone may be defined as the watershed of the Chilcotin River and that of the Fraser River from Lillooet in the south to Soda Creek escarpment in the north; and in addition the watershed of Bonaparte Creek above the confluence of Loon Creek.

The general elevation of this heavily-timbered rocky plateau is about 3,000 feet. At lower elevations a limited amount of open grassland occurs. Generally speaking, similar conditions of soil, climate and grass cover obtain at the same altitudes as in the Kamloops-Nicola.

Cultivated crops are grown to a lesser extent than in other range areas because of the short frost-free period and the scarcity of arable land. Ranges fit for spring, fall and winter grazing are very limited so that great dependence is placed upon winter feeding of hay. Hay is obtained chiefly from spring-flooded native hay meadows. Thus while grazing capacity per acre of summer range is low, an ample acreage exists for ranches now operating and the chief factor limiting cattle production is the availability of winter feed.

**Market Outlets.**—There are two types of market open to range cattle, the butcher market and the feeder market. While some cattle are not fit for the butcher class and others carry too much finish to go as feeders, a great many range cattle are the so-called two-way cattle, that is, are suitable for either purpose. The consuming centres for butcher cattle are naturally the larger centres of population: Vancouver, Winnipeg and Toronto as well as other Eastern cities. Consumption of butcher cattle within the range areas, or close to them, is negligible. Feeder cattle have several outlets. Ontario, Manitoba and the corn belt of the United States have been the standbys through the years

<sup>1</sup> Ibid.

but local feedlots, centred mainly in the irrigation districts of Alberta, have been expanding their capacities particularly in the vicinity of the beet sugar factories. While some cattle are now finished in the northern coarse grain areas of the Prairie Provinces, expansion of this enterprise would appear to be logical. The United Kingdom has provided another market which absorbed from 1920 to 1929, inclusive, nearly 500,000 cattle. In the last decade 1930 to 1939, inclusive, an average of 32,814 head were shipped annually from Canada to Great Britain. This was equivalent to nearly 25 per cent of our gross exports. These figures include dressed beef converted on the basis of a five hundred pound carcass as well as live cattle.<sup>1</sup>

### Land Tenure and Grazing Regulations

**Dominion Lands.**—On July 15, 1870, the territory now comprising the Prairie Provinces became part of the Dominion of Canada. The block survey system of the area to which this report applies was completed in the early 1870's with the exception of certain regions in British Columbia. Although the first Dominion Lands Act of 1872 authorized the granting of grazing leases to settlers, most of the lands used for grazing in the seventies were free and a goodly portion of them continued to be used in that way up to the turn of the century. However, by 1900 several factors working together had gradually whittled down the amount of free grazing land.

From 1879 to 1881 the Government was anxious to stimulate cattle raising so that supplies of beef would be available for feeding the Indians. One means of attaining this end and attracting ranchers into the country was the provision for granting leaseholds on single tracts of land up to 100,000 acres at a rental of one cent per acre per year.

With the linking of British Columbia and the Eastern Provinces by the completion of the Canadian Pacific transcontinental railway in 1885 it was recognized that vast areas on the prairies were suitable for agricultural purposes and, in fact, the building of the various railways was made possible through the alienation of the prairie land. A certain amount of land was taken up by "squatters' rights" before the survey was completed and legal possession of this land by the squatters was recognized. Because of their hereditary right in the land the Indians and half-breeds had reserves set apart for them. The final settlement with the Hudson's Bay Company for the transfer of their rights in the territory over to the Dominion Government gave the Company some 6,600,000 acres distributed throughout the country in section and three-quarter-section parcels. In addition to other inducements to railroad companies, 32,000,000 acres of land were alienated in railway land grants in Western Canada. The odd numbered sections were reserved for this purpose but most of the land was taken in selected blocks. The even numbered sections were reserved for free homestead and preemption but were open for grazing leases until required for farming by incoming settlers. Through various kinds of schemes, colonization and irrigation companies were given blocks of land at nominal prices for purposes of settling them and aiding in the opening up of the West. Sections 11 and 29 in each township were reserved for sale (mainly by public auction), or lease, and the returns from these sales were to be used for the construction and maintenance of schools. Nearly 2,000,000 acres of land were granted to veterans of the South African War although it is said that much of this got into the hands of speculators and others. Much later, in 1919, the Soldier Settlement Act provided for the granting of quarter-sections without homestead fees to veterans of the first World War.

<sup>1</sup> See Appendix II.



With the allotment of lands as described in the foregoing, and with the impetus given settlement and farming through national policies and economic forces, the period of free grass for the rancher inevitably passed within a very short time. Grain growers forced the issue of acquisition and the extent to which they did may be gauged by the swiftness of their expansion. From 1905 to 1925 wheat acreage in Alberta trebled, and in Saskatchewan it increased tenfold. The advent of the railways, an open immigration policy, rising prices for wheat, and the rapid mechanization of farming, each added their own impetus to this expansion.

In British Columbia a different set of conditions with respect to the Crown Lands existed than on the prairies. It was the original intention to survey before settlers were allowed to take up land but because of difficulties encountered in getting the surveys done it was impossible to adhere to the plan. Consequently each settler indicated the piece of property he desired and it was then surveyed. This has resulted in a very irregular land pattern. Some large tracts of the more desirable grazing lands were purchased outright by large interests.

Leasing of lands never became widespread in British Columbia and was largely confined to the Railway Belt, a strip 20 miles on either side of the C.P.R. main line. This land grant eventually reverted to the Dominion Government in lieu of other lands. The bulk of the Crown Land was grazed on a permit basis under the supervision of the Forest Branch of the Department of Lands. This type of grazing system was really cheaper to the stockmen from the viewpoint of both current rentals and capital improvements.

Private acquisition of land occurred in much the same way as on the prairies although a considerable amount eventually occupied was bought directly from the Government by individuals.

While the development of wheat farming on the prairies was in progress, tenure of ranch lands passed through a series of changes that had far reaching effects upon the history of the grazing industry. Following the regulations of 1881 in which rentals were placed at one cent per acre, new regulations were passed in 1886 raising the rental to 2 cents per acre per year.

In 1887 all leases greater than four sections were thrown open for purchase by tender. This in effect placed a capital value on lease rights in these lands, charges for which were in addition to the regular rental fee.

In the same year also, 21-year leases were provided for, terminable at any time for homestead entry or preemption. Later, there were several convenient arrangements made between the ranchers and the land companies whereby Dominion lands, held under lease and subsequently turned over to the railway or land companies, were sold to the ranchers at one dollar and a half per acre. About this same time school lands were made available for leasing at the rate of 4 cents per acre. A further change during these years was made when all those holding leases under the old form which did not provide for the withdrawal of lands for homestead and railway purposes were notified that their leases would be terminated on or after December 31, 1896, but they were given the privilege of purchasing up to 10 per cent of their leaseholds at \$1.25 per acre.

In 1905 a regulation was passed confining the issuance of grazing leases to a tract south of the 29th township in Alberta and to certain corresponding areas in Saskatchewan. The same order in council made provision for the inspection and supervision of these lands. However, the continuation of the "open" leases subject to cancellation at two years' notice left indeterminate the boundaries of grazing and normal agriculture.

As the pressure of settlement increased, tenure conditions for the rancher did not improve and finally a Commission was appointed in 1913 to report fully on the situation. In a very concise report this Commission recommended amongst other things, the principle of setting aside permanently for grazing purposes certain lands clearly unfit for homestead settlement or sale. The two-year cancellation clause which had accompanied all grazing leases with the



exception of the limited range of "closed leases" provided for in 1905, was to be abolished, and leases were to be granted for ten years with prior rights of renewal. The maximum area under lease was to be 24,000 acres (eventually 12,000) and there were a number of other provisions of the order in council resulting from the Commission's investigation and recommendations.

The exceptional crop year of 1915 and the rapidly rising price of wheat offset the efforts of ranchers extending over a great many years to secure their tenure. Land which previously had been considered sub-marginal for wheat farming was now classed as crop land so that the competition for land between ranchers and farmers increased. The introduction of the combine hastened the spread of farming activities. The rapidly rising prices of farm lands foretold the difficulties ranchers would face in the early twenties. The collapse of many of the great ranch holdings in that era may be traced directly to the overcapitalization of land and consequent indebtedness incurred during the period of the First Great War.

Land tenure was again very much to the forefront of the range men's problems in the middle twenties, as many of the 21-year leases granted following the 1905 revisions and the 10-year leases resulting from the 1914 order in council were coming up for renewal. As a result of negotiations by various agencies the regulations were revised to establish the twenty-one year closed lease. Ranchers then felt they had achieved a high degree of security of tenure in their grazing lands. This was to be a short-lived period of inactivity as an entirely new development loomed over the horizon with the proposal to turn the administration of Crown lands over to the provinces.

**Provincial Lands.**—From 1930 the administration of grazing lands became provincial in scope as the natural resources were turned over by the Dominion Government to the provinces.

*Saskatchewan.*—At the time of the transfer, leased lands in Saskatchewan amounted to slightly over 3,300,000 acres. In April, 1941, the end of the period covered by this study, the area of provincial lands disposed of by lease and permits exceeded 4,000,000 acres. Of this area, over 350,000 acres had been transferred to the Dominion Government for inclusion in community pasture projects. In 1941 nearly 8,000 cattle and 1,600 horses were pastured under permit on Forest Reserves.

The regulations pertaining to grazing leases and permits are left largely to the discretion of the Minister of Natural Resources but certain salient points are laid down for the guidance of the administrators. A minimum of 2 cents and a maximum of 4 cents per acre rental are specified.

The minimum grazing dues on Forest Reserves are 8 cents per month for cattle and 10 cents per month for horses. Administration and control of the grazing districts within the Reserves lies with the Forestry Branch.

Stockmen in general had suffered from the effects of the drouth and the depression during the early and middle thirties and, as a means of assisting them, the provincial government established two important policies. The first one allowed a dollar for dollar bonus on all lease arrears owing as at May 1, 1937. The second one was a reduction by one-half, of lease rental rates for three and one-half years, from May 1, 1937 to November 1, 1940. Provincial government assistance had also been provided through reduction of arrears of land taxes in January, 1937. Under this policy ranchers who had been in arrears on taxes received consideration similar to that accorded to farmers. In the southwest corner of the province, known as the drouth area, all arrears of taxes except for the years 1935 and 1936 were cancelled with provision for advance credit on the payments by ranchers whose taxes were currently paid up. Approximately 70 per cent of taxes in arrears were written off under this scheme.

*Alberta.*—There were a little over 3,200,000 acres held under grazing lease in Alberta in 1930 at the time the province took over the Crown Lands. On March



31, 1941, there were nearly 2,000,000 acres held under long term leasehold in addition to over 2,800 grazing permits on provincial school lands of which there was no information on area entailed. In the four Forest Reserves controlled by the province over 20,000 cattle, 3,000 horses and 4,000 sheep are pastured yearly under grazing permits.

The regulations affecting the use of these grazing lands are very similar to those in Saskatchewan. No specific rate of rental is laid down in the regulations but the present rates (including taxes) vary from 2 to 4 cents per acre depending upon the relative grazing capacity of the range.

Yearly permits for grazing of stock on the Forest Reserves are at the rate of a minimum of 5 cents and a maximum of 15 cents per month for cattle and horses. The number and kind of stock allowed in a grazing district are controlled by the Forestry Branch, Department of Lands and Mines.

For a number of years ranchers in the Shortgrass Zone complained that provincial lease rentals were out of line with the value of forage available. During the drouth and depression years of the thirties, the agitation for revision of lease rentals increased, and an organization known as the Shortgrass Stock Growers was formed to promote revision of the system of levying rentals. The method of assessment advocated was developed from the principles that the rentals should be based upon the ability of the land to produce grass, and that the value of the grass should be commensurate with cattle prices. An agreement was entered into between the provincial government and a number of ranchers to try out the scheme on an experimental basis for a period of 5 years. Under this agreement a committee elected by the ranchers assesses the carrying capacity of the ranch. In cases of dispute the rancher's assessment is arbitrated by a recognized authority on range grasses. The method of determining the rental is as follows: the grazing capacity in number of cattle per acre multiplied by 250 (considered a normal gain in pounds per animal per year) gives the production in pounds of beef per acre; and the total value of beef produced is obtained by multiplying the production of beef per acre by the average price of all cattle on the Calgary market for the last six months of the year. The government is to receive 10 per cent of the total estimated value of beef produced, as its share for the use of the grass. Under this system annual rental payments would vary directly with the carrying capacity of the land and with the price of cattle.

*British Columbia.*—The public lands in British Columbia, unlike those of Saskatchewan and Alberta, have been under provincial control since the formation of the province. British Columbia transferred to the Dominion a belt of land 20 miles on either side of the main line of the Canadian Pacific Railway for which the province received a yearly indemnity. This land was to be used in financing the construction of the railway but only 1,300 acres were selected by the company and the remainder was subsequently returned to the province.

In 1940 there were nearly 600,000 acres of grazing land held under lease in British Columbia. Leasing of land never became widespread as more economical grazing could be obtained on a permit basis. The rate of leasing provincial lands is 4 cents per acre outside and 2 cents per acre inside the railway belt.

The regulations pertaining to the use of leased grazing lands are substantially the same as those in force in the other two Western Provinces. Of greatest importance to most producers in British Columbia are the regulations concerning the use of the Crown range and Forest Reserves. Crown ranges may be apportioned between users or groups of users; the number and class of stock are prescribed, and also the length of the grazing period (which is usually from June 1 to 15, to October 1 to 15); grazing permits may be issued for terms up to 10 years; fees are at the rate of 5 cents per head of cattle per month with a maximum of 50 cents per annum, and horses at 6¼ cents per head per month with a maximum of 62½ cents per annum.

## Production Practices on Western Ranches

**Breeds of Cattle.**<sup>1</sup>—Herd improvement by selection and breeding has been given a great deal of effort, time and expense by Western ranchers. This has been rewarded by the production of a fairly standard type of beef animal of high quality.

Herefords have established their dominance throughout the range areas mainly because of their adaptability to the rigorous range conditions. On the ranches surveyed, over 80 per cent of the cattle in Alberta and Saskatchewan were of Hereford breeding including 17 per cent of Hereford-Shorthorn crosses. Most of the remainder were in herds where no particular breed predominated. In British Columbia, Herefords were even more strongly represented (over 90 per cent), although the Hereford-Shorthorn cross was also more widely practised.

In relation to the size of ranch, the smaller places (less than 100 cattle) tended more towards indiscriminate mixed breeding, while those running from 100 to 800 head favoured the Hereford. On the large ranches (over 800 head) Herefords still tended to predominate, but other breeds loomed more significantly particularly in British Columbia where the Shorthorn cross accounted for 61 per cent of the cattle on these outfits.

**Winter Feed.**—The problem of wintering range stock economically is always a critical one for ranchers. There was a time when range lands were abundant and the general practice was to let the cattle rustle out. Any that died were written off as part of the cost of wintering. However, several severe winters, for example that of 1907, forced ranchers to change their practices. It is still the general rule to let the animals rustle for themselves as much as possible, but now reserve supplies of feed are kept on hand at nearly all times to take care of emergencies. With the limited amounts of suitable winter range available to most operators, all cattle are fed for at least part of the winter, except in a few favoured localities such as the Milk River valley. Most ranchers aim at having from one-half to two tons of hay per head on hand in the fall as a winter feed reserve, varying with their local conditions. Some differences between zones exist both in the number of days that the animals are normally fed and in the amount of feed generally used (Table 2).

TABLE 2.—NORMAL WINTER FEEDING REQUIREMENTS, BY ZONES

	Feeding days for mature cattle	Feeding days for calves	Winter Feed required as reserve per head
	No.	No.	T.
Shortgrass.....	83	129	1.00
Cypress Hills.....	84	133	0.75
Northern Prairie.....	127	161	1.50
Foothills.....	99	159	0.75
Kamloops-Nicola.....	108	123	1.00
Cariboo-Chilcotin.....	105	132	1.00

The Foothills ranches reported feeding more days but less hay than those on the Shortgrass. The explanation of this seems to lie in the greater availability of shelter to cattle and relatively stable supplies of feed in the Foothills; whereas the greater extremes of weather in the Shortgrass Zone with highly variable yields make larger reserves necessary to meet these contingencies.

With respect to hay yields there are, of course, many variables such as soil type, temperatures and water supply. However, data were collected which, when taken in conjunction with the normal feed requirements, give some idea of the hay acreage necessary to supply winter feed (Table 3).

<sup>1</sup> See, "Cattle Ranching in Western Canada", Economics Division, Marketing Service, Dominion Department of Agriculture, 1941. A mimeographed report to cooperators.



TABLE 3.—NORMAL HAY YIELDS PER ACRE, BY ZONES

	Native Hay	Tame Hay		Oat Hay	Wheat Hay
		Dry	Irrigated		
	T.	T.	T.	T.	T.
Shortgrass.....	0.75	1.00	2.00 plus	1.00	0.75
Cypress Hills.....	0.75	1.00	.....	01.00	0.75
Northern Prairie.....	0.75	1.00	.....	1.00	0.50
Foothills.....	0.50	1.00	.....	1.00 plus	.....
Kamloops-Nicola.....	.....	.....	2.00 plus	0.75	0.75
Cariboo-Chilcotin.....	0.75	1.00	.....	1.00 plus	1.00 plus

On the basis of native hay for winter feed it would appear that one to two acres of this type of hay land is necessary to support one head of cattle. Tame hay would require 0.75 to 1.50 acres if dry or less than 0.50 if irrigated. Grain hays are similar to other tame grasses except that generally wheat cut for hay does not give as good results as oats.

An anomalous situation with respect to native hay yields in the Foothills appears to exist. The lower yield obtained in that area resulted from the practice of cutting the native hayfields in alternate years. While the yields generally amounted to one ton per cutting, this was reduced by half when based on an annual rather than biennial basis.

**Range Management.**—Ranchers have evolved their own system of range management, based on their individual requirements. No involved or complex schemes are used, the principle generally applied being that of apportioning the range for seasonal use according to suitability and convenience. On the open prairie lands the deep draws, coulees, and river breaks and valleys are kept for winter use and the more exposed, flat upper reaches are used in summer. In the Foothills, the northern slopes, being brushy hold the snow, and so are used in summer, when the brush acts as a shelter from flies and sun. The southern slopes that are grazed during the winter are comparatively free from brush and are swept clear of snow by Chinooks. Shelter from storms can be obtained in the valleys, which are often heavily brushed.

Range management in British Columbia hinges upon the use of lands at certain altitudes during certain seasons. Hence, winter feeding is done in valley floors where the feed is produced, or in wild hay meadows. The open, and semi-open ranges, at 1,000 to 2,500 feet are used during the spring, the cattle moving upward, as the season progresses and the grasses develop, until they are in the timber ranges at 2,500 to 5,000 feet. Here, they remain until fall when, as winter approaches, the procedure is reversed by bringing them down to lower altitudes and open ranges. This could be termed a system of rotational grazing.

Many ranches in the Foothills follow a system somewhat similar to this, except that it consists merely of taking certain classes of cattle, usually non-breeding stock, back into the mountains to summer on Forest Reserves.

While a number of ranches in all zones make use of specific fields for spring and fall grazing, this is not a common practice, except in British Columbia. On the prairies, certain fields are sometimes reserved for spring or fall use primarily because of the need to utilize stock-water resources, at seasons when they are available. Moreover, many ranchers segregate, the various classes of cattle into different fields, such as breeding pastures, beef fields, yearling heifer fields, and so on but this is more a matter of livestock management than of range management. This may at times cause over-grazing, when there is insufficient range in a particular field for the number and class of stock kept there from year to year.

Deferred and rotational grazing has never become a common practice on prairie ranches; and it is most fortunate that ranchers did not encumber themselves with additional expense in fencing and watering facilities necessary for this system, although it was advocated some years ago. Investigation<sup>1</sup> of this system, as applied under semi-arid conditions, has failed to prove its practicality, either in the response of the cattle or of the improvement of range grasses.

The most important factors bearing upon the conservation of range lands and the maintaining of maximum forage production are: conservative grazing; protection of new grass in early spring; and adequate distribution of water.

With respect to distribution of stock-watering facilities, evidences of over-grazing near the water supply have been found. On the other hand under-grazing distant from water supply occurs when cattle have to travel more than one and one-half miles to water; the evidence is most distinct and conclusive, when they have to go two miles or more. From the data in Table 4 it is apparent that there is pressing need for further work in developing water supplies in the Shortgrass and Northern Prairie Zones. The other areas are quite well watered and no basic problem exists in that regard.

TABLE 4.—PERCENTAGE DISTRIBUTION OF RANCHES ACCORDING TO MAXIMUM DISTANCE TO WATER PERMITTING OPTIMUM GRAZING CAPACITY, BY ZONES, 1938-39

	Maximum distance to water		
	Less than one mile	One to two miles	Over two miles
	%	%	%
Shortgrass.....	16	44	40
Cypress Hills.....	65	29	6
Northern Prairie.....	43	38	19
Foothills.....	81	15	4
British Columbia.....	77	13	10

Results obtained at the Range Experiment Station, Manyberries, reveal the importance of conservative grazing at all times and the protection of the young grass in the early spring. It was found that in order to maintain the range grasses only 55 per cent of the current year's growth should be consumed by fall. This allows at least 25 per cent to produce seed and the remainder is usually unobtainable. A carryover of this amount also acts as protection to the young plants the following spring from trampling, close grazing, wind and water erosion. Proper use of range lands always has received due attention from the progressive type of rancher, but the problem of over-grazed ranges became acute and widespread especially during the drouth periods. During such periods the tendency to over-grazing was aggravated by the rigidity of lease regulations and of fixed charges such as taxes, which frequently were only distantly related to carrying capacity. Many adjustments have been made in lease regulations, rentals and taxes to meet this situation. Over the years ranchers have also learned what the productive capacities of different range lands are, and in the future are not so likely to purchase land at prices so high that capital charges on it must be met by increased rates of stocking. More ranchers now realize the ill effects of over-grazing, and so govern their range management accordingly.

**Other Practices.**—The summer round-up generally made during the month of June or July is for the purpose of branding calves for identification purposes. None of the ranchers interviewed reported having used chemical methods of branding. Experiments with these materials at the Range Experiment Station, at Manyberries, indicated that the scar tissues formed was not deep enough to cause the direction of the hair growth to change or swirl and the brands tended to be blotched or indiscernible.

<sup>1</sup> Data from Dominion Range Experiment Station, Manyberries, Alberta.



It is common practice to castrate the bull calves at the same time as branding. The two jobs are done as early as is convenient while the weather is cool, thus the danger from blow flies and maggots is minimized. The same methods of castrating are used by nearly all ranchers although a few individuals making use of the burdizzo instead of the customary knife report good results.

Spaying of heifers was not a common practice among ranchers. A few ranchers spayed regularly, a few spayed in occasional years and a number indicated they would like to spay if they knew how to do it. Comparatively few stockmen were familiar with the spaying technique. Moreover the need of it has now become less urgent, as, with modern methods of fencing and range control, heifers can be kept by themselves.

The usual ranch custom of dehorning yearlings in the spring of the year is being replaced gradually by dehorning of calves. Some of the smaller operators used caustic potash stocks when the horns were "buttons" and could be removed with a knife after which the caustic was applied. A system gaining increasing favour is the dehorning of calves in the fall after the weather has cooled off but before the calves are weaned. The young horns are removed quite close to the head with dehorning instruments or snippers. Ranchers reported that by this practice the calves did not seem to suffer any setback as the horns were still so small that their removal did not cause such a physical shock as when removed six months or so later. Moreover, as the calves were on their mothers' milk for one or two months afterwards, they did not shrink in condition. Dehorning in the spring causes such a setback to yearlings that they take two or three months to come back; spring storms make the situation much worse.

Disease control is one of the most important phases of ranch operations and, in spite of reasonably progressive methods of prevention being practised, diseases cause substantial losses to ranchers every year. Vaccination for the prevention of blackleg was a common procedure and generally was done at the summer round-up. One unusual local condition was found in connection with blackleg. In the western Chilcotin the disease has never been reported and so ranchers in that area find it unnecessary to vaccinate. Through systematic dipping in earlier years mange has practically disappeared as a problem on the range. However, one or two localities had to dip for mange during one year of this study. Coccidiosis among calves was the most important cause of death by disease; and one of the most effective remedies was the castor oil. Care in keeping the calves on clean, fresh feed grounds each year with sulphur and iron sulphate added to the salt ration are helpful preventives. However, even after taking these precautions, outbreaks of serious proportions have been known to occur. Urethral calculi (deposition of calcareous stones in the urethral tract) caused by a mineral unbalance periodically takes a heavy toll of steer calves in certain localities. Very little is known of this disease and no specific remedy has been found. A few stockmen, however, have become expert at removing these so that the animal makes complete recovery.

In the timbered regions of British Columbia a poisonous plant known as timber-milk vetch causes a condition in cattle known as *Astragalus* poisoning or, commonly, "knock heels". The gradual emaciation and lingering death produced by this plant annually takes heavy toll of cattle, particularly cows suckling calves. No cure has been found; the only form of prevention being not to over-graze timber ranges and thus to lessen the chances of cattle picking the plant up.

While generally speaking Bang's disease (abortion) was not considered prevalent on Western ranges many ranchers reported their suspicions of its presence, especially on British Columbia ranges. As the general practice is to sell off cows in the year which they show up dry, this tends to keep abortion in check.

Hemorrhagic septicemia (shipping-fever) causes severe losses periodically. Being a lung infection it is difficult to treat under range conditions once the animal has contracted it. Isolation of affected animals and vaccination act as preventives against the contraction and spreading of the disease.

Other diseases such as tuberculosis, pneumonia, goitre, lump jaw, tetanus infection, "cancer eye", "wooden-tongue" and milk fever were relatively minor causes of loss.

Warble flies and lice are quite prevalent but of recent years control of these has been under development. Ticks often cause loss to very young animals but not to an important extent.

Table 5 indicates the percentage of total losses attributable to various causes. This information was gathered for the year 1938-39 and shows very high losses from a spring storm in that year. In a normal year while the relationship between other losses would probably remain the same, they would represent a greater percentage of the total loss with a corresponding reduction in the percentage of storm loss. No detailed data on losses were obtained for the years 1939-40 and 1940-41.

TABLE 5. PERCENTAGE OF CATTLE LOSSES FROM VARIOUS CAUSES, APRIL 1, 1938-MARCH 31, 1939

Cause	Per cent of total losses			
	Saskat-chewan	Alberta	British Columbia	Average
	%	%	%	%
Disease.....	9	2	6	4
Poison.....	5	2	14	5
Lost, strayed, stolen.....	5	4	3	4
Ranch operations.....	3	3	8	4
Accidents.....	3	3	13	6
Storms, winter.....	61	64	3	48
Unaccounted for.....	14	22	53	29
Total.....	100	100	100	100

Losses from ranch operations are those resulting from castration, vaccination, dehorning, spaying and from calving. Accidents include losses from bogs and mires, drowning, lightning, predatory animals, and deaths from injury. Unaccounted losses increase in the more mountainous areas where it becomes more difficult to keep a close watch on cattle.

The very severe blizzard in the spring of 1938 was the major cause of loss that year. Although the storm was in progress during the last days of March, deaths occurred on into April and, as the opening inventory of this study came at the first of that month, losses were considered for that year. The open plains areas were most severely affected.

### Cattle Marketing and Prices

**Marketing Facilities and Methods.**—Most ranches are too remote from central stockyards to truck cattle to market. The general practice is to drive them to local railway shipping points. The distance cattle have to travel on foot varies considerably in the different zones. On the average, Shortgrass cattle travel about 13 miles, or about one day's drive. Cypress Hills cattle are about two days' drive, or 25 miles, from local shipping points. In the Northern Prairie distances averaged about 11 miles; in the Foothills about 21 miles; in Kamloops-Nicola, 11 miles; and in the Cariboo-Chilcotin, 53 miles. In this last



zone, ranches in the Cariboo proper are reasonably close to shipping points on the Pacific Great Eastern Railway; but the western Chilcotin ranchers drive as far as 200 miles to the loading yards at Williams Lake. Ranches in the Chilcotin suffer the disadvantage that their cattle may be on the trail for as long as three weeks or a month.

From the local shipping points some cattle go to the central stockyards at Vancouver, Calgary, Moose Jaw, Winnipeg and other points in the East. The proportion of ranch cattle shipped to these points cannot be accurately determined. Most of the larger packing houses have their country buyers who visit ranches and purchase stock either at the ranch or the local shipping point. These buyers frequently contract for stock as long as six months in advance of delivery, but this practice is not so prevalent to-day as it was in earlier times.

Drovers and independent buyers also travel the range areas, and many cattle are sold to them. Generally, drovers have a rather bad reputation among livestock growers, but through fair dealings some men in this line of business have built up an enviable clientele among ranchers. In the main, drovers buy on order for some small packing house or special trade, but may speculate on their own as well.

The survey indicated that while the great majority of ranchers did not patronize one type of buyer exclusively, some differences were apparent between zones. A larger proportion of Shortgrass ranchers sold to drovers than to any other class of buyer. In the Foothills the packer-buyer was more important, although selling practices varied considerably in this zone. In British Columbia drovers offered little competition to the packer-buyer; and sales through commission houses at the Vancouver stockyards were relatively small.

In addition to the standard methods of sale some producers had developed special outlets for their stock such as direct sale to feeders in the East or in irrigated areas of the West. A few ranchers held their own private auctions; while, in the southern Foothills, a larger number patronized the community auction sales developed and operated by themselves. Such auction sales appear to be of growing importance, and serve a valuable purpose making it possible for the local farm-feeder to obtain his feeder cattle conveniently and at lower cost. Other similar feeder sales at central points are also patronized by ranchers. The recently established Williams Lake feeder sale in British Columbia has had a marked effect on the market value of stock in that area.

**Market Information.**—The great majority of ranchers made use of more than one of the several sources of market information. Shortgrass ranchers appear to favour equally the newspaper, radio and commission firm reports. Buyers' and government reports were considered by a minority of these ranchers; while a few appear to pay no attention to market reports but to sell when their cattle have the maximum finish for the season. In the Foothills there was an apparent tendency to make less use of radio reports, and to rely mainly on newspaper and commission house information.

In British Columbia the Beef-growers Association maintained an agent at the stockyards in Vancouver to assist in the orderly distribution of marketing during the rush months of the fall. His weekly letter along with commission firm reports was relied on most heavily by the British Columbia ranchers. Something less than 10 per cent of the ranchers relied on the weekly government report; about an equal proportion did not make use of any type of market information.

## PART II

### THE RANCH SURVEY, 1938 to 1941

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#### Method of Study

The ranch business survey method was used to assemble the data included in this report. A form was prepared covering all the information related to the study. Enumerators visited the ranchers, explained the purpose of the study, and completed the questionnaire. The questions were answered by the ranchers from records and by estimate.

In a business as extensive as that represented by many ranches it is hardly to be expected that absolute accuracy can be secured in surveying the results of the years' operations. It is believed, however, that reasonable accuracy has been obtained. Errors in estimates would represent but small percentages of the total business on any ranch; and, when ranches are grouped, tend to be compensating.

For purposes of the study the business year was taken as from April 1 to March 31, and information was obtained from ranchers in each of the three years 1938-39, 1939-40, and 1940-41. The number of ranches reporting varied from year to year. Separate reports covering all ranches reporting were published for 1938-39<sup>1</sup> and 1939-40<sup>2</sup>. At the conclusion of the third year it was found that 218 ranches had provided information in each year of the study. This group of ranches was used for the study of the ranch business over the three-year period, 1938-41.

The significance of group averages from a sample depends upon the representativeness of the sample. If valid inferences are to be drawn with regard to ranches generally, the ranches included in the sample must be representative of the larger group from which the sample is taken. Representativeness may be secured by random sampling. In securing the sample for this study there was no deliberate selection of ranches although in the absence of an official definition distinguishing a ranch from a farm an arbitrary decision had to be made. Outfits on which wheat, horses and sheep were supplementary sources of income were included, as well as those where the sale of cattle was the only source of revenue.

An earlier section of this report described the various ranching zones in Western Canada. These zones differ appreciably in their basic physical characteristics, and these basic differences are associated with significant differences in ranch organization and practices. For this reason separate analysis has been made of ranches in each of six zones. No general averages are provided as it is felt that, with the substantial differences between zones, general averages would have little significance. The numbers of ranches in each zone are as follows: Shortgrass 104; Cypress Hills 14; Northern Prairie 11; Foothills 43; Kamloops-Nicola 18; Cariboo-Chilcotin 28.

The significance of a group average depends on the number of records in the group, and the variations in the data between ranches. As the variations between individual ranches are substantial the number of ranches in the group

<sup>1</sup> Elliott, G. C. and G. D. Chattaway, "Cattle Ranching in Western Canada", an economic study, Economics Division, Marketing Service, in co-operation with Experimental Farms Service, Dominion Department of Agriculture, 1941. A processed report to co-operators.

<sup>2</sup> "Cattle Ranching Survey in Western Canada." A Preliminary Report on an Economic Study of 287 Cattle Ranches in Saskatchewan, Alberta and British Columbia, for the year March 31, 1939 to April 1, 1940. Prepared for the information of co-operators.



is important. From this point of view the Shortgrass sample is more adequate than the samples for the other zones. Less significance can be attached to the averages for ranches in the Cypress Hills, Northern Prairie, and Kamloops-Nicola Zones, where the numbers of ranches included are relatively small.

### Economic and Climatic Conditions

At the beginning of the three-year period (April 1, 1938) the ranch industry of Western Canada was in a seriously depressed condition. Drouth and low prices for a number of years had eaten into reserves both physical and financial, and, at the end of the worst year of drouth, 1937, severe losses were incurred as a result of a spring storm which affected the ranching areas of Alberta and Saskatchewan. This marked the turning point, and, with improved weather and price conditions over the period of the survey, rapid recovery and progress was made.

**Cattle Prices, 1938 to 1941.**—Over the entire three-year period price conditions were good. Average September, October and November prices for steers, heifers, cows and feeders were all above the 19-year (1922-40) average at Calgary. With the exception of good steers, prices in 1938-39 were rising but were still somewhat less than average. Prices of all classes of cattle were higher than average in 1939-40, and continued to rise until in the fall of 1940 all classes of stock were selling for about \$2 per cwt. above the 19-year average. In relation to other commodities generally and to the prices of the goods and services paid for by ranchers, cattle prices were in a favourable position during the period; the purchasing power of cattle was high. In many respects the middle year (1939-40) would seem nearest to normal. In that year, although prices were good, this favourable condition was offset by the necessary retrenchment following the earlier years of drouth and low prices. By the following year (1940-41) ranchers were in a position to take advantage of the continuing rise in prices; although ranch expenses, particularly wages of hired labour, had begun to advance appreciably.

**Climatic Conditions, 1938 to 1941.**—Over the period of the study average annual precipitation was higher than normal; and, more important from the standpoint of vegetative growth, the precipitation from April to July was, at most points, also more than average. The three winters were milder than usual. These facts are reflected in Table 6.

TABLE 6.—TEMPERATURE AND PRECIPITATION AT SELECTED STATIONS<sup>1</sup>

	Medicine Hat	Calgary	Kamloops
	Deg. F.	Deg. F.	Deg. F.
Normal Mean Annual Temperatures.....	42	38	47
Mean Annual Temperature, 1938-39.....	46	42	51
Mean Annual Temperature, 1939-40.....	42	40	50
Mean Annual Temperature, 1940-41.....	43	40	51
	In.	In.	In.
Normal Precipitation, April to July (incl.).....	6.76	8.91	3.75
Precipitation, April to July (incl.), 1938.....	6.2	9.8	1.5
Precipitation, April to July (incl.), 1939.....	7.1	11.2	4.8
Precipitation, April to July (incl.), 1940.....	8.2	10.4	3.7

<sup>1</sup> Dominion Meteorological Records.



### Land Tenure and Utilization

The total land area in the 218 ranches reporting exceeded 2,300,000 acres. This represents an average of over 10,000 acres per ranch, and indicates the extensive scale on which ranch operations are carried on. In addition to the use of land in ranch units, from 15,000 to 18,000 head of cattle were recorded as pastured on Crown timber lands, National Forest lands, and community pastures. In other words additional pasture was available for approximately 150 head per ranch for a period of six months each year.

The average acreage in ranches increased during the period of the study by roughly 170 acres per ranch, or about two per cent, indicating a trend toward larger holdings.<sup>1</sup> Most of the increase occurred in the Shortgrass (387 acres) and Foothills (177 acres) Zones. In the Northern Prairie Zone there was a pronounced decline of 898 acres (Table 7) occasioned mainly by lapsing of leases. Large areas of abandoned land in this zone often were free for the using, which influenced some ranchers to forsake their lease rights.

**Tenure of Ranch Land.**—Land in ranches is held and used under various forms of tenure. 'Deeded' land is owned by the ranch operator, and held by deed. 'Rented' land is land not owned by the operator and used primarily for crop production, the rental being usually paid through a share of the crop. Land owned by the province, and held by a rancher under a cultivation lease, is included in this category. The term 'leased' land applies to all land held under lease. Such land is used primarily for grazing purposes, although in some cases a small proportion may be cultivated for feed production. Ownership of land as it existed at the end of the survey period is shown in detail in Table 7. Land designated as 'private' lease is owned by companies or individuals. 'Free' lands are parcels, presumably owned by others, but for which no rental was being paid by the ranchers.

'Provincial' lease constituted the largest proportion of lands, leased and rented (Table 7). 'Private' lease was the second most important form of lease tenure. Nearly every ranch held some land under 'provincial' lease; and a substantial number of them also had 'private', 'school' and 'Hudson's Bay' leases. A few ranches (less than 5 per cent) leased land from Indian Reserves, railroad companies, and National Forests; and consequently the average acreage per ranch under this form of tenure is small. However the availability of such land has considerable importance in particular locations.

TABLE 7.—TENURE OF LAND IN RANCHES, BY ZONES, 1940-41

	Short- grass	Cypress Hills	Northern Prairie	Foothills	Kamloops- Nicola	Cariboo- Chilcotton
—	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
Lease:—						
Provincial.....	12,003	4,040	844	3,059	3,966	1,279
Indian Reserve.....	80	.....	.....	95	56	21
School Lands.....	150	137	29	134	.....	.....
Hudson's Bay.....	129	11	143	22	.....	.....
Railroad.....	27	.....	58	22	.....	.....
National Forest.....	.....	7	.....	37	.....	.....
Private.....	1,528	.....	541	515	699	20
Total Lease.....	13,917	4,195	1,615	3,884	4,721	1,320
Rented.....	61	.....	218	2	.....	.....
Deeded.....	1,856	2,094	1,672	3,343	1,554	2,780
Free.....	353	114	.....	.....	.....	.....
Total Land Unit.....	16,187	6,403	3,505	7,229	6,275	4,100
Change 1938-41.....	387	-17	-898	177	31	10

<sup>1</sup> Where changes in acreages occurred during a particular business year, such changes were accounted for in the year in which the change made the greatest difference in the organization and operation of the ranch, that is, in the year in which the larger part of the full season's use was gained or lost whether the land was used as summer range, winter range, or as cropland.

The proportion of land rented for cultivation was much higher in the Northern Prairie Zone than in other zones. In the Northern Prairie Zone 50 per cent of the ranchers rented farm land, while less than 20 per cent of the Shortgrass ranchers did so. In British Columbia zones the number of ranchers renting farm land was negligible.

Of the land in the 218 ranches nearly 500,000 acres were 'deeded' land. Exclusive of the relatively small amount of 'free' land, the remainder was held under the various forms of lease or rental agreement, the greatest portion being leased from the provinces. The approximate proportions of deeded land to the total land unit in the various zones were as follows: Shortgrass, 10 per cent; Foothills, 45 per cent; Cypress Hills, 33 per cent; Northern Prairie, 42 per cent; Kamloops-Nicola, 25 per cent; Cariboo-Chilcotin, 68 per cent. Over the three-year period there were no very significant changes in the proportion of 'deeded' land.

In the past the tendency has been to purchase such lands as were suitable for ranch headquarters, water supply, or the growing of feed and cash crops. Grazing lands were purchased only when it appeared unavoidable, either because the lands were thrown open for sale by the owners and might be purchased by others, or because they were held by railways, land-grant companies, or homesteaders and could not be obtained on a lease basis. Thus in the Shortgrass Zone only land of heavier soil type and adaptable to cultivation or land suitable for irrigation, was bought. These same conditions appear to have guided the purchase of land in the two British Columbia ranching zones. However, in the Kamloops-Nicola, Cariboo-Chilcotin and Shortgrass Zones grazing land was readily available under lease or permit. On the other hand, lease lands were scarce in the Cypress Hills, Northern Prairie and Foothills, much of the land having been originally acquired through purchase grant or homestead. Consequently if additional land was desired in these zones it had to be bought.

In considering differences between zones, in land in ranches and in the tenure of land, attention must also be given to arrangements for the grazing of cattle on forest reserves, timber lands, community pastures, or land belonging to neighbouring land owners. The use of land under this type of arrangement is referred to as non-ranch grazing or feeding, and is paid for on a livestock head basis. Table 8 shows the amount and percentages of total feed months obtained from ranch and non-ranch sources. A feed month represents the feed required to carry one animal for one month.

TABLE 8.—AVERAGE FEED MONTHS FROM RANCH AND NON-RANCH SOURCES, BY YEARS, BY ZONES

—	Short- grass	Cypress Hills	Northern Prairie	Foothills	Kamloops- Nicola	Cariboo- Chilcotin
	Mo.	Mo.	Mo.	Mo.	Mo.	Mo.
1938-39—						
Ranch.....	4,418	3,217	1,996	5,066	3,263	3,681
Non-Ranch.....	495	490	321	1,522	1,389	2,337
Total.....	4,913	3,707	2,317	6,588	4,652	6,018
1939-40—						
Ranch.....	4,799	3,431	2,453	5,483	3,522	3,814
Non-Ranch.....	479	481	56	1,428	1,272	2,101
Total.....	5,278	3,912	2,509	6,911	4,794	5,915
1940-41—						
Ranch.....	5,425	3,521	2,468	5,579	3,946	3,924
Non-Ranch.....	297	654	121	1,456	1,044	2,182
Total.....	5,722	4,175	2,589	7,035	4,990	6,106



In the Shortgrass Zone, where 90 per cent of the land was leased or rented, less than 10 per cent of the total feed months were obtained from non-ranch sources. On the other hand, Cariboo-Chilcotin ranches with 68 per cent "deeded" land obtained more than 36 per cent of their total feed months from non-ranch sources. A somewhat similar relationship existed in the Foothills where 45 per cent of the land was "deeded", but over 20 per cent of the total feed months were of non-ranch origin. The Northern Prairies zone had a high proportion of "deeded" land but the usual complement of this, a high proportion of non-ranch grazing land, was not apparent. This was in part due to the inadequacy of the data. Large amounts of open "free" range were available for use and no accurate data could be procured on the extent to which this land was used. The proportion of deeded land in the Cypress Hills (32 per cent) was higher than in the Shortgrass Zone, and about 85 per cent of the feed months were obtained within the ranch units. The Kamloops-Nicola Zone had a somewhat smaller proportion of "deeded" land (25 per cent) and a rather higher proportion of non-ranch feed months (21 to 30 per cent).

The average feed-months of seasonal non-ranch grazing are shown in Table 9. Foothills and Cypress Hills ranchers secured summer grazing in Forest Reserves and on privately owned properties, the latter being relatively unimportant. In the Foothills, non-ranch summer grazing provided for 190 to 210 head per ranch for a period of five months; in the Cypress Hills the number of head was 95 to 131. Summer grazing under permit in the Kamloops-Nicola and Cariboo-Chilcotin Zones was almost entirely on Crown timber ranges, or Forest Reserves. The number of head involved per ranch in the Cariboo-Chilcotin (420 to 461 head) was nearly twice as great as in Kamloops-Nicola (197 to 262 head). Again the period was roughly one of five months. Ranchers in the Shortgrass ran from 41 to 76 head per ranch for about seven months, mainly on community pastures and privately owned lands.

About 15 per cent of the Shortgrass, and over 50 per cent of the Foothills ranchers secured grazing or wintering facilities on lands other than their own. The number involved was about 200 to 250 head of cattle per ranch using wintering facilities; and the period was about four months. For all ranches this represented 30 to 40 head per ranch in the Shortgrass, and 100 to 120 head in the Foothills. While the number of ranchers in the Shortgrass using this type

TABLE 9.—AVERAGE FEED MONTHS PER RANCH PER YEAR, OBTAINED FROM OUTSIDE THE RANCH, BY YEARS, BY ZONES<sup>1</sup>

	Shortgrass	Cypress Hills	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	Mo.	Mo.	Mo.	Mo.	Mo.
1938-39—					
Summer Grazing Feed Months.....	318	490	1,048	1,308	2,306
Winter Feed Months.....	177	.....	475	81	31
Total Feed Months.....	495	490	1,523	1,389	2,337
1939-40—					
Summer Grazing Feed Months.....	291	481	1,007	1,239	2,101
Winter Feed Months.....	188	.....	421	33	.....
Total Feed Months.....	479	481	1,428	1,272	2,101
1940-41—					
Summer Grazing Feed Months.....	175	654	982	985	2,182
Winter Feed Months.....	122	.....	474	59	.....
Total Feed Months.....	297	654	1,456	1,044	2,182

of wintering fluctuated from year to year it was a regular practice with more than half the Foothills' ranchers. In other zones the number of ranchers wintering stock off the ranch was insignificant.

**Land Utilization.**—On the prairies the proportion of crop and hay land which was irrigated ranged from 2 per cent in the Northern Prairie Zone to 25 per cent in the Shortgrass, while in contrast the Kamloops-Nicola ranches had 99 per cent of their crop and hay land irrigated and those in the Cariboo-Chilcotin 94 per cent (Table 10). In the British Columbia range areas, moisture is such a limiting factor that in order to obtain any amount of winter feed, irrigation is necessary. While it is very desirable on the prairies, it has not been an absolute necessity in many parts; however, through the efforts of the Prairie Farm Rehabilitation Administration, much has been and is being accomplished to promote water development.

TABLE 10.—UTILIZATION OF LAND IN RANCHES, BY ZONES, 1938-41

—	Short- grass	Cypress Hills	Northern Prairie	Foothills	Kamloops- Nicola	Cariboo- Chilcotin
	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
Range Land—						
Deeded.....	1,366	1,841	1,188	2,866	1,274	2,366
Leased and Rented.....	13,702	4,198	1,971	3,760	4,703	1,277
Free.....	352	102	105	12		
Irrigated Hay Land—						
Deeded.....	46	6		7	13	234
Leased and Rented.....	30		14			36
Dry Hay Land—						
Deeded.....	12	65	116	169		
Leased and Rented.....	56		62	24	1	4
Irrigated Crop Land—						
Deeded.....	60	27		26	245	146
Leased and Rented.....	6				21	7
Dry Crop Land—						
Deeded.....	294	172	354	267	2	23
Leased and Rented.....	70		145	10		

In the Shortgrass, Cypress Hills and Northern Prairie Zones, about three-quarters of the hay and crop land was cultivated. In the Foothills a greater dependence was placed on native hay fields and about 60 per cent of the hay and crop land was cultivated. In British Columbia the two extremes of conditions were found. In the Kamloops-Nicola Zone 95 per cent of the hay and crop land was cultivated while only 39 per cent was tilled in Cariboo-Chilcotin.

The more diversified organization of the Northern Prairie Zone was apparent from the high ratio of crop and hay land per animal unit (3·4:1). In the Shortgrass there was about 1·3 crop and hay acres per animal unit while the lowest ratio was obtained in the Kamloops-Nicola Zone where the average was 0·7 acres per animal unit. These ratios are of course influenced by the proportion of irrigated land as well as the availability of non-ranch feed resources. The availability of non-ranch grazing resources tends also to distort the pasture picture. Grazing land was controlled to the extent of 35 acres per animal unit in the Shortgrass, while the Cariboo-Chilcotin ranches held only 7 acres per animal unit by lease or deed. However, in this latter zone 55 per cent of the feed months was obtained off the ranch while in the former only 8 per cent was provided.



### Ranch Livestock

The number of cattle on ranches varied considerably with the Foothills zone having the highest, averaging just over 500 head, and the Northern Prairie the lowest, a little less than 200 head. However, the similarity of the herd composition was most remarkable in view of the great differences in physical conditions found in the various areas (Table 11).

TABLE 11.—AVERAGE NUMBERS OF STOCK PER RANCH BY ZONES, 1938-41

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	No.	No.	No.	No.	No.	No.
Breeding Cows <sup>1</sup> .....	213	138	88	255	204	242
Yearlings.....	101	78	47	131	108	129
Two-Year Old Steers <sup>2</sup> .....	39	38	23	65	61	67
Three-Year and Over Steers	16	28	13	50	.....	31
Bulls.....	7	3	3	9	7	8
Total Cattle.....	376	285	174	510	379	477
Horses.....	56	38	36	45	23	34
Sheep and Hogs.....	33	26	10	25	6	6

<sup>1</sup> Includes cows and two-year-old heifers.

<sup>2</sup> Includes a very small number of spayed heifers.

The average of the inventories at April 1, 1938 and March 31, 1941 indicated a slightly higher proportion of cows on Shortgrass ranches than on others, but this was largely a result of drouth conditions preceding the survey which forced ranchers in that area to sell down their herds more than in other zones. At the close of the period these outfits were very close to normal, having 54 per cent of their herds made up of cows and two-year-old heifers.

The proportion of yearlings was remarkably constant in all areas although the tendency to expand as conditions improved resulted in a general increase in the proportion of this class of cattle. This was most marked in the Cypress Zone where the proportion increased 6 per cent over the survey period.

The distinctive feature of the distribution of market steers was the absence of steers, three-year-old or over, on ranches in the Kamloops-Nicola Zone and the predominance of this class of stock on Cypress and Foothills ranches. In the former case it would appear that the combination of market demands, range types and areas available and the stability of the area have produced an organization which is unique for its constancy. The fact that the Kamloops-Nicola area produce cattle almost solely for the Vancouver market, that it is limited in its geographical boundaries with consequent familiarity of producers with their neighbour's methods, and that the summer ranges are largely unfenced, have tended to standardize the organization of these ranches. In the case of the Cypress Zone the high proportion of steers three years old or more was largely the effect of one ranch on the small sample in that area. At the beginning of the survey this operator held four and five-year-old steers having refused to sell at the low price obtainable in previous years. These cattle were liquidated during the period, however, and so at the close of the study the Cypress Zone was not abnormal in this respect. While the sample was adequate in the Foothills, somewhat the same motives which influenced the individual in the Cypress Hills had influenced a number of ranchers and here again at the close of the period the proportion of steers, three years old and over, was not particularly high. The low proportion of steers on Shortgrass ranches has been noted as a consequence of the drouth, and the tendency to recover was apparent in this class of cattle—the converse of the downward trend in the proportion of cows.

The tendency to augment depleted cattle inventories was most marked on the Shortgrass ranches where a 28 per cent increase over the April 1, 1938 inventory was obtained by March 31, 1941 (Table 12). The Cypress Zone exhibited a 20 per cent increase over the same period; the Northern Zone 17 per cent; the Foothills 10 per cent; the Kamloops-Nicola, 6 per cent and the Cariboo-Chilcotin 5 per cent. The effect of the drouth years was clearly evident in the prairie regions with the Foothills affected the least. Undoubtedly this tendency to expand was also affected by the rising price level which results from the tendency for production to increase as prices advance and to contract as they tend to fall.

TABLE 12.—CHANGES IN NUMBERS OF STOCK PER RANCH BY ZONES, 1938-41

—	Short- grass	Cypress Hills	Northern Prairie	Foothills	Kamloops- Nicola	Cariboo- Chilcotin
	No.	No.	No.	No.	No.	No.
Breeding Cows <sup>1</sup> .....	30	24	6	18	9	-22
Yearlings.....	34	31	14	19	18	16
Two-Year-Old Steers <sup>2</sup> .....	23	13	-2	16	-7	16
Three-Year and Over Steers	2	-17	9	-8	.....	12
Bulls.....	1	1	.....	1	3	.....
Total Cattle.....	91	52	27	47	24	22
Horses.....	3	1	2	6	5	5
Sheep and Hogs.....	12	4	1	18	-3	2

<sup>1</sup> Includes cows and two-year-old heifers.

<sup>2</sup> Includes very small number of spayed heifers.

**Horses.**—In the prairie region the indications were that ranches tended to commercial production of horses to a greater extent than in the Foothills or British Columbia. In the Shortgrass Zone 15 head of horses per 100 head of cattle were carried on the average; 13 in the Cypress, 21 in the Northern, 9 in the Foothills, and 6 and 7 in the Kamloops-Nicola and Cariboo-Chilcotin respectively. The higher proportion obtaining in the Northern Prairie area was undoubtedly the result of the relatively more extensive cropping activities on ranches there. A general increase in numbers of horses was apparent in all zones over the three years, the largest being in the Foothills and British Columbia Zones.

**Sheep and Hogs.**—In keeping with the tendency toward greater diversification found on ranches of the prairie region, the numbers of sheep and hogs, relative to cattle numbers, were greater in those areas. On Shortgrass outfits the average inventory was 33 head of sheep and hogs. This was equivalent to 9 per cent of the average cattle inventory. A similar proportion of these types of livestock was found on ranches in the Cypress Zone while the Northern had 6 per cent. In the Foothills the proportion was lower, amounting to 5 per cent although in total numbers the average was almost as high as in the Cypress Zone. In British Columbia these types of livestock were negligible. Over the period of the study the tendency for increasing inventories of sheep and hogs was marked particularly in the Shortgrass and Foothills. The former increased from 29 to 41 head and the latter more than doubled, rising from 16 to 34. In the case of Shortgrass ranches the greatest increase occurred during the first year of the study while in the Foothills the major change occurred during the second year, 1939-40.

### Purchases and Sales

Purchases of stocker cattle were highest in the Cariboo-Chilcotin where they were equivalent to about 6 per cent of the spring turnout. In the Shortgrass, Foothills and Kamloops-Nicola purchases were a little over 5 per cent while



in the Cypress and Northern Zones they amounted to less than 2 per cent. Calves and yearlings were largely represented in the purchases in all areas although in the first and second years of the survey a substantial proportion of the purchases of Foothills ranches represented breeding stock. The Cypress and Cariboo-Chilcotin ranches indicated a high rate of bull replacement. In this respect the Northern Prairie Zone was particularly low.

With respect to the class of cattle generally sold (Table 13), of the 218 ranches included in the survey, 5 ranches were purebred outfits selling a number of breeding bulls in addition to their commercial output. Of the remaining 213 ranches about 10 per cent were purchasing stockers and feeders for re-sale; 6 per cent were on a cow-calf basis; 18 per cent sold mainly yearlings; 38 per cent were on a two-year-old steer basis; 12 per cent sold cattle at three years or over; and 7 per cent combined the latter two types, selling both two and three-year-olds with no emphasis on one or the other. The remainder of the ranches, 9 per cent, had various other combinations. Thus over half the ranches studied were organized to sell steers two years old or over.

The turnover of cattle when the number was calculated as a percentage of the average opening inventory was highest in the Northern Prairie with other zones falling close together. However, when the net output in numbers was considered, that is, by adding the net of inventory increase minus purchases to sales, the Cypress Zone was highest with a 37 per cent turnover, followed by the Shortgrass (33 per cent) and Northern (31 per cent) with the Kamloops-Nicola, Foothills and Cariboo-Chilcotin being considerably lower, with percentages amounting to 27, 26 and 24 respectively.

With respect to the proportion of various classes of cattle sold, the Shortgrass sales tended to a higher proportion of calves and yearlings with the Northern Zone exhibiting a similar tendency although not so marked. The Cypress and Foothills ranches sold a relatively greater proportion of steers three years or over although in the former case the influence of one ranch in the limited sample has been noted in the discussion of inventories. The Kamloops-Nicola Zone had disproportionately high sales of two-year-old steers which made up 53 per cent of their sales. The proportion of cows and two-year-old heifers was lowest in the Northern Prairie (23 per cent) and highest in the Kamloops-Nicola (41 per cent).

### Labour

There are several types of labour used on ranches. First, of course, is that of the operator which may be in the case of larger ranches purely managerial with little or no manual labour on his part. Second, is that of the operator's family which is often unpaid although older members of the family may draw wages or have a share in the cattle. Third, is the hired or paid labour, which of itself may be subdivided into several categories. On larger ranches there may be foremen, on middle sized ranches year hands, while smaller outfits generally have recourse to month hands often depending on neighbours for semi-regular help. In addition to these there is the seasonal labour required in the summer for haying and other operations in that busy time. These hands may be hired on a monthly or daily basis depending on the rancher's individual requirements. Contract labour is used extensively in some districts, largely for putting up hay and fencing. Various arrangements are made in this connection but generally the contractor provides his own groceries and equipment, often drawing on the ranch for perquisites.

Unfortunately, data on the physical quantity of contract labour were not available and as this type of labour was responsible for 10 to 15 per cent of the total labour costs in the Foothills and Cariboo-Chilcotin, this must be borne in mind when considering physical labour requirements of those areas. In the

TABLE 13.—AVERAGE NUMBERS OF CATTLE AND OTHER LIVESTOCK SOLD PER RANCH BY ZONES, 1938 TO 1941

	Shortgrass				Cypress Hills				Northern Prairie				Foothills				Kamloops-Nicola				Cariboo-Chilcotin			
	1938-9	1939-40	1940-1	Average 1938 to 1941	1938-9	1939-40	1940-1	Average 1938 to 1941	1938-9	1939-40	1940-1	Average 1938 to 1941	1938-9	1939-40	1940-1	Average 1938 to 1941	1938-9	1939-40	1940-1	Average 1938 to 1941	1938-9	1939-40	1940-1	Average 1938 to 1941
Cows.....	26	27	26	26	15	18	29	21	12	13	11	12	44	54	47	48	52	34	38	41	52	53	36	47
Yearlings.....	12	24	23	20	4	3	6	4	7	14	6	9	6	11	17	11	.....	1	3	1	11	4	5	7
Two-Year Steers.....	11	27	28	22	7	13	15	12	14	14	5	11	24	30	35	30	56	55	48	53	37	42	37	37
Three-Year and Over Steers.....	14	13	10	12	21	29	21	24	8	10	24	14	45	39	41	42	.....	3	1	1	25	25	28	26
Calves.....	12	19	24	18	.....	.....	3	1	8	2	6	5	6	10	6	7	1	3	1	2	1	8	.....	3
Bulls.....	1	1	1	1	.....	1	.....	.....	.....	3	2	2	2	2	2	2	1	3	2	2	3	3	1	2
All Cattle.....	86 <sup>1</sup>	112	120 <sup>1</sup>	106	48	64	75	62	49	74 <sup>1</sup>	55	59	127	146	151	141	110	114 <sup>1</sup>	114 <sup>1</sup>	113	136 <sup>1</sup>	142 <sup>1</sup>	114 <sup>1</sup>	131
Horses.....	6	6	5	6	3	3	4	3	2	2	2	2	2	3	3	3	2	1	1	1	.....	1	.....	.....
Sheep and Hogs.....	23	47	43	38	12	19	25	19	11	16	18	15	16	31	25	24	23	12	16	17	4	2	8	5

<sup>1</sup> Information secured from one or two ranches covered only total number of cattle sold, and did not permit breakdown by classes. In the years affected the number included under "all cattle" exceeds the number of cattle by classes.



first year of the study the Kamloops-Nicola area also made use of a substantial amount of this type of labour. However with respect to the other types of labour little change was noted in the amounts used on ranches over the survey period. There was some slight indication of the impact of war on labour supply in the final year for the Shortgrass and Kamloops-Nicola Zones and in the second and final years in the Northern Prairie Zone.

One of the most significant features of the labour picture was the marked difference in the number of ranch units operated per man year between the Shortgrass, Cypress and Foothills Zones on the one hand and the Northern, Kamloops-Nicola and Cariboo-Chilcotin Zones on the other. The former had from 130 to 180 ranch units per man equivalent on the average while the latter zones had from about 80 to 110. In both cases the upper limit of the ranges represents the zones using substantial amounts of contract labour. The tendency was for the number of units per man year to increase over the period of the study as inventories generally increased, while the amount of labour held relatively constant.

Some regional differences were observed in the proportion of the annual supply of hired labour utilized during different seasons. These are illustrated in Figure 2 where three areas have been compared. In the prairie region the proportion steadily increased during the spring months to reach a high level in July and August which months consume a quarter of the year's requirements.

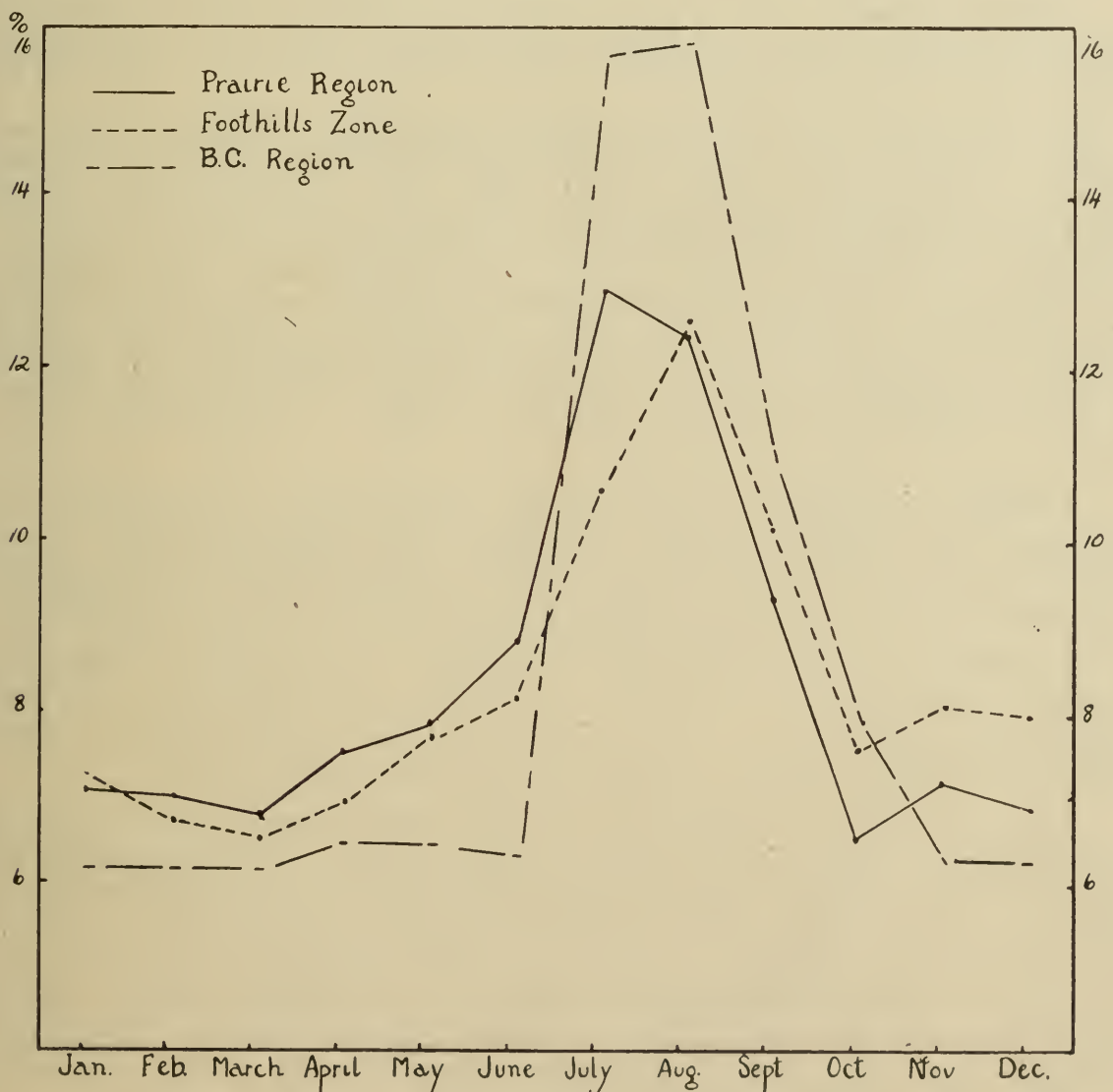


Fig. 2.—Monthly Percentage Distribution of Hired Labour.

The distribution in the Foothills Zone followed a somewhat similar course reaching a peak in the month of August. The British Columbia region exhibited a slightly different picture. Here, from November to June (inclusive) a relatively low proportion was used almost continuously. However, in July the amount of labour more than doubled as the haying season got under way. This held through August but fell off rapidly during September and October. The result on British Columbia ranches was that about 50 per cent of the hired labour was used from November to June (inclusive), while the other half was used in the four months of July, August, September and October.

### **Ranch Production and Practices**

**Crop Production and Winter Feeding.**—Hay and crop yields were generally good in each of the three years, although in the second and third years crops in the Shortgrass and in the Cypress Hills were seriously depleted by grasshoppers (Table 14). As a result of the favourable winters, feed consumption was generally normal or below normal in all zones except the Northern Prairie (Table 15). The British Columbia and Shortgrass Zones were particularly favoured in this respect. The Foothills and Cypress Hills were close to normal; although the latter exhibited fairly marked variations, a characteristic feature of conditions in the Great Plains region.

**Grazing Capacity.**—The average grazing capacity of ranches for each of the three years expressed as a percentage of the ranchers' estimate of normal grazing capacity is presented in Table 16.

The Shortgrass and Cypress Hills were understocked in the first year as a result of herd liquidations in the drouth years of 1936 and 1937. Stocking in these zones was approximately normal by 1941. The Northern Prairie, Foothills and Kamloops-Nicola were slightly over stocked in the first year and by the third year overstocking had assumed serious proportions. The tendency to overstocking was encouraged by favourable climatic and feed conditions coupled with rising prices. The position of the Cariboo-Chilcotin Zone was largely a reflection of quantities of range land available, this being the only range area in which expansion of the cattle ranching industry is still possible under the present extensive system of ranching.

**Breeding Practices.**—Approximately one-third of the ranchers in the Shortgrass and Cariboo-Chilcotin made use of breeding pastures. One-half or more of the ranches in the Cypress Hills, Northern Prairie and Foothills had established them. No breeding pastures were used in the Kamloops-Nicola.

One-fifth of the ranchers in the Shortgrass, and one-half of those in the Northern Prairie made a practice of breeding yearling heifers. In British Columbia over 85 per cent of the ranchers bred their yearling heifers. Cypress Hills and Foothills ranchers bred their heifers at two years of age.

The rougher the topography and the larger the area over which the breeding cows grazed the higher was the ratio of bulls to cows. In the Shortgrass about one-third of the ranchers ran less than 25 cows per bull, one-third ran 25 to 34 cows, and the remaining third ran 35 or more cows per bull. In the Cypress Hills and Northern Prairie over one-half of the ranches had 35 or more cows per bull. One-third of the Foothills ranches ran less than 25 cows per bull, and slightly under one-half of the ranches had 25 to 34 cows per bull. In the British Columbia region approximately one-half of the ranches had less than 25 cows per bull.



YABLE 14.—AVERAGE YIELDS OF GRAIN AND HAY PER ACRE ON RANCHES, BY ZONES, 1938-41

	Shortgrass			Cypress Hills			Northern Prairie			Foothills			Kamloops-Nicola			Cariboo-Chilcotin		
	1938	1939	1940	1938	1939	1940	1938	1939	1940	1938	1939	1940	1938	1939	1940	1938	1939	1940
Wheat.....Bu.	16	12	12	19	5	9	13	14	19	29	19	20	28	31	36	12	16	25
Oats.....Bu.	28	25	26	51	8	24	43	23	28	60	39	27	121	52	53	38	42	37
Barley.....Bu.	31	30	25	30	14	27	15	18	23	34	20	29	36	31	31	25	.....	.....
Rye.....Bu.	11	9	9	17	8	.....	1	24	18	16	6	.....	.....	.....	.....	.....	.....	.....
Mixed Grain.....Bu.	19	15	12	13	2	1	3	.....	.....	2	.....	.....	34	.....	.....	2	.....	.....
Grain Hay.....T.	0.9	1.0	0.9	1.7	0.9	0.9	0.9	0.5	.....	1.6	0.9	1.3	1.5	.....	.....	1.5	1.4	1.5
Legume Hay.....T.	2.1	1.8	1.7	2.0	2.5	1.2	.....	.....	.....	1.4	1.6	1.2	2.8	1.9	1.6	2.4	1.9	1.9
Grass Hay.....T.	1.5	1.2	1.1	1.4	0.8	0.8	0.5	0.2	1.2	1.3	0.6	0.8	.....	0.8	.....	1.5	1.4	1.0
Mixed Hay.....T.	1.6	1.0	2.3	1.2	1.5	1.6	1.0	.....	.....	1.1	1.5	1.6	1.5	1.4	1.2	1.2	1.0	1.4

TABLE 15.—FEED USED PER CATTLE UNIT DURING WINTERS OF 1938-39, 1939-40 AND 1940-41, BY ZONES

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
1938-39—						
Roughage.....T...	0.75	0.68	1.95	0.82	0.87	0.95
Grain.....Bu..	4.00	2.00	8.00	4.00	1.00	1.00
1939-40—						
Roughage.....T...	0.98	0.93	2.73	0.77	0.88	0.71
Grain.....Bu..	4.00	3.00	15.00	4.00	2.00	1.00
1940-41—						
Roughage.....T...	0.73	0.49	1.63	0.69	0.76	0.82
Grain.....Bu..	4.00	2.00	13.00	3.00	1.00	1.00

TABLE 16.—RELATIONSHIP BETWEEN GRAZING CAPACITY UTILIZED AND NORMAL GRAZING CAPACITY ON RANCHES, BY ZONES

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	%	%	%	%	%	%
1938-39.....	90	88	105	110	106	80
1939-40.....	96	93	117	110	103	78
1940-41.....	105	101	121	117	114	80

**Calf Crop.**—The percentage of calf crop increased generally in all zones from 1938-39 to 1940-41. The percentage distribution of calf crops obtained for the three-year average is shown in Table 17.<sup>1</sup>

Calf crops appeared to be closely related to the topography of the range areas. It was found that 48 per cent of the Shortgrass ranches had calf crops of 70 per cent or over. Northern Prairie ranches closely approached this and were followed by those in the Cypress Hills. The Foothills ranches had calf crops of 70 per cent or over in only 23 per cent of the cases, while in British Columbia, the Kamloops-Nicola had 22 per cent and only 18 per cent in the Cariboo-Chilcotin.

With respect to the average calf crop obtained over the three-year period, the Northern Prairie ranches had the highest, amounting to 70 per cent. This exceeded that of the Shortgrass and Cypress Hills ranches by 5 per cent and was the result in part of the smaller herds maintained in the former area. The Foothills and Kamloops-Nicola zones each had 57 per cent calf crops over the three years of the survey, while ranches in the Cariboo-Chilcotin lagged behind with an average of 53 per cent over the period.

TABLE 17.—PERCENTAGE DISTRIBUTION OF RANCHES ACCORDING TO AVERAGE PERCENTAGE CALF CROP, BY ZONES, 1938-41

Calf Crop	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	%	%	%	%	%	%
Less than 55 per cent.....	21	14	19	35	45	46
55 to 69 per cent.....	31	43	36	42	33	36
70 per cent and over.....	48	43	45	23	22	18

<sup>1</sup> See page 59 for method of calculating percentage calf crop.



**Death Losses.**—Losses each year, as a percentage of total cattle on hand at the beginning of year, are presented in Table 18. Usually losses up to 3 per cent are considered unavoidable.

TABLE 18.—PERCENTAGE DEATH LOSSES OF CATTLE FROM ALL CAUSES BY YEARS AND BY ZONES<sup>1</sup>

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	%	%	%	%	%	%
1938-39.....	4.2	3.5	2.5	2.1	3.3	3.4
1939-40.....	1.9	1.5	1.2	1.7	1.9	2.2
1940-41.....	2.3	2.0	3.0	1.9	2.9	2.8

<sup>1</sup>NOTE: total death loss during year as a percentage of opening inventory.

### The Ranch Business

**Ranch Capital.**—Ranch capital represents the operator's estimate of the value of ranch assets. In arriving at a value for ranch lands an effort was made in the first year to secure a long-run valuation based on productive or earning capacity, and the values obtained in the first year were carried through the three years of the study. Changes in the value of land per ranch therefore reflect either the acquisition or sale of land, or improvements such as irrigation development, breaking, and so forth. The values of breeding cows and of horses, sheep, hogs and poultry were likewise held constant over the three years. Other cattle, and feed and supplies inventories were valued at the current market prices, taking into account the class and condition of stock, and the quality of feed and supplies. Changes in these items consequently reflect changes both in quantity and in prices. Valuations of buildings, improvements, machinery and fences were adjusted for depreciation and repairs, and total inventory values reflect acquisitions and sales.

The average value of ranch assets, over the three years, ranged from less than \$22,000 per ranch in the Northern Prairie Zone, to over \$51,000 in the Foothills Zone (Figure 3).<sup>1</sup> Measured in this way, ranches in the Cypress Hills were relatively small; those in the Shortgrass and British Columbia Zones were intermediate in size.

In all zones cattle represented the largest item of capital. Cattle values per ranch accounted for from 40 to 45 per cent. of total ranch capital, except in the Northern Prairie Zone where the proportion was as low as 29 per cent. Low values of other livestock indicate a high degree of specialization, which was most pronounced in the Foothills and British Columbia Zones. The value of land per ranch varied from 20 to 24 per cent of total capital in the Shortgrass, Cypress Hills and Northern Prairie Zones, and from 30 to 36 per cent in British Columbia and the Foothills. Machinery values ranged from 5 per cent of the total capital in the Foothills to 13 per cent in the Northern Prairie Zone. Fences, generally, represented about 5 per cent of total capital, and feed and supplies were a relatively small item.

Over the three-year period there was a general increase in the value of assets. The main increase was in cattle inventories reflecting both increased numbers and rising prices. In comparison with 1938, land values per ranch in 1941 were slightly higher indicating some net addition and improvements to ranch holdings. Although feed and supplies remained a relatively small item in total capital there was a proportionately large increase in stocks during the survey. Because of the unfavourable conditions feed reserves on hand in 1938

<sup>1</sup> See Appendix III, Table I.

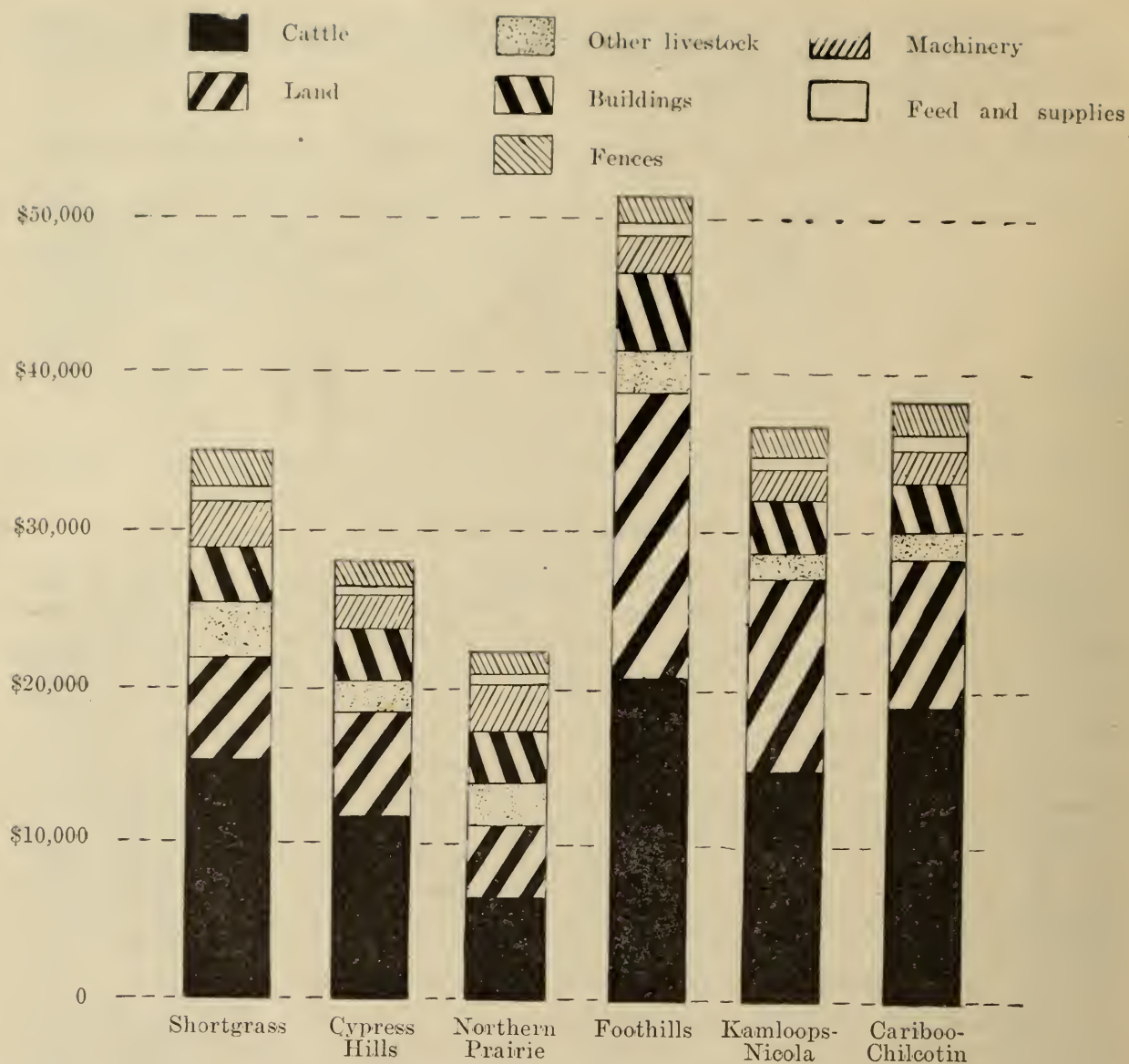


Fig. 3.—Average Capital per Ranch by Zones.

were low, but these reserves had been replenished by 1941. Other assets, including buildings, improvements, machinery and fences tended to depreciate over the period of the study.

*Land Values.*—The long-time productive values placed on range lands tended to be direct reflections of varying productivity of such lands. In the case of the Foothills Zone these values were inflated somewhat by the priority rights on Forest Reserve lands contiguous to these deeded parcels and conversely deflated in the Northern Prairie Zone by the availability of free lands (table 19).

Native hay land was entirely irrigated in the Cariboo-Chilcotin Zone consisting of spring flooded meadows around the edges of lakes and rivers. In other areas, except the Shortgrass, native hay land was almost a negligible quantity. This type of land in that zone was the result of the spring run-off which collected in low spots forming sloughs and pot-holes which dry up in the summer making satisfactory hay fields. Very few ranchers had attempted to improve the quality of these slough hays by introducing cultivated species although a number had improved drainage or flooding by ditches or dykes. The higher value placed on this land in the Cariboo-Chilcotin compared with the Shortgrass may be a reflection of the valuable fall and winter grazing obtained on these meadows in the former area.





A two-year-old heifer raised in the  
Shortgrass Zone.



A good range bull.



Market steers from the Foothills  
of Alberta.



Purebred Shorthorns in the Chilcotin  
Zone in British Columbia.



Breeding cows on the range near  
Kamloops, British Columbia.



A good growth of hay on irrigated land  
in the Shortgrass Zone.



A straw pile provides shelter and feed  
in the Northern Prairie Zone.



Wild upland hay in the Foothills.



Alfalfa on irrigated land near  
Kamloops, British Columbia.



A wild hay meadow in the Chilcotin  
Zone, British Columbia.

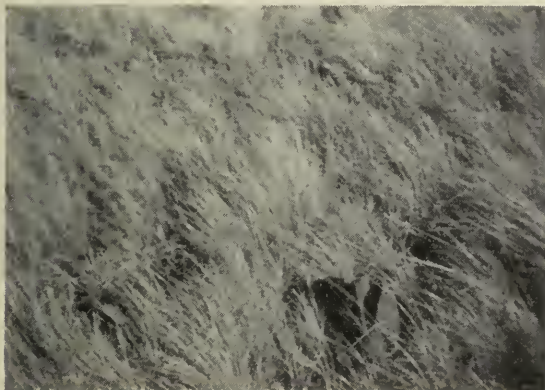




Prairie type grass characteristic  
of the Shortgrass Zone.



A mixed prairie type grass in the  
Northern Prairie Zone.



A sub-montane mixed prairie type  
in the Foothills.



Open bunch grass type in the  
Kamloops-Nicola Zone.



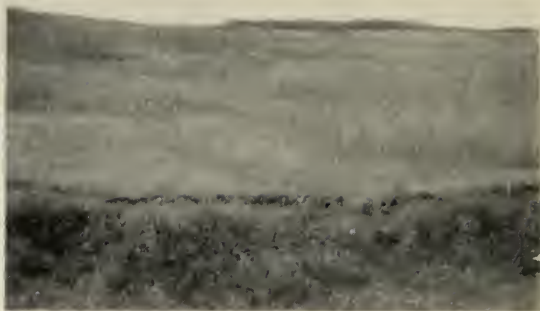
Forest region type grass in the  
Cariboo-Chilcotin Zone.



Typical topography in the Shortgrass Zone  
near Wood Mountain, Saskatchewan.



Characteristic topography in the Tilley East area of Alberta, also in the Shortgrass Zone.



An example of the topography in the Northern Prairie Zone. Note the bluffs.



Upper bench lands in the Cypress Hills.



In the Foothills west of Nanton, Alberta.



Range lands in Kamloops-Nicola Zone, British Columbia.



Forest and Open rangelands in the Cariboo-Chilcotin Zone near 100-Mile House, British Columbia.



TABLE 19.—AVERAGE VALUE OF DEEDED LAND PER RANCH AND PER ACRE, BY ZONES, 1940-41

	Shortgrass		Cypress Hills		Northern Prairie		Foothills		Kamloops-Nicola		Cariboo-Chilcotin	
	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre
—	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
Range Land.....	2,495	1.71	4,080	2.22	1,790	1.50	13,711	4.78	2,390	1.86	4,338	1.83
Irrigated Native Hay.....	505	10.98	11	1.00	.....	.....	163	23.28	307	23.62	3,514	14.95
Dry Native Hay.....	31	3.44	477	7.34	430	3.71	1,277	7.31	.....	.....	.....	.....
Irrigated Crop.....	1,478	23.09	154	5.70	.....	.....	468	16.71	9,883	40.17	3,154	21.46
Dry Crop.....	2,619	8.79	1,900	10.92	2,290	6.40	2,718	10.18	36	18.00	201	8.74
All Land.....	7,128	3.84	6,622	3.16	4,510	2.70	18,337	5.49	12,616	8.12	11,207	4.03

TABLE 20.—SALES VALUE OF LEASE RIGHTS, AVERAGE VALUE PER RANCH AND PER ACRE, BY YEARS AND BY ZONES

	Shortgrass		Cypress Hills		Northern Prairie		Foothills		Kamloops-Nicola		Cariboo-Chilcotin	
	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre
—	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1938-39.....	3,237	0.24	2,881	0.69	341	0.14	1,092	0.30	.....	.....	.....	.....
1939-40.....	3,157	0.24	2,912	0.69	341	0.18	1,257	0.32	.....	.....	.....	.....
1940-41.....	3,332	0.24	2,897	0.69	341	0.20	1,257	0.32	.....	.....	.....	.....

The higher values placed on dry native hay land in the Foothills and Cypress Zones as compared with the Northern Prairie were a result of the relative scarcity in those areas of this source of winter feed. This type of hay land was non-existent in the British Columbia zones and of little importance in the Shortgrass.

Irrigated crop land was of primary importance in the Kamloops-Nicola Zone and the high value per acre (\$40) reflects the high cost of bringing the water long distances from mountain lakes and storage basins to the valley bottoms. It is justified by the added production which this crop land makes possible. While this type of land was important to Cariboo-Chilcotin ranchers, the greater availability of flood meadows resulted in the artificial irrigation of the more accessible crop land which tended to hold down costs and consequently values. Irrigated crop land in the Shortgrass Zone was largely located in the various irrigation districts and values consequently are a reflection of conditions in those areas.

The higher value placed on dry crop land in the Foothills and Cypress Zones is again a reflection of the greater productivity of those areas. Values in the Northern Prairie seemed very low; a probable result of the depressed condition of farming which predominated in the area.

Leased acreages often have an exchange value in excess of the value of fences and other improvements made by the lessee. In such cases when ranches are sold and leases transferred payment may be made for the lease rights. In this study an attempt was made to determine the market value attached to property rights in leases, but the estimates obtained were not included in the ranch capital. While many of the ranchers interviewed claimed no sales value to their leases, others did. The averages for all ranches in each zone are given in Table 20. No sales values were attached to leased lands in the British Columbia zones. Two factors were responsible for this. First, the high costs of fencing; and second, the competition of available grazing on Crown timber ranges at very reasonable rates. Under very different circumstances, ranchers in the Cypress Hills valued their leased lands at 69 cents per acre. Here leases were scarce, and outside of a limited amount of Forest Reserve grazing, the alternative to the leasing of land was to purchase land. In the Foothills, many ranchers placed values on leased land as high as \$1.50 per acre including fences. Others claimed no sale value at all. On the average, after deducting the value of fences, the value per acre in this zone was 30 to 32 cents. Because of lower grazing capacity, values in the Shortgrass were somewhat lower at 24 cents per acre. In the Northern Prairie, as a result of available free grazing, the value per leased acre was as low as 13 to 19 cents.

*Cattle Values.*—The average value of breeding cows varied from \$30 a head in the Cariboo-Chilcotin to \$37 in the Shortgrass Zone at April 1, 1938 (Table 21). The Foothills and Kamloops-Nicola ranchers valued their cows at an average of \$36, the Cypress valued theirs at \$35 and in the Northern Prairie Zone the average value of cows was \$31 each. Although the value of cows was held constant throughout the survey period, some increase was evident resulting from the higher prices of two-year-old heifers which were included with the breeding cows. This resulted in a range in average values at the close, March 31, 1941, from \$32 in the Cariboo-Chilcotin to \$40 in the Shortgrass.

Yearlings were valued highest in the Cypress Zone (\$27) at the opening of the period and lowest in the Cariboo-Chilcotin (\$21). On the other hand the greatest increase in value at the close was evident in the latter zone (\$17) while the smallest increase occurred in the Cypress (\$10). At March 31, 1941 values of yearlings were very similar in all zones.



TABLE 21.—AVERAGE INVENTORY VALUATIONS OF RANCH CATTLE BY ZONES

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cows—						
April 1, 1938.....	37	35	31	36	36	30
April 1, 1939.....	37	35	31	35	35	30
April 1, 1940.....	38	36	32	36	36	32
March 31, 1941.....	40	38	34	37	38	32
Yearlings—						
April 1, 1938.....	24	27	23	24	24	21
April 1, 1939.....	27	26	24	25	25	21
April 1, 1940.....	30	28	28	32	28	30
March 31, 1941.....	38	37	37	39	39	38
Two-Year Steers—						
April 1, 1938.....	37	42	33	38	35	36
April 1, 1939.....	40	43	36	36	42	34
April 1, 1940.....	46	41	41	42	45	44
March 31, 1941.....	53	50	51	55	59	59
Three-Year and Over Steers—						
April 1, 1938.....	51	53	42	47	.....	41
April 1, 1939.....	56	57	46	51	48*	43
April 1, 1940.....	58	59	51	55	42*	54
March 31, 1941.....	73	81	64	67	.....	64
Bulls—						
April 1, 1938.....	100	113	87	101	120	83
April 1, 1939.....	120	177	90	108	120	78
April 1, 1940.....	118	128	86	117	95	84
March 31, 1941.....	138	150	123	139	113	134

\*Inadequate numbers.

The Cypress Zone again recorded the highest opening values in the case of two-year-old steers (\$42) while the Northern Prairie values appeared particularly depressed at \$33 for this class of stock. The Cypress ranches had increased the value of two-year-olds the least in the closing inventory (\$8) while very large increases were recorded in the Kamloops-Nicola and Cariboo-Chilcotin, \$24 and \$23 respectively.

The value of steers three years old and over increased by substantially the same amounts in nearly all zones although ranchers in the Northern Prairie and Cariboo-Chilcotin Zones placed considerably lower values on this class of stock in the opening inventory. The Cypress ranches had a relatively high value on these cattle at the close (\$81).

Bulls were valued less in the Northern Prairie and Cariboo-Chilcotin Zones at the opening, April 1, 1938. In the closing inventory at March 31, 1941, however, the values of these animals were sharply increased which brought them into line with those in other areas.

Generally, valuations of cattle were lower in the Cariboo-Chilcotin and Northern Prairie Zones throughout. However, in the former case particularly, values were increased more than in other areas so that at the end of the survey very few outstanding differences remained. On the other hand while opening values were high in the Cypress, smaller increases were noted and at the close this zone had low values on most classes of cattle.

Increases were very minor during the years 1938 to 1939, and 1939 to 1940 with one exception. In the second year values were increased a substantial amount in the Cariboo-Chilcotin Zone. This appeared to be largely the effect of the establishment of the Feeder Sale at Williams Lake which opened a valuable outlet for the cattle of the district. Another fact which undoubtedly had its effect on valuations was the employment of an agent by the Cariboo ranchers at the Vancouver stockyards. The first-hand reports sent by this representative on the market situation helped to inform many ranchers concerning the value of their stock.

In the final year, 1940 to 1941, however, substantial increases were recorded for all classes of stock in all areas. In nearly all cases the increase during this year amounted to more than the increase made in the first two years combined. With the coincident increase of numbers the effect on the gross income to ranches was very marked.

One final observation with respect to cattle values should be made. In the case of breeding stock the value obtained was representative of the rancher's estimate of the long-run productive value of this class of animal. The average estimate of approximately \$35 per head was remarkably close to similar values developed by research workers in the United States. This class of stock makes up close to 50 per cent of the herd on most ranches, and should be kept in mind by those capitalizing their ranches and those buying into the business. Naturally, exceptionally well-bred stock would be worth more and poor stock less but for the general run of range cows, the figure would appear to provide a sound base.

*Machinery Values.*—The average value of machinery per ranch, over the three years, ranged from \$1,856 in the Kamloops-Nicola Zone to \$2,826 in the Northern Prairie Zone, and \$2,951 in the Shortgrass (Table 22). The high investment in machinery in the latter zones is an indication of the relative importance of crop production.

TABLE 22.—AVERAGE VALUE OF MACHINERY PER RANCH BY ZONES, 1938 TO 1941

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
General Equipment.....	1,749	1,456	1,890	1,434	1,114	1,558
Threshers and Combines...	156	18	134	34	62	100
Automobiles.....	458	458	337	485	436	308
Tractors.....	374	119	336	260	114	72
Trucks.....	213	38	128	96	128	201
All Machinery.....	2,950	2,088	2,826	2,330 <sup>1</sup>	1,856	2,238

<sup>1</sup> One ranch for which the distribution of machinery value was not available was omitted.

Of the total machinery value, general equipment accounted for from 60 to 70 per cent. Investment in equipment for harvesting crops (threshers and combines) was high in the Shortgrass and Northern Prairie Zones. The value of tractors per ranch was also high in these zones, and in the Foothills.

With the exception of the Foothills Zone, the general tendency was for machinery values to decline over the three years (Table 23). The amount of depreciation was greatest in the Northern Prairie Zone where values were highest. General equipment appeared to have depreciated in all zones. On the other hand the value of automobiles per ranch showed a general increase. New tractor purchases and expenditure on repairs more than balanced depreciation in the Shortgrass, Cypress Hills, and Foothills Zones.

TABLE 23.—AVERAGE CHANGE IN VALUE OF MACHINERY PER RANCH BY ZONES, 1938 TO 1941

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
General Equipment.....	-186	-249	-169	-105	-53	-278
Threshers and Combines...	- 3	+ 14	- 30	+ 1	-35	- 57
Automobiles.....	- 5	+ 61	- 6	+ 42	+ 3	+ 23
Tractors.....	+ 56	+ 62	-269	+ 92	-45	+ 6
Trucks.....	+ 62	- 26	+105	+ 26	-45	- 48
All Machinery.....	- 75	-139	-369	+ 96 <sup>1</sup>	-175	-353

<sup>1</sup> One ranch for which the distribution of machinery value was not available was omitted.



**Ranch Debt.**—As conditions improved during the survey period ranches in most zones reduced their indebtedness materially (Table 24). Actually, even at April 1, 1938, the economic position of most ranches was not serious and, on the average the only zone where the liquid position was seriously threatened was the Cariboo-Chilcotin. In this area the debt was equivalent to nearly one-third of the ranch assets at that time. The most favourable position was that of the Northern Prairie ranches where the debt was equivalent to slightly less than 10 per cent of the assets.

TABLE 24.—AVERAGE RANCH INDEBTEDNESS AT APRIL 1, 1938 AND MARCH 31, 1941, BY ZONES

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
April 1, 1938, Debt.... \$	4,232	2,863	1,899	7,898	4,609	10,947
Per Cent of Capital.... %	13.8	11.2	9.1	16.6	13.4	31.2
March 31, 1941, Debt.. \$	2,461	1,241	1,483	4,566	4,335	9,757
Per Cent of Capital.... %	6.5	4.2	6.5	8.4	11.2	23.2
Reduction in Debt, 1938-41..... \$	1,771	1,622	416	3,332	274	1,190

At the closing of the books on March 31, 1941, the greatest improvement of the debt situation was evident in the Foothills and Cariboo-Chilcotin where the ranchers' equity in their places had increased 8.2 and 8.0 per cent, respectively. Little change was noted in the condition of the Kamloops-Nicola or Northern Prairie ranches where the reduced percentage was largely a reflection of the increased value of the assets. The Shortgrass had made a 7.3 per cent gain while the Cypress was close behind with 7.0 per cent.

With respect to all ranches (217, as the debt was unobtainable from one in the Shortgrass Zone) at the start of the survey period, 17 per cent had no debt; 20 per cent less than \$1,000; 36 per cent, \$1,000 to \$5,000; and 27 per cent were over \$5,000 in debt. At the close, March 31, 1941, 25 per cent had no debt; 22 per cent less than \$1,000; 34 per cent, \$1,000 to \$5,000; and 19 per cent had over \$5,000 debt.

For the year 1938-39 in the prairie zones and Foothills about one-half the ranchers had a 90 per cent equity in their outfits while in British Columbia only about one-third were as well off. However, for the year 1940-41, approximately two-thirds of the prairie and Foothills ranches had debt equivalent to less than 10 per cent of their assets while the proportion of British Columbia ranches with this equity changed very little (Table 25).

TABLE 25.—FREQUENCY OF DEBT AS A PERCENTAGE OF AVERAGE CAPITAL, BY ZONES, 1940-41

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	No.	No.	No.	No.	No.	No.
No debt.....	12	5	3	13	5	.....
Less than 10 per cent.....	57	5	5	18	1	10
10-19 per cent.....	17	3	1	4	8	6
20-49 per cent.....	14	1	2	6	3	7
50 per cent and over.....	3	.....	.....	2	2	5

**Ranch Receipts.**—Over the three-year period, average annual receipts per ranch ranged from \$4,118 in the Cypress Hills to \$8,970 in the Foothills (Figure 4).<sup>1</sup> Receipts from cattle varied considerably between zones both in amount and as a proportion of total receipts, but represented over 80 per cent

<sup>1</sup> See Appendix III, Table 3.

of total receipts except in the Northern Prairie and Shortgrass Zones. In the Northern Prairie receipts from cattle were less than 60 per cent and in the Shortgrass less than 75 per cent of total receipts. In both these zones ranches secured substantial receipts from crops and feed, and receipts from other livestock were also relatively large.

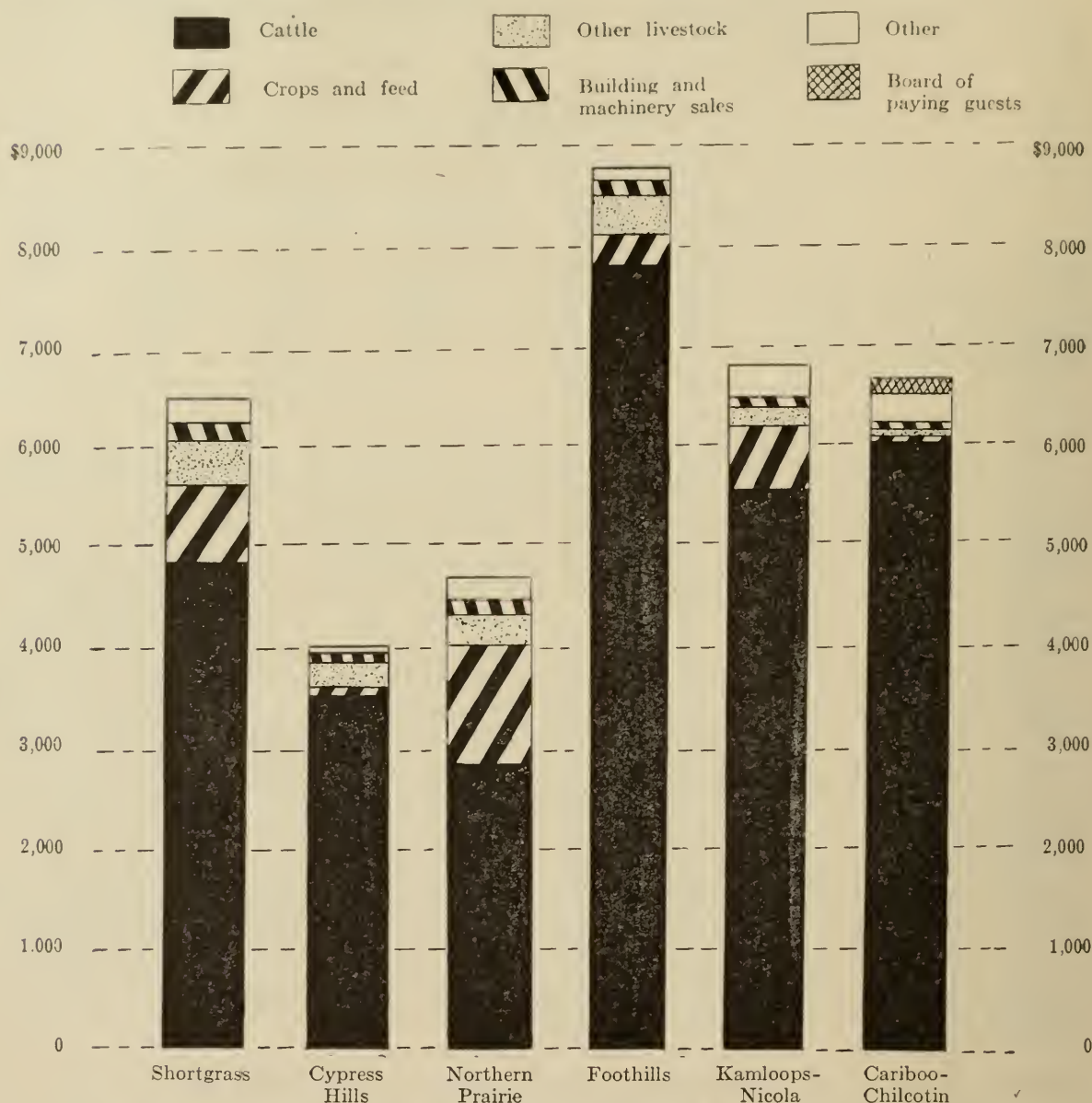


Fig. 4.—Average Receipts per Ranch by Zones, 1938-41.

In all zones some revenue was obtained from the sale of machinery and equipment, including the "trade-in" value of equipment turned in on purchases. Sales of ranch produce, including butter, cream and eggs, were higher in British Columbia zones than elsewhere. Receipts from custom work were comparatively high in the more diversified Northern Prairie Zone. Ranches in the Cariboo-Chilcotin recorded significant receipts from board of paying guests or "dudes".

Over the three years of the study, the trend was toward substantially higher receipts (Figure 5).<sup>1</sup> The largest increases were recorded between 1938-39 and 1939-40, and the trend was most pronounced in the Shortgrass, Cypress Hills and Foothills Zones. The only decrease recorded was in the Northern Prairie Zone where total receipts were 2 per cent lower in 1940-41 than in 1939-40. The upward trend in total receipts was largely the result of changes in receipts from

<sup>1</sup> See Appendix III, Table 4.



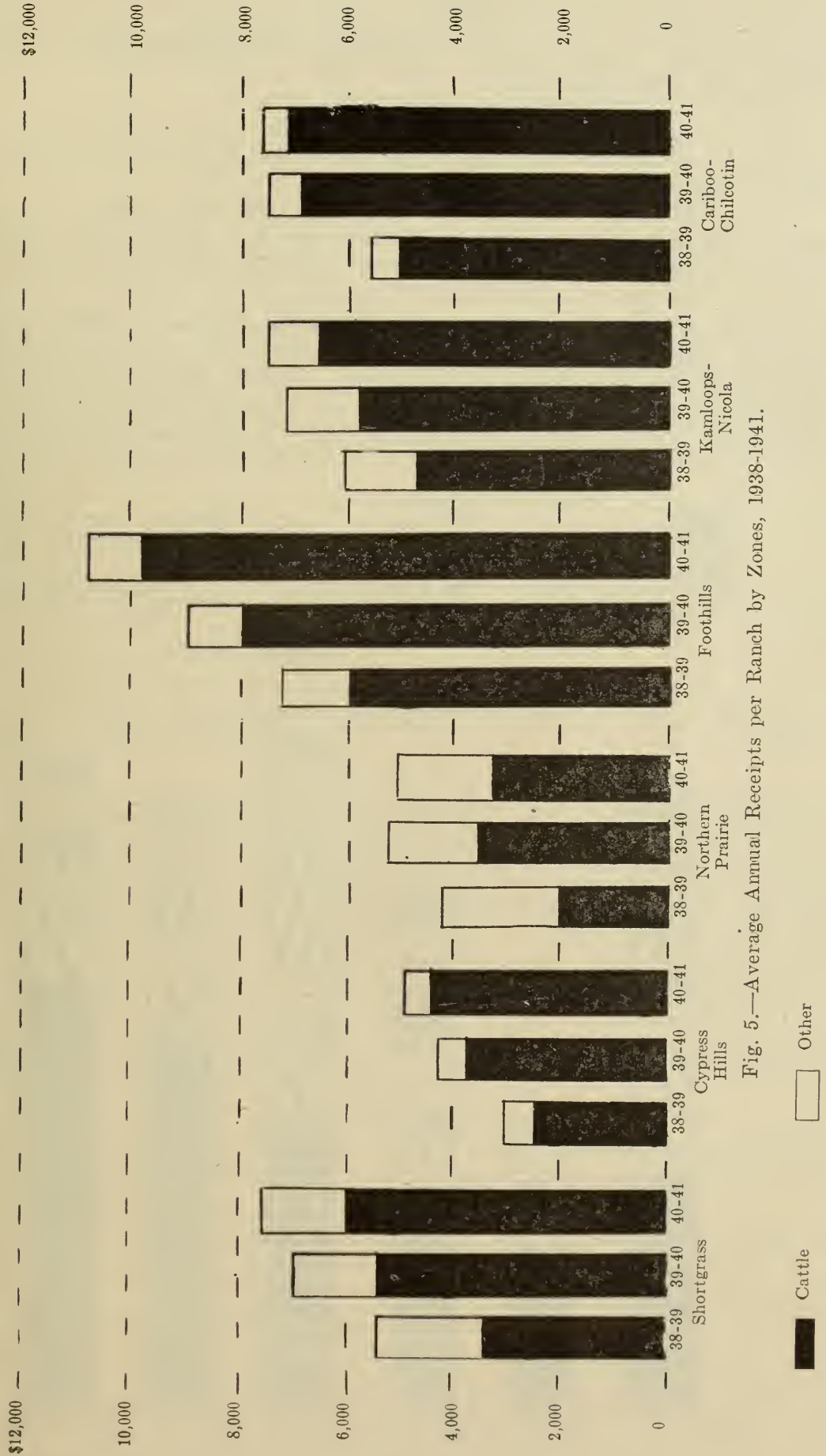


Fig. 5.—Average Annual Receipts per Ranch by Zones, 1938-1941.

cattle; and again the only decrease in cattle receipts recorded was in the Northern Prairie Zone in 1940-41. Generally receipts from crops and feed tended to decrease over the years, the result of increased production for feed and the restoration of feed reserves. The Northern Prairie Zone was once more an exception to the general rule.

**Ranch Expenses.**—Over the three years of the study average annual operating expenses ranged from \$1,697 per ranch in the Cypress Hills to \$3,929 in the Foothills (Figure 6).<sup>2</sup>

The main items of expense were labour, land, feed charges, equipment and repairs, harvesting expenses, and miscellaneous expenses. Labour was the largest single item of expense in all zones, labour expense varying from 37 to 41 per cent in the zones in Alberta and Saskatchewan to 61 per cent and 65 per cent in the British Columbia zones. Average labour expenses of \$645 per ranch were comparatively low in the Cypress Hills, a factor which was associated with the low total operating expenses in this zone. On the other hand, average labour expenses were well over \$2,000 per ranch per year in the British Columbia zones. Land charges per year varied from 11 per cent of total operating expenses in the Cariboo-Chilcotin zone to 20 per cent in the Shortgrass and Cypress Hills. In

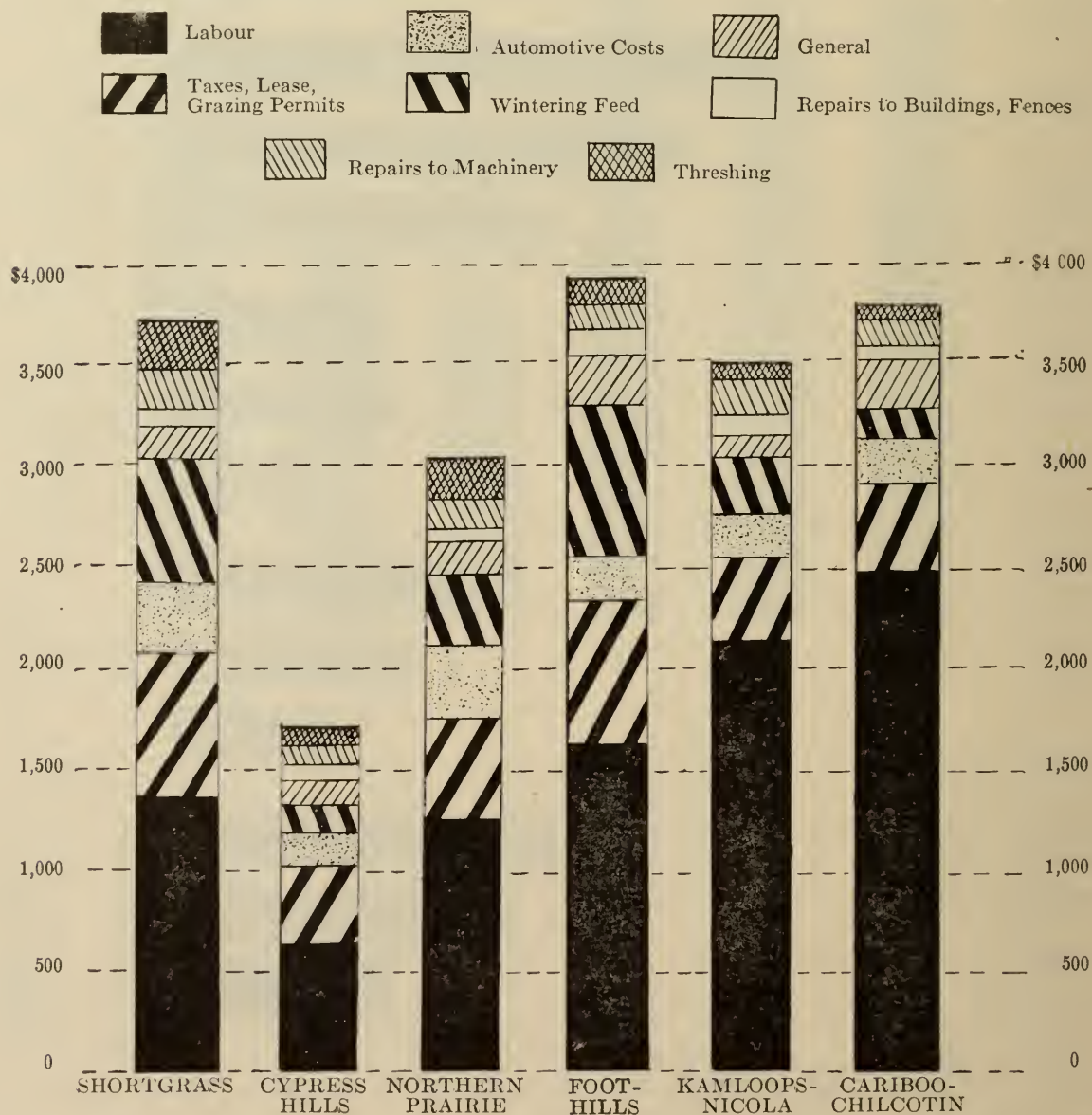


Fig. 6.—Average Operating Expenses per Ranch by Zones, 1938-41.

<sup>2</sup> See Appendix III, Table 5.



the Shortgrass and Foothills land charges per ranch amounted to over \$700 per year. In the Foothills zone wintering and feed expenses exceeded land charges amounting to 19 per cent of the total operating expense. The proportion of these in the Shortgrass was nearly as high (17 per cent) but Cariboo-Chilcotin ranches spent a very large sum on these items. Average expenses for equipment and repairs were high in the more diversified Shortgrass and Northern Prairie Zones. In the Cypress Hills equipment and repair expenses per ranch were low, but represented a relatively high proportion (22 per cent) of total operating expenses. Harvesting expenses per ranch were high in the Shortgrass, Northern Prairie and Foothills, with the highest proportion of total operating expenses (7 per cent) being in the Northern Prairie Zone. General and miscellaneous expenses ranged from 5 to 7 per cent of total operating expenses in the different zones.

*Labour Expenses.*—Total labour expenses include contract labour, usually employed in putting up hay; paid labour and board of paid labour; unpaid family labour (excluding the labour of the operator) and board of unpaid labour. The payments for contract labour and paid labour are a matter of record; the other items must be estimated. Family labour was charged at the rates for comparable hired labour.

Paid labour was the largest item of labour expense in all zones, ranging from \$334 per ranch per year in the Cypress Hills to over \$1,400 in each of the British Columbia zones. Contract labour was highest in the Foothills and Cariboo-Chilcotin Zones, indicating the extensive adoption in these zones of the practice of employing contract labour for haying. Unpaid family labour showed relatively little variation between zones, ranging from \$177 per ranch in the Cypress Hills to \$251 in the Foothills.

The tendency for labour expenses to increase, especially in 1940-41, was particularly noticeable in the case of paid labour and was the result of increases in wages paid to ranch employees.

*Land Expenses.*—The items entering into total land expenses include taxes on deeded land, that is all taxes levied by the province or by the municipality; rentals for grazing leases, including in this case both tax and rental charges; rents for rented cropland, paid either in cash or as a share of the crop, water rent for irrigated land; and grazing permits and the expenses of summering stock off the ranch. Differences in land tenure, and in ranch organization and practices, made for differences in land expenses in the different zones. Thus the main item of land expenses in the Shortgrass Zone was lease rentals. In other zones taxes on deeded land was the largest item. Rent for cropland was relatively large in the Northern Prairie; and grazing permits and summering in the Foothills and Cariboo-Chilcotin.

Fairly substantial increases in land charges over the three years were noted for the Shortgrass and Kamloops-Nicola zones. In the former case this increase mainly resulted from increased lease rentals following the resumption of the regular rates in Saskatchewan.

Taxes on deeded land and lease rentals represent about 10 per cent of operating expenses, and a still smaller percentage of total expenses when interest, depreciation, and a charge for operator's labour and management are added. Generally speaking such changes as have occurred in taxes and lease rentals, over a period of years, have not materially affected ranch incomes; and it does not seem probable that changes which might be expected would have any appreciable affect on long-run ranch incomes. Tax and lease rates on individual ranches, as well as between parcels of land in the same ranch, are in greater need of revision than over-all blanket rates for areas or provinces.

It has become increasingly recognized that the charge in taxes and rentals should conform to the productive capacity of the land. Reference has been made earlier to the long-run physical productivity of lands in the different zones and to the marked annual variations which may occur. It is necessary to emphasize also that striking differences in the level of productivity do occur within zones, and even among the land parcels incorporated into particular ranch units.

In 1940-41, average taxes per acre of deeded land varied from less than 7 cents per acre in Cariboo-Chilcotin to slightly less than 14 cents an acre in the Northern Prairie. Average lease rentals for government leases were about 2 cents an acre in the Shortgrass and Kamloops-Nicola, 3 cents in the Cypress Hills and Northern Prairie, 4 cents in the Foothills, and 8 cents in the Cariboo-Chilcotin. Average lease rentals on land other than government lease land (Hudson's Bay Railways and others) are hardly significant but tend to support the relations between zones indicated in the case of provincial leases. Rents paid for cropland in the Foothills were higher than in the Shortgrass and Northern Prairie (Table 26).

TABLE 26.—AVERAGE RENTALS AND TAXES PER ACRE BY TENURE OF LAND, BY ZONES, 1940-41

—	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Provincial Lease.....	0.021	0.031	0.033	0.040	0.021	0.078
Indian Reserve.....	0.062			0.063	0.071	0.042
School Land.....	0.040	0.036	0.034	0.045		
Hudson's Bay.....	0.054	0.182	0.077	0.136		
Railroad.....	0.074		0.086	0.091		
National Forest.....		0.061		0.027		
Private.....	0.056		0.102	0.202	0.076	0.450
Rented.....	0.492		0.504	2.000		
Deeded.....	0.089	0.074	0.137	0.994	0.116	0.068
All Land.....	0.042	0.045	0.125	0.078	0.052	0.073

The average monthly charge for non-ranch summer grazing was highest in the Shortgrass Zone, but declined over the three-year period from 19 to 16 cents (Table 27). The costs in the Foothills remained relatively constant at 14 to 15 cents, but in the Cypress Hills they declined from 16 to 12 cents. In these three zones, these costs included all of the expenses involved in running the cattle during the summer, such as salt, fencing, and labour.

TABLE 27.—AVERAGE COST PER FEED MONTH OF NON-RANCH SUMMER GRAZING, PER RANCH AND PER ACRE, BY YEARS AND BY ZONES

	Shortgrass		Cypress Hills		Northern Prairie		Foothills		Kamloops-Nicola		Cariboo-Chilcotin	
	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre	Average per Ranch	Average per Acre
	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
1938-39,.....	60	0.19	78	0.16	3	0.01	147	0.14	50	0.04	106	0.04
1939-40,.....	46	0.16	54	0.11			155	0.15	66	0.05	101	0.05
1940-41,.....	51	0.16	79	0.12			137	0.14	68	0.07	117	0.05

Grazing permit costs in the Kamloops-Nicola increased from 4 cents to 7 cents per month, but were fairly constant in the Cariboo-Chilcotin, at 4 to 5 cents. Deviation in costs within these two zones, is explained by the variation in the number of cattle run for different periods during the summer. Thus,



while a fixed charge is made for the summer period, some cattle may be taken off before the period is ended, and by reducing the number of feed months thereby, the cost per month is increased. The minimum charge was 5 cents per head per month, but rebates and allowances were made when cattle were running on Crown ranges adjoining ranch lands, with no fence between them. When this occurred, cattle would often drift down on ranch lands. This was termed "on and off" grazing, and rebates were made in compensation for the time cattle were not on Crown ranges. Thus the net charge might be 4 cents or less per month. In these two zones, the cost covers the provincial department's expenses only; expenses for salt and labour are additional charges.

*Wintering and Feed Expenses.*—The items under this heading include such things as the purchase of cover crops, stubble grazing, hay and grain, miscellaneous concentrate and mineral feeds, or contract feeding. Details on these costs were not segregated but substantial increases of the total occurred during the period except in the British Columbia zones. Naturally these changes in the expense incurred from these items were not uniform as crop and winter conditions varied from year to year.

*Equipment and Repair Expenses.*—Equipment and repair expenses include repairs to buildings and fences, repairs to general machinery, expenses of tractor operation, and expenses of operating trucks and automobiles.

Over the three years, average expenses for repairs to buildings and fences per ranch per year were over \$150 in the Shortgrass and Foothills. Repairs to general equipment were relatively high in the Shortgrass (\$178) and the Northern Prairie (\$179); and the same two zones had relatively high tractor expenses (\$130 and \$183 respectively). Truck and auto expenses were highest in the Shortgrass (\$214) and the Cariboo-Chilcotin (\$206).

The upkeep and operation of buildings, fences, general and automotive equipment was highest in the Shortgrass and Northern Prairie, the two more diversified zones—and was associated with higher tractor costs and machinery repairs.

The general tendency during the period of the study was for tractor, truck and automobile expenses per ranch to increase. In the case of repairs to buildings and fences and to machinery, the general tendency was a decrease in expenses in 1939-40 and an increase in 1940-41.

*Threshing and Binder Twine Expenses.*—These harvesting expenses were relatively high in the more diversified Shortgrass and Northern Prairie Zones. The general tendency was for harvesting expenses to decrease over the three years, although some increase occurred in 1940-41 in the Northern Prairie and Foothills Zones. Decreasing expenses for harvesting were an indication of some shifting from the less profitable crop production to the more profitable cattle production.

*General and Miscellaneous Expenses.*—As already noted, these expenses represented roughly the same proportion of total operating expenses in all zones. The general tendency over the three years was for general expenses to decrease in 1939-40, followed by an increase in some zones in 1940-41.

### Financial Summary

Cash receipts per ranch, which have been discussed in an earlier section, were augmented over the period of the study by a substantial increase in ranch inventories in all zones. As already pointed out in the section dealing with ranch capital this increase in assets was the result mainly of increases in numbers of cattle and in the value of marketable stock on ranches in March, 1941. Table

28 indicates the extent of the increase in inventories. Over the three years the increase in ranch inventories in the Shortgrass Zone averaged over \$2,400 per year. Substantial increases were also recorded in the Foothills and Cariboo-Chilcotin Zones. The increase in the Northern Prairie Zone was relatively small.

Increases in inventories result in part from capital expenditures which are in addition to the operating expenses already discussed. Depreciation charges are allowed in calculating inventory values. Table 28 indicates substantial capital expenditures in all zones, averaging as high as \$2,091 per ranch per year in the Foothills. However, in all zones but the Northern Prairie inventory increases exceeded capital expenditures. The excess of capital expenditures over inventory increases in the Northern Prairie reflects relatively unsatisfactory conditions in this zone.

TABLE 28.—FINANCIAL SUMMARY PER RANCH, BY ZONES, 1938-41

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cash Receipts.....	6,559	4,118	4,938	8,970	6,951	6,867
Inventory Increase.....	2,416	1,257	564	2,338	1,486	2,335
Total Receipts.....	8,975	5,375	5,502	11,308	8,437	9,202
Operating Expenses.....	3,690	1,697	3,008	3,929	3,453	3,785
Capital Expenditures.....	1,625	776	1,102	2,091	1,333	1,857
Total Expenses.....	5,315	2,473	4,110	6,020	4,786	5,642
Ranch Income.....	3,660	2,902	1,392	5,288	3,651	3,560
Operator's Labour.....	906	784	564	855	838	876
Return to Capital.....	2,754	2,118	828	4,433	2,813	2,684
Average Capital.....	34,182	27,542	21,807	51,084	36,523	38,643
Per Cent Return to Capital.....	8.1	7.7	3.8	8.7	7.7	6.9
Interest on Capital (5 per cent).....	1,709	1,377	1,090	2,554	1,826	1,932
Operator's Labour Income.....	1,951	1,525	302	2,734	1,825	1,628
Ranch Perquisites.....	468	512	414	554	658	731

**Ranch Income.**—Ranch income is the difference between total receipts, including both cash receipts and inventory increases, and total expenses, including both operating expenses and capital expenditures. It represents the return to the rancher for his labour and management, and for the ranch capital. Table 28 shows the average ranch income per year in each of the zones.

It is obvious that because of the marked difference in size of ranch, measured in terms of capital, ranch income does not provide a satisfactory measure for comparing the returns to ranchers in, for example, the Foothills and Northern Prairie Zones. A more useful comparison can be made by considering either the rate of return to capital or the return to operator's labour and management; and because of the large capital investment in ranches it may be more useful to make a deduction for operator's labour and management from ranch income, and to compare the rate of return to capital represented by the remainder.

The value of operator's labour shown in Table 28 is based upon values placed on their labour and management by ranch operators. In securing this estimate the same principle was employed as was adopted in getting values for unpaid family labour. Ranchers were asked to value their labour and management on the basis of what they would have to pay a manager to supervise operations on their ranch. It will be seen from Table 28 that the average



estimates are not greatly different for the various zones, with the exception of the Northern Prairie where the value of operator's labour is significantly lower than in the other zones.

**Per Cent Return to Capital.**—The average annual return to capital (Table 28) was obtained by deducting the value of operator's labour from ranch income; and the return to capital expressed as a percentage of average capital indicates the annual rate of return to capital over the period of the study. On this basis and excepting the Northern Prairie Zone the per cent return to capital ranged from 6.9 per cent in the Cariboo-Chilcotin Zone to 8.7 per cent in the Foothills. Returns in the Northern Prairie Zone were much less satisfactory.

In interpreting the returns to ranches over the period of the study consideration must be given, first, to the climatic and price conditions in the three years, and second, to the value of operator's labour assumed in arriving at the return to capital. Physical and price factors were on the whole favourable during the period; and ranch operators were in 1938 emerging from a succession of years in which, it is safe to assume, drouth and low prices resulted in much lower returns, if any, to capital employed in ranch production.

The trend over the three years of the study was toward a substantial increase in returns in all zones (Tables 29, 30 and 31). In 1938-39 average ranch income exceeded the value of operator's labour in four of the six zones. These four zones showed a positive return to capital ranging from 2.7 per cent in the Shortgrass and Cypress Hills to 4.6 per cent in the Foothills. In the Northern Prairie and in the Cariboo-Chilcotin ranch income was less than the estimated value of operator's labour. The relatively low returns in the Cariboo-Chilcotin were in part the result of the failure of closing inventories in this zone to reflect the increase in cattle prices which resulted in inventory increase in the other zones.

In 1939-40 returns were substantially higher than in the previous year. Ranch income exceeded the estimated value of operator's labour and management in all zones, and the return to capital ranged from 2.3 per cent in the Northern Prairie to 11.7 per cent in the Cariboo-Chilcotin. The high returns in the latter zone were due to an unusually large increase in inventories. This

TABLE 29.—FINANCIAL SUMMARY PER RANCH, BY ZONES, 1938-39<sup>1</sup>

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
Cash Receipts.....	\$ 5,097	\$ 2,945	\$ 4,244	\$ 7,150	\$ 6,165	\$ 5,523
Inventory Increase.....	2,135	1,218	550	1,954	824	668
Total Receipts.....	7,232	4,163	4,794	9,104	6,989	6,191
Operating Expenses.....	3,623	1,763	3,109	3,797	3,402	3,914
Capital Expenditures.....	1,396	734	844	1,855	932	1,346
Inventory Decrease.....	464	215	331	430	461	980
Total Expenses.....	5,483	2,712	4,284	6,082	4,795	6,240
Ranch Income.....	1,749	1,451	510	3,022	2,194	—49
Operator's Labour.....	904	735	549	816	773	840
Return to Capital.....	846	716	—39	2,208	1,421	—889
Average Capital.....	31,392	26,159	21,071	48,340	34,476	34,984
Per Cent Return to Capital.....	2.7	2.7	.....	4.6	4.1	.....
Interest on Capital (5 per cent).....	1,570	1,308	1,054	2,422	1,724	1,749
Operator's Labour Income.....	179	143	—544	600	470	—1,798
Ranch Perquisites.....	491	541	449	563	728	745

<sup>1</sup>For a statement of labour earnings see Appendix, Table—

TABLE 30.—FINANCIAL SUMMARY PER RANCH, BY ZONES, 1939-40

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cash Receipts.....	6,956	4,272	5,331	8,920	7,167	7,459
Inventory Increase.....	2,410	494	531	2,658	1,461	4,197
Total Receipts.....	9,366	4,766	5,862	11,578	8,628	11,656
Operating Expenses.....	3,647	1,607	2,841	3,841	3,487	3,615
Capital Expenditures.....	1,739	588	999	2,457	1,786	2,078
Inventory Decrease.....	527	589	998	311	130	876
Total Expenses.....	5,913	2,784	4,838	6,609	5,403	6,569
Ranch Income.....	3,453	1,982	1,024	4,969	3,225	5,087
Operator's Labour.....	902	735	549	834	834	841
Return to Capital.....	2,551	1,247	475	4,135	2,391	4,246
Average Capital.....	33,216	26,462	21,008	50,109	35,422	36,304
Per Cent Return to Capital.....	7.7	4.7	2.3	8.2	6.8	11.7
Interest on Capital (5 per cent).....	1,661	1,323	1,050	2,505	1,771	1,815
Operator's Labour Income.....	1,792	659	-26	2,464	1,454	3,272
Ranch Perquisites.....	447	468	393	544	599	740

increase compensated for the failure of inventory values to increase in the previous year; and part of the returns during 1939-40 could properly be attributed to 1938-39. This already has been touched on in the section dealing with cattle values.

The year 1940-41 recorded still further increases in returns. The return to capital ranged from 8.8 per cent in the Northern Prairie to 16.2 per cent in the Cypress Hills.

**Labour Income.**—In the previous section, ranch income has been divided between management and capital using an estimated value of the former and crediting the balance to capital. It is equally valid to assign a rate of return to capital and credit the balance of the ranch income to the operator for his labour and management. For this purpose the rate of the return to capital, assumed as competitive, was 5 per cent and the resulting operator's

TABLE 31.—FINANCIAL SUMMARY PER RANCH, BY ZONES, 1940-41

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cash Receipts.....	7,625	5,138	5,240	10,842	7,522	7,619
Inventory Increase.....	3,752	3,020	1,862	3,510	2,714	4,122
Total Receipts.....	11,377	8,158	7,102	14,352	10,236	11,741
Operating Expenses.....	3,799	1,721	3,077	4,147	3,470	3,827
Capital Expenditures.....	1,741	1,006	1,462	1,960	1,282	2,148
Inventory Decrease.....	171	25	64	262	129	60
Total Expenses.....	5,711	2,752	4,603	6,369	4,881	6,035
Ranch Income.....	5,666	5,406	2,499	7,983	5,355	5,706
Operator's Labour.....	913	883	594	915	908	948
Return to Capital.....	4,753	4,523	1,905	7,068	4,447	4,758
Average Capital.....	36,016	27,930	21,754	52,966	37,459	40,115
Per Cent Return to Capital.....	13.2	16.2	8.8	13.3	11.8	11.8
Interest on Capital (5 per cent).....	1,801	1,397	1,088	2,648	1,873	2,006
Operator's Labour Income.....	3,865	4,009	1,411	5,335	3,482	3,700
Ranch Perquisites.....	465	527	399	556	646	708



labour incomes are shown in Table 28. With the exception of the Northern Prairie Zone the average return to operator's labour and management ranged from \$1,525 in the Cypress Hills to \$2,734 in the Foothills.

In the first year of the survey two zones, the Northern Prairie and the Cariboo-Chilcotin, had negative labour incomes on the average while positive returns ranged from \$143 in the Cypress to \$600 in the Foothills. This further illustrates the depressed condition of the industry during that year.

In 1939-40 conditions had improved materially and the only area where a negative return occurred was in the Northern Prairie. The returns in the Cariboo-Chilcotin were unduly enhanced by the local market situation already commented on but except for this zone the Foothills again led with an average return to operator's labour and management of \$2,464.

In the final year of the study all zones recorded positive operator's labour incomes which ranged on the average, from \$1,411 in the Northern Prairie to \$5,335 in the Foothills. A very considerable advance occurred in Cypress Hills zone in this year putting it in second position with a \$4,009 return to the operator for his labour and management.

**Ranch Perquisites.**—In addition to cash receipts and the receipts represented by inventory increases, additional income is furnished from ranch produce used in the home. Further, as the value of the ranch dwelling house is included in the ranch capital some credit should be given for the use of the house. The value of these perquisites is not included in ranch income, return to capital, or operator's labour income.

In arriving at the total value of perquisites, produce consumed on the ranch, for example, eggs, milk, butter, beef, was valued at prices which could be obtained locally for these products. The credit for the use of the house was arrived at by taking 10 per cent of the value of the ranch dwelling. The value of perquisites is shown in Table 28. The average value per ranch for the three years ranged from \$414 in the Northern Prairie to \$731 in the Cariboo-Chilcotin. The higher values in the British Columbia zones reflect higher local prices for produce.

While perquisites represent a real addition to ranch returns it must be pointed out that their effect on earnings cannot be measured by a simple addition to ranch income. A substantial part of the ranch produce is consumed by ranch labour, both hired and family; and part of the use of the house may also properly be charged against labour. However this portion of the ranch labour cost is not included in operating expenses in the determination of ranch income.

### Summary of the Ranch Business, 1938 to 1941

**Average Conditions Over the Three Years.**—Differences in ranch organization and the ranch business between zones is so substantial that general averages appear to have little significance. Consequently in describing the main features of the ranch business during 1938 to 1941, it is necessary in most cases to refer to the range between zones.

Total ranch capital varied from \$22,000 in the Northern Prairie to \$51,000 in the Foothills. In general, the value of cattle represented from 40 to 45 per cent of total capital; other livestock 4 to 12 per cent; land 20 to 36 per cent; buildings and improvements 8 to 15 per cent; machinery 5 to 1 per cent; and fences, 5 per cent. Numbers of cattle per ranch ranged from 174 head (Northern Prairie) to 510 head (Foothills). In general, cows represented about 51 per cent of all cattle; yearlings, 27 per cent; two-year olds, 13 per cent; three-year olds and over, 7 per cent. The number of cows per bull was around 30. Total land area per ranch varied from 3,954 acres (Northern Prairie) to 15,994 acres (Shortgrass); but in some zones substantial additional grazing was available

outside the ranch. The proportion of "deeded" land in ranches ranged from 10 per cent (Shortgrass) to 68 per cent (Cariboo-Chilcotin). Provincial leases constituted the largest proportion of lands leased or rented. The proportion of total feed months secured from non-ranch sources varied from 10 per cent (Shortgrass) to 36 per cent (Cariboo-Chilcotin). The per acre value of "deeded" range land was as low as \$1.50 in the Northern Prairie, and as high as \$4.78 in the Foothills. Machinery values per ranch varied from \$1,856 (Northern Prairie) to \$2,951 (Shortgrass); and buildings and improvements values from \$3,103 (Cariboo-Chilcotin) to \$5,121 (Foothills).

Average annual receipts per ranch were \$4,118 in the Cypress Hills and \$8,970 in the Foothills. In all zones receipts from cattle represented more than 80 per cent of all receipts. Sales from other livestock and from crops were generally small. The numbers of cattle sold per year ranged from 69 head (Northern Prairie) to 141 head (Foothills). The composition of cattle sales varied considerably between zones.

Average annual operating expenses were \$1,697 in the Cypress Hills and \$3,929 in the Foothills. Labour was the principal item, total labour expenses accounting for from 37 to 65 per cent of all expenses. Wages of paid labour varied from \$334 per ranch (Cypress Hills) to \$1,492 per ranch (Kamloops-Nicola). Land charges represented from 19 to 36 per cent of all expenses. The constituent items of land expense varied between zones depending upon ranch organization and tenure conditions. Lease rentals were about 2 cents an acre in the Shortgrass and Kamloops-Nicola, 3 cents in the Cypress Hills and Northern Prairie, 4 cents in the Foothills, and 8 cents in the Cariboo-Chilcotin. Costs for summer grazing off the ranch were about 17 to 18 cents per head per month in the Shortgrass; 14 to 15 cents in the Foothills; and 14 cents in the Cypress Hills. In these zones charges include all expenses. Summer grazing costs to ranchers in the Kamloops-Nicola were around 4 to 7 cents; and in the Cariboo-Chilcotin, 4 to 5 cents per acre. Equipment and repair expenses varied from \$373 per ranch (Cypress Hills) to 629 (Shortgrass); threshing and binder twine expenses from \$50 (Cariboo-Chilcotin) to \$215 (Northern Prairie); and general and miscellaneous expenses from \$121 (Cypress Hills) to \$230 (Foothills).

The average increase in inventory values over the three years was \$564 in the Northern Prairie and \$2,416 in the Shortgrass; and average annual capital expenditures ranged from \$776 (Cypress Hills) to \$2,091 (Foothills). Ranch income per year was as high as \$5,288 (Foothills) and as low as \$1,392 (Northern Prairie). Excluding the Northern Prairie, the range in per cent return to capital was from 6.9 per cent (Cariboo-Chilcotin) to 8.7 per cent (Foothills); and the range of operator's labour income from \$1,525 (Cypress Hills) to \$2,734 (Foothills). The returns to ranchers in the Northern Prairie were out of line with those in other zones, their average return to capital being 3.8 per cent and the average operator's labour income \$302. This condition in the Northern Prairie reflects the combination of relatively small ranch units and greater dependence on crop production. Outside of this zone, returns over the three-year period were more than satisfactory, but must be interpreted in the light of the period of drouth and low prices preceding the survey.

Over the three years under review, the trends were generally toward higher receipts, particularly from cattle, and higher ranch returns. There was a general increase in the value of ranch assets. The substantial increase in cattle values reflected both increased numbers and rising prices for marketable stock. Increases in inventories of feed and supplies were considerable and indicated a building up of feed reserves. Buildings, machinery, improvements and fences tended to depreciate over the period. While receipts from sales of cattle increased materially, receipts from crops and feed tended to decrease as a result of a



shift from crop production, increased feed consumption on ranches, and the building up of feed stocks. Over the three years operating expenses were much more stable than were receipts; and any tendency to an increase in expenses was more apparent in 1941 than in 1940. The items tending to increase were labour (particularly wages of hired labour) and land charges (the result mainly of some increase in buildings). There was some tendency for tractor, truck and automobile expenses to increase; but harvesting expenses tended to decline.

Buoyant receipts and relatively stable expenses made for substantial increases between years in ranch income. In 1938-39, only four zones showed positive returns to capital, and the highest rate of return was 4.6 per cent (Foothills). In 1939-40 the return to capital ranged from 2.3 per cent (Northern Prairie) to 11.7 per cent (Cariboo-Chilcotin) where the return in this year was affected by delayed response in inventory values to rising prices; and in 1940-41, the range was from 8.8 per cent (Northern Prairie) to 16.2 per cent (Cypress Hills). Operator's labour income reflected the same trend.

### PART III

#### FACTORS AFFECTING RANCH INCOME

The records of individual ranch businesses disclosed marked differences in their returns. Some ranches showed consistently high returns and others were consistently low. Some ranches varied considerably in position from year to year, recording relatively high returns in one year and relatively low returns in another. These differences were the result of many different causal factors.

There are three types of factors which may affect the returns to individual ranches. First, differences in returns may be due to the unequal incidence of uncontrollable factors. One ranch may suffer heavy stock losses as a result of a localized storm, while others are unaffected. Second, differences in returns may be due to factors beyond the control of individual ranchers and these may affect some ranches more than others. For example, price cannot be controlled by the individual rancher and changes in price are not wholly predictable. Some ranches may be so located as to be able to profit from a price increase more than others do. Third, variation in returns may be due to differences in the organization and operation of ranches. These are the factors which are susceptible in greater or less measure to control by the cattleman. Admittedly, adjustments to secure more effective and profitable organization of the business are not easily made. Some of the inefficiency of a ranch organization may be the result of earlier decisions and conditions which have created difficult management problems. However, it is within the field of organization and ranch management in its broadest sense that the stockman can influence the returns to his ranch business.

In this study an attempt has been made to measure the relation between ranch returns and several features of organization and management. The method of analysis employed is described in detail in Appendix V. It is felt that the relationships established are significant, and may suggest to ranchers changes in the organization and management of their ranches which would enable them to increase their returns.

The several factors discussed are size of ranch, degree of specialization, calf crop, labour efficiency, capital per ranch unit, and feeding practices. In the analysis of the effect of size of ranch, all 218 ranches were used. The relation described between size and ranch income indicates the combined effect on income of size and of other factors as these are associated with size. On the other hand, in the analysis of the effects of other factors only ranches of less than 600 ranch units were used, thus minimizing the effect of size as a factor. Further, in the discussion of other factors, the relation indicated is, in each case, the estimated net effect on income of the particular factor concerned. This means that a change in the particular factor would bring about the estimated increase in ranch income only if other factors remained unchanged. For example, it appears that, under the price conditions prevailing during the period of the study, ranch income tended to increase with greater specialization in the cattle enterprise, and also that ranch income was directly related to calf crop. The implication is that a rancher operating a diversified outfit could increase his returns by specializing more in cattle; but this result would follow only if, at the same time, the calf crop was not reduced.

In the discussion of degree of specialization, calf crop, labour efficiency, capital per ranch unit, and feeding practices, reference is made first to observed relations between the factors themselves, and, second, to the relation between the particular factor and ranch income.



In the determination of "ranch income" for the purpose of this part of the report, all cattle values were held constant within each year. In a period of rising prices the incomes of all ranches are affected by increases in inventory valuations. By holding inventory values constant part of the effect of rising prices is eliminated, and the remaining differences in ranch incomes are more directly due to differences in ranch organization and operation.

### Measurement of Factors Affecting Ranch Income

Size of ranch is measured in "ranch units". A ranch unit is equivalent to one head of cattle, one horse, five sheep, five hogs, or one and one-half acres of saleable crop.<sup>1</sup> The number of ranch units on each ranch was obtained from the average of the opening and closing inventories. With diversification of enterprises on many ranches, ranch units provide a more satisfactory measure of the size of ranch business than is provided by the number of cattle. While in farm studies and some local ranch surveys the size of business has been measured in terms of the land area of the unit, this was not feasible in this case because of the tremendous variation of soil and climatic conditions encountered over the vast area surveyed.

Degree of specialization is measured by the relation of cattle units to total ranch units. Thus, where cattle units represent 90 per cent of total ranch units there is a higher degree of specialization in cattle production than where the corresponding figure is only 50 per cent.

Calf crop is measured by expressing the number of calves tallied at branding time as a percentage of the number of cows and two-year-old heifers in the spring turn-out. This means that all cows and yearling heifers in the previous summer were considered as potential breeders.

Labour efficiency is measured by the number of ranch units per man equivalent. A man equivalent is twelve months of labour per man. No record of time was available where work was contracted out; and so, for the analysis of labour efficiency, those ranches using contract labour were eliminated.

Capital per ranch unit is obtained by dividing the average of the opening and closing total inventory values by the number of ranch units.

The use of winter feed, and the expense involved, has always been a problem to cattlemen. Feeding practice is measured by the amount of "feed used per animal unit". The basis for determining animal units is indicated in the earlier reference to ranch units.

### Size of Ranch

In considering the relation between size of ranch and ranch returns, two questions arise. First, what is the minimum size of ranch necessary to provide a reasonable living for the operator and his family? Second, what is the size of ranch which will give the largest net income per ranch unit?

**The Minimum Size of Ranch.**—Ranch income less interest on ranch indebtedness represents "income available for living". In arriving at "income available for living", interest at  $6\frac{1}{2}$  per cent on average ranch indebtedness was deducted from ranch income. This rate of interest was used because much of the indebtedness represents overdrafts on which interest varies from 6 to 7 per cent.

The size of ranch at which "income available for living" is equal to actual family living expenditure is the minimum size which could provide continuously for the current scale of living, under conditions similar to those prevailing at the time.

<sup>1</sup> In the case of hogs, ten hogs sold or eaten were also considered to be equivalent to one ranch unit. For a more detailed description see Appendix IV.

It is apparent from Figure 7, that prices have a marked effect on the minimum size of ranch. In the first year of the study, income for living did not meet actual living expenditure until the size of ranch was about 725 units. However, in the second year, 195 units provided sufficient income; and 130 units in the final year. It has been pointed out that while price and production conditions were below normal in the first year, the middle year appeared to approximate long-run conditions more closely, being, if anything, slightly better than normal. Consequently, on a long-run basis, it would appear that the minimum size of ranch which could be expected to provide a reasonable living to the operator and his family, would be one of between 200 and 300 ranch units.

A typical example of this family ranch would be one which had about 175 head of cattle, 25 horses, 5 sheep or hogs and 50 acres of cash crops about half of which would be raised on rented land. About two sections of land would be owned and sufficient pasture would be held by lease or grazing permit to

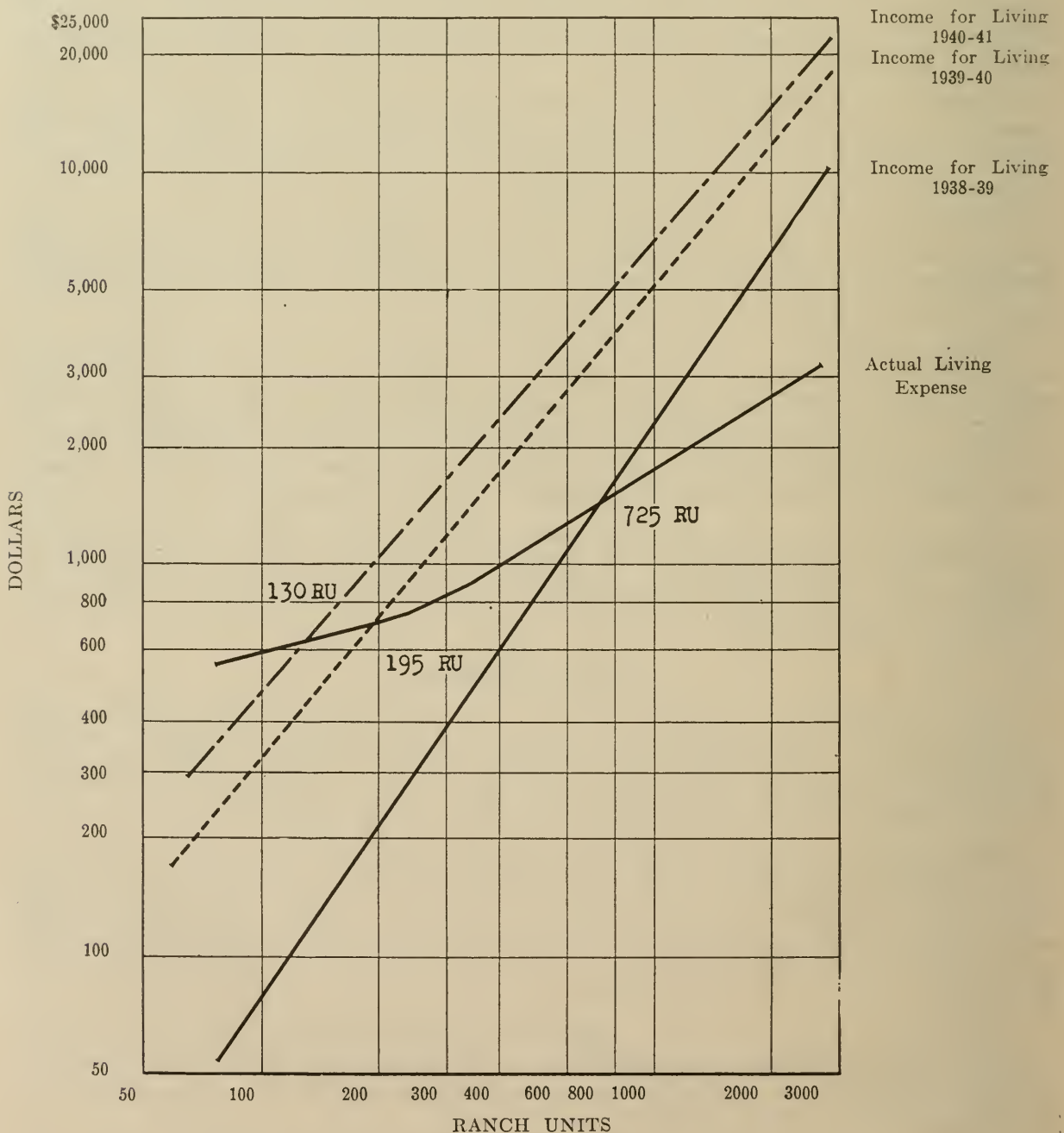


Fig. 7.—Graphic Presentation of the Minimum Size of Ranch.



carry the livestock. Total capital would amount to about \$19,000 with about \$6,500 in cattle, \$4,000 in land, \$3,000 in buildings, \$2,000 in machinery, \$1,000 in fences and the remainder in other livestock, feed and supplies and operating capital. In addition to the operator's own labour the equivalent of about 15 man months of hired labour would be required.

**Size of Ranch and Ranch Income.**—Size of ranch would not affect income per ranch unit if all factors remained constant. Increased size of ranch does make possible the attainment of greater efficiency in some factors. On the other hand, it is possible for the small operator to obtain a higher degree of efficiency in some other factors.

**Interrelation Between Size and Other Factors.**—The data in Table 32 indicate the following relations between size and certain other factors.

Increased size of ranch is associated with increased specialization. Large areas of grass land are required to run large numbers of cattle. Large areas of grass are found only where the land is submarginal for crop production. Consequently, there is a limited amount of crop land on large ranches.

Increased size of ranch tends to be associated with a decrease in calf crop. The operator with the smaller breeding herd can watch the breeding efficiency of his cows, and so obtain a higher calf crop.

There is a marked relation between size of ranch and labour efficiency. The number of ranch units per man equivalent is much higher on the larger ranches than on the smaller ones. Greater efficiency on the larger ranches is also reflected in the lower capital per ranch unit.

TABLE 32.—INTERRELATION BETWEEN SIZE AND OTHER FACTORS, 1938-41

	Number of Ranch Units					
	100-199	200-299	300-399	400-599	600-999	1,000-1,999
<b>1938-39—</b>						
Number of Ranches..... No.	42	33	43	38	31	17
<b>Average—</b>						
Ranch Units..... No.	150	240	343	501	767	1,450
Per Cent Cattle of Ranch						
Units..... %	74	73	69	75	76	83
Per Cent Calf Crop..... %	64	58	60	57	56	56
Ranch Units per Man Equiva-						
lent..... No.	68	92	107	111	128	201
Capital per Ranch Unit..... \$	90	78	67	67	77	61
Feed per Animal Unit..... T.	0.92	0.86	0.87	0.78	0.71	0.61
<b>1939-40—</b>						
Number of Ranches..... No.	40	33	45	38	30	22
<b>Average—</b>						
Ranch Units..... No.	150	247	344	492	758	1,395
Per Cent Cattle of Ranch						
Units..... %	75	68	68	74	79	84
Per Cent Calf Crop..... %	70	62	68	64	59	62
Ranch Units per Man Equiva-						
lent..... No.	71	95	115	137	133	177
Capital per Ranch Unit..... \$	85	76	68	69	78	61
Feed per Animal Unit..... T.	1.11	1.09	1.19	0.87	0.83	0.75
<b>1940-41—</b>						
Number of Records..... No.	36	31	45	38	34	21
<b>Average—</b>						
Ranch Units..... No.	156	250	353	494	781	1,460
Per Cent Cattle of Ranch						
Units..... %	78	70	68	77	78	80
Per Cent Calf Crop..... %	67	67	70	62	60	62
Ranch Units per Man Equiva-						
lent..... No.	78	96	126	124	153	209
Capital per Ranch Unit..... \$	90	72	70	76	75	60
Feed per Animal Unit..... T.	0.93	1.08	0.80	0.89	0.72	0.47

### *ERRATUM*

Page 62, Fig. 8. Scale at left of graph should read as dollars, not hundreds of dollars as shown.



Variations in cattle receipts, which brought about variations in total receipts, were due to differences in price and output. Output is affected by calf crop; and the class of cattle sold affects both price and output.

Ranches with less than 200 units had higher receipts than might have been expected. This was due to two factors. First, although the price received for cattle sold off the smaller ranches was less than average, output in pounds of beef produced per ranch unit was relatively high, because of higher calf crop and the sale of younger stock. Second, the smaller ranches had unusually large receipts from produce sales, custom work, road work, and so forth.

*Relation Between Size and Expenses.*—As the size of ranch increased current operating expenditure per unit (excluding depreciation) decreased slightly. Between 150 and 1,400 ranch units the difference was approximately one dollar per unit. Labour expenses per unit were fairly constant, although the type of labour varied with the size of ranch. Unpaid family labour was more important on the smaller ranches. The larger ranches used relatively more contract labour. The greater self sufficiency of the smaller ranches was evident in relatively higher threshing and binder twine expenses, and relatively lower wintering and feed expenses.

There was a significant downward trend in depreciation charges per ranch unit with increasing size of ranch. Between 150 and 1,400 units the difference was approximately \$1.50 per unit. The larger ranches had a lower capital per ranch unit; but this was due entirely to lower investment, per ranch unit, in buildings, fences, and machinery.

### Degree of Specialization

*Interrelation Between Degree of Specialization and Other Factors.*—As the degree of specialization increases the calf crop tend to decrease.<sup>1</sup> This appears to be the result of two conditions. First, the less specialized ranches generally have fewer cattle so that more attention can be given to the cows with a consequent increase in breeding efficiency and reduced calf losses. Second, more highly specialized ranches tend to be located in areas of rougher topography where high calf crops are difficult to obtain.

As the degree of specialization increases, capital per ranch unit tends to increase. In most areas a ranch unit of one head of cattle is worth more than a unit of one and one-half acres of cropland. Consequently as the proportion of cattle units increases the capital per ranch unit also increases.

There is some evidence that as the degree of specialization increases, the amount of feed per animal unit tends to decrease. This tendency is apparent from the data for two of the three years. More highly specialized ranches have less feed available on the ranch, and, as has been noted earlier in this report, make more general use of winter pasture.

No clear relation is apparent between degree of specialization and labour efficiency. However, in all three years, the more diversified ranches (less than 55 per cent cattle units) made relatively efficient use of labour.

*Relation Between Degree of Specialization and Ranch Income.*—In the first year (1938-39) as the degree of specialization increased (from 50 per cent to 80 per cent cattle units) ranch income per ranch unit *decreased* slightly (Figure 9). In the two later years the same increase in degree of specialization was accompanied by an *increase* of about \$1.60 to \$1.70 of ranch income per ranch unit. The explanation of this difference in the relation is to be found in the movement of prices. In the first year, returns from cattle were, if

<sup>1</sup> Appendix VI, Table 1.

The tendency is for the amount of feed used per animal unit to decrease as the size of ranch increases. This appears to be due in part to the higher degree of specialization on the larger ranches; and, in part, to the more effective subdivision of pastures, with the reservation of certain fields for winter use, on larger ranches. With the higher degree of specialization less feed is available; the increased use of special winter pastures reduces the need for supplementary feed.

*Relation Between Size and Ranch Income.*—Figure 8 indicates the relation between size and ranch income per ranch unit in each of the three years. Income per ranch unit shows little tendency to increase up to 250 ranch units. Beyond this point increasing size is associated with a sharp increase in income?

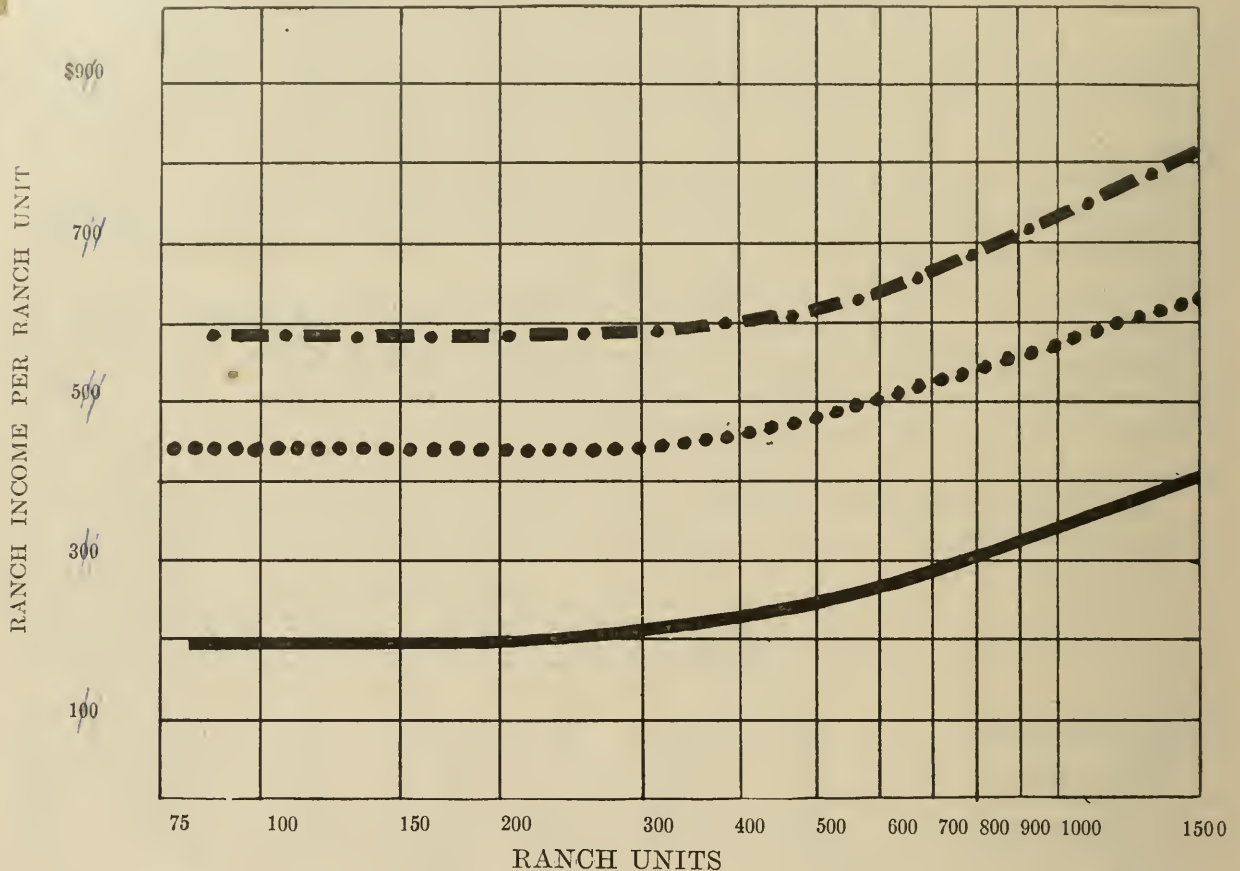


Fig. 8.—The Relationship of Size of Ranch to Ranch Income, 1938-39, 1939-40, 1940-41.

Note.—Lower solid line shows 1938-39; middle dotted line, 1939-40; upper broken line, 1940-41.

The absence of any apparent relation between size and income below 250 units per ranch may have two explanations. First, there may be efficiencies which are possible only on small ranches and which offset the effect of other factors making for higher income on large ranches. Second, some operators of small ranches are successful in securing fuller use of labour and equipment, and increased revenue, by engaging in supplementary activities. Where these sources of revenue are available ranch income can be maintained at higher levels.

It is improbable that ranch income per ranch unit would increase indefinitely with increasing size. However, it was not possible to discover, from the data available, any size of ranch beyond which income per unit might be expected to decrease.

*Relation between Size and Receipts.*—Sales of cattle accounted for the largest proportion of ranch receipts and, with cattle prices rising throughout the three years, were responsible for an increasing proportion of total receipts.



Variations in cattle receipts, which brought about variations in total receipts, were due to differences in price and output. Output is affected by calf crop; and the class of cattle sold affects both price and output.

Ranches with less than 200 units had higher receipts than might have been expected. This was due to two factors. First, although the price received for cattle sold off the smaller ranches was less than average, output in pounds of beef produced per ranch unit was relatively high, because of higher calf crop and the sale of younger stock. Second, the smaller ranches had unusually large receipts from produce sales, custom work, road work, and so forth.

*Relation Between Size and Expenses.*—As the size of ranch increased current operating expenditure per unit (excluding depreciation) decreased slightly. Between 150 and 1,400 ranch units the difference was approximately one dollar per unit. Labour expenses per unit were fairly constant, although the type of labour varied with the size of ranch. Unpaid family labour was more important on the smaller ranches. The larger ranches used relatively more contract labour. The greater self sufficiency of the smaller ranches was evident in relatively higher threshing and binder twine expenses, and relatively lower wintering and feed expenses.

There was a significant downward trend in depreciation charges per ranch unit with increasing size of ranch. Between 150 and 1,400 units the difference was approximately \$1.50 per unit. The larger ranches had a lower capital per ranch unit; but this was due entirely to lower investment, per ranch unit, in buildings, fences, and machinery.

### Degree of Specialization

*Interrelation Between Degree of Specialization and Other Factors.*—As the degree of specialization increases the calf crop tend to decrease.<sup>1</sup> This appears to be the result of two conditions. First, the less specialized ranches generally have fewer cattle so that more attention can be given to the cows with a consequent increase in breeding efficiency and reduced calf losses. Second, more highly specialized ranches tend to be located in areas of rougher topography where high calf crops are difficult to obtain.

As the degree of specialization increases, capital per ranch unit tends to increase. In most areas a ranch unit of one head of cattle is worth more than a unit of one and one-half acres of cropland. Consequently as the proportion of cattle units increases the capital per ranch unit also increases.

There is some evidence that as the degree of specialization increases, the amount of feed per animal unit tends to decrease. This tendency is apparent from the data for two of the three years. More highly specialized ranches have less feed available on the ranch, and, as has been noted earlier in this report, make more general use of winter pasture.

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<sup>1</sup> Appendix VI, Table 1.

anything, less than from other enterprises. The advance in cattle prices has been more rapid than that of prices of other products since 1939. Consequently, as expenses associated with cattle did not keep pace, more highly specialized cattle ranches recorded greater returns.

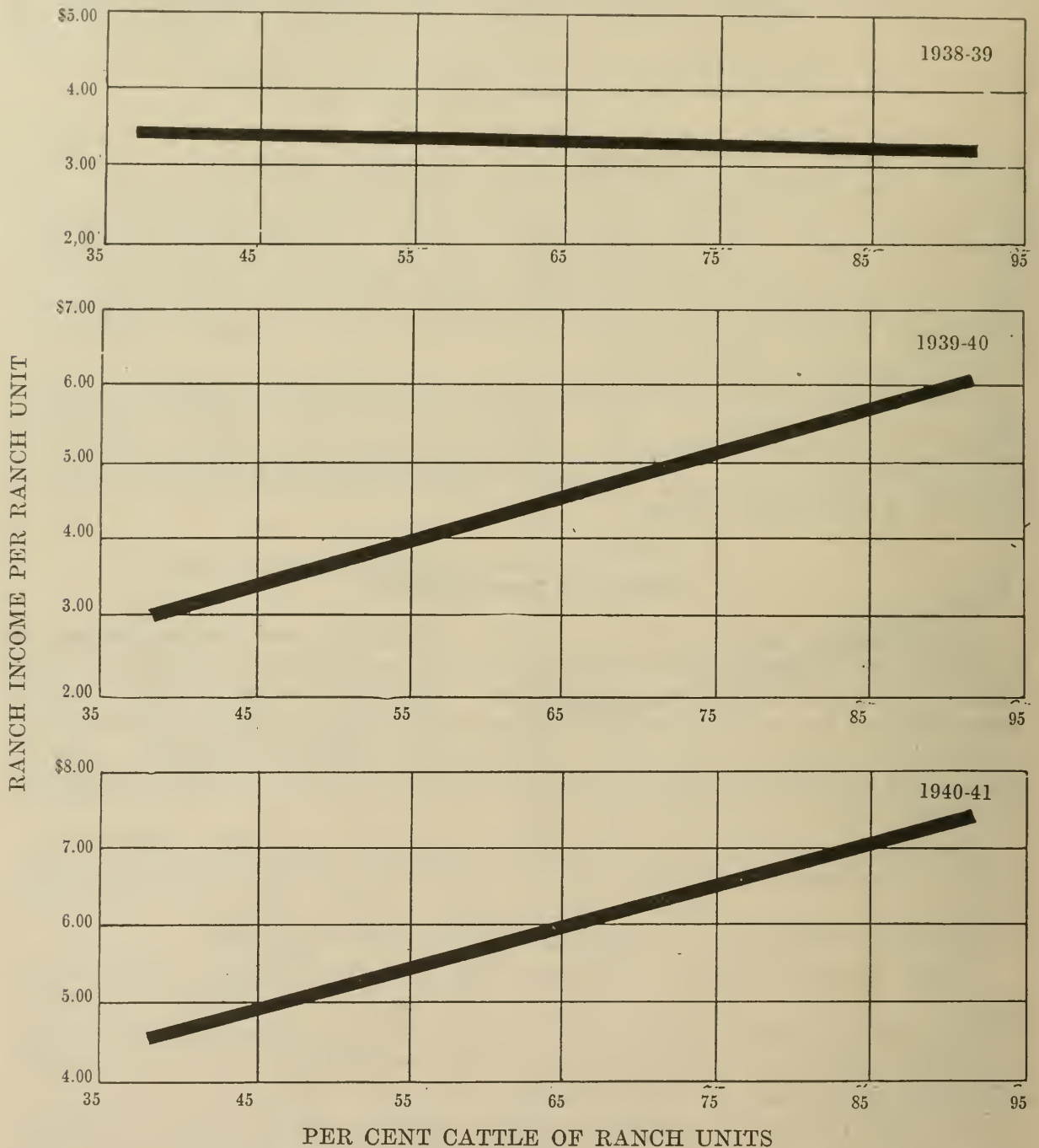


Fig. 9.—Relation Between Specialization and Ranch Income.

The record of the three years suggests two general conclusions. First, as the prices of different products are variable, and seldom increase or decrease at the same rate, there is an advantage in a flexible organization which will enable the operator to take advantage of changes in the relative profitability of different enterprises. Second, the combination of enterprises on the more diversified ranches makes for more constant returns; the risks of failure, as well as the opportunities for large gains, are reduced. If one enterprise fails



on account of poor prices or adverse physical conditions, other enterprises help to support the whole business and to prevent complete failure. It is recognized that in some areas there is little alternative to specialization.

## Calf Crop

**Interrelation Between Calf Crop and Other Factors.**—Calf crop is the result of management practices; a high calf crop is evidence of efficient management. Some relation is apparent between calf crop and degree of specialization.<sup>1</sup> In this case it would appear to be the effect of size acting through degree of specialization in the manner described in the previous section. There is also evidence of a relation between calf crop and capital per ranch unit. Here again calf crop is the effect. More highly specialized ranches have higher capital per ranch unit and lower calf crops.

**Relation Between Calf Crop and Ranch Income.**—Calf crop appeared to be one of the major factors affecting ranch income (Figure 10). In the first year (1938-39) as calf crop increased ranch income per ranch unit increased, although, at higher levels of calf crop, the rate of increase in income declined. In the second year (1939-40) there was a steady increase in income with increasing calf crop. In the final year (1940-41) income increased rapidly up to a calf crop of 60 to 65 per cent; beyond that the rate of increase in income declined rapidly, and above 80 per cent calf crop little change in income was apparent. However, in all three years, the difference in ranch income per ranch unit as between a 50 per cent and an 80 per cent calf crop, amounted to about \$2.50 per unit.

Three other consequences of variation in calf crop may be noted. First, except in the first year when production on some ranches was seriously affected by storm losses, output of beef per ranch varied directly with calf crop. Second, in all three years, the groups of ranches with calf crops below 50 per cent, had decreases in cattle numbers over the year. Third, differences in sales policies are apparently related to calf crop. Thus, ranches with high calf crops (over 70 per cent) tend to sell younger cattle; on the other hand ranches with low calf crops tend to raise and sell older cattle. One possible explanation of this difference is that ranchers with consistently low calf crops realize that they can spread their risk by selling older cattle. In this way they are not dependent on the output of the cow alone, but depend as well on the added production from gains in weight.

To illustrate the point, suppose that a rancher has enough pasture and feed to run 100 head of cattle. If these cattle were all cows then, with a 50 per cent calf crop and no losses or replacements, the rancher could sell 50 calves in the fall at a weight of about 400 pounds, giving him a total output of 20,000 pounds of beef. On a three-year-old selling basis, and with the same calf crop, the rancher would have 40 cows, 20 yearlings, 20 two's and 20 three's; and the sale of the three-year-olds at 1,175 pounds would give an output of 23,500 pounds, or 3,500 pounds more than on the cow-calf basis. However, with a 75 per cent calf crop the situation would be quite different. On the cow-calf basis, the rancher would sell 75 calves or 30,000 pounds of beef. On the three-year-old basis, the rancher would have a herd of 31 cows, 23 yearlings, 23 two's and 23 three's; the latter would give an output of 27,025 pounds, or 2,975 pounds less than on the cow-calf basis. From this illustration it can be seen that where calf crop is low output can be increased by the sale of older cattle; and that where calf crop is high the sale of young cattle will give a larger output. It appears that many ranchers are aware of this and adjust their sales policy accordingly.

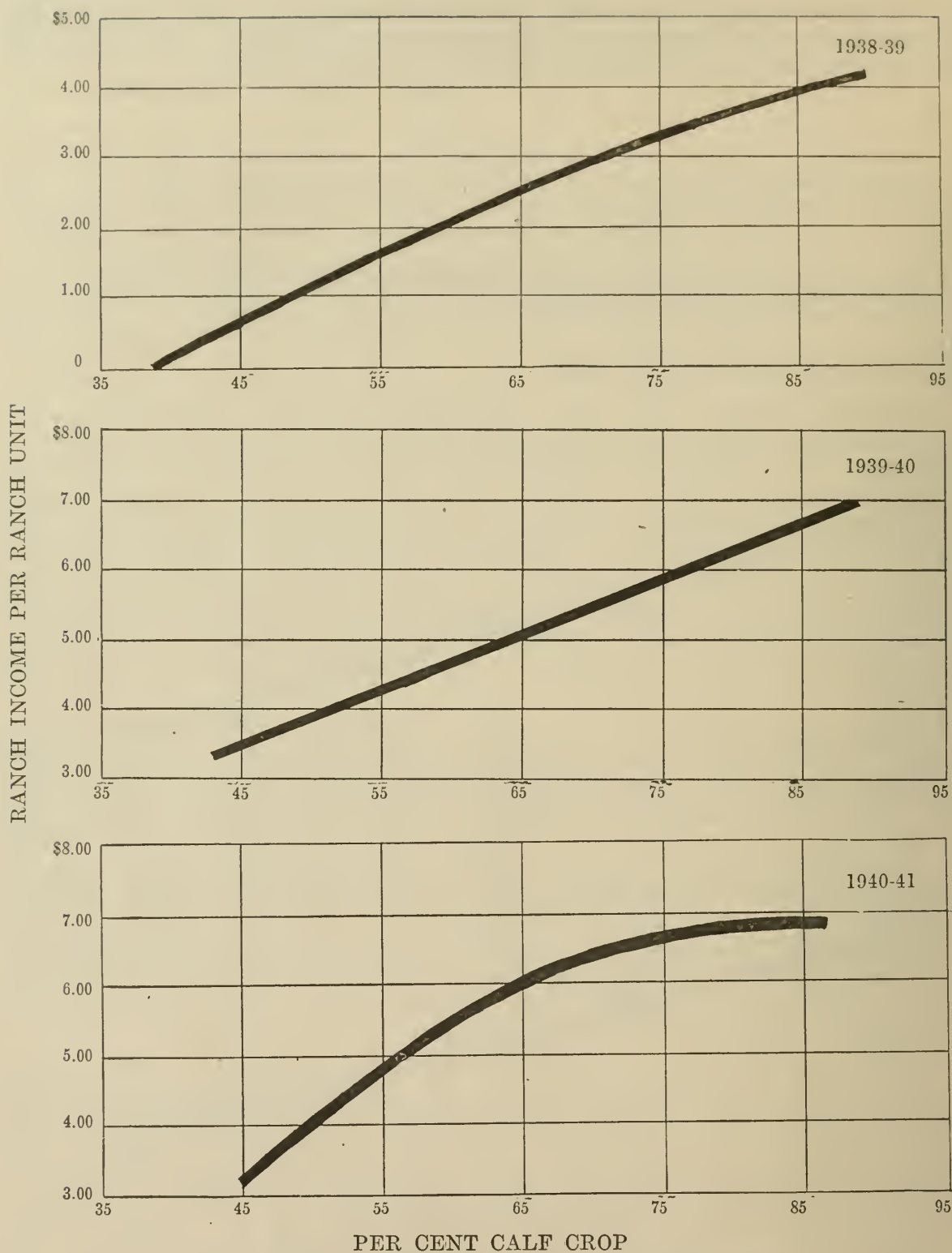


Fig. 10.—Relation Between Calf Crop and Ranch Income.

### Labour Efficiency

**Interrelation between Labour Efficiency and Other Factors.**—It appears that as ranch units per man equivalent increase the amount of feed per animal unit decreases.<sup>1</sup> This is the result of the larger amount of labour per animal where hand feeding is practised, and the relation is referred to again in the later section on feeding practices. Some relation is apparent between labour efficiency and capital per ranch unit.

<sup>1</sup> Appendix V, Table III.



**Relation between Labour Efficiency and Ranch Income.**—Ranch income per ranch unit increased with increased labour efficiency, although the effect was more pronounced in the first year than in either of the following years (Figure 11). In 1938-39, an increase in ranch units per man equivalent from 80 to 160 was associated with an increase in ranch income of over \$2 per unit. In the later years, the corresponding increase in income was less than \$1 per unit. During 1939-40 and 1940-41 wages did not increase as rapidly as cattle prices, consequently wages were lower in relation to the value of the product. Under these conditions the limited use of labour has a lesser effect on profits.

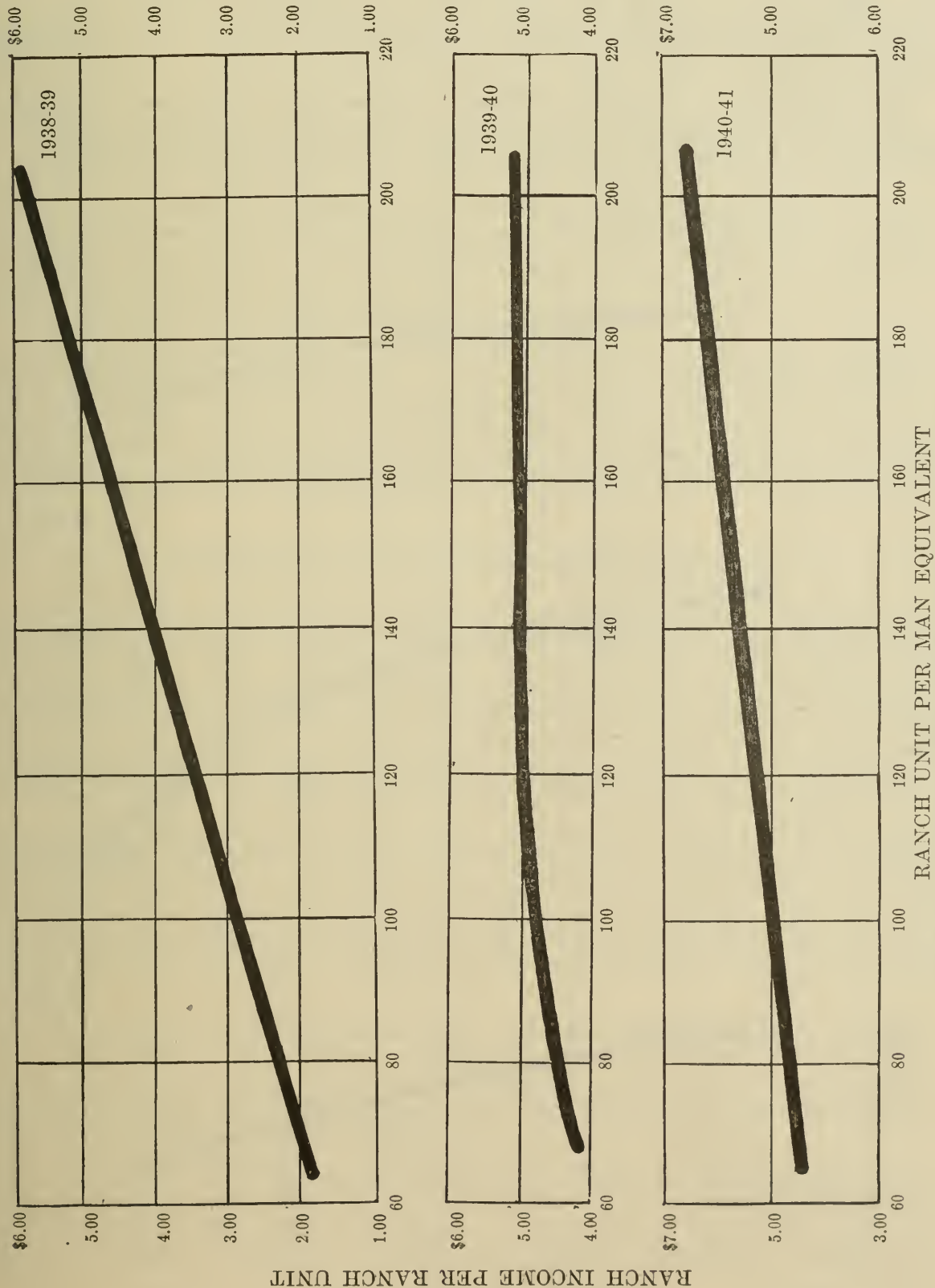


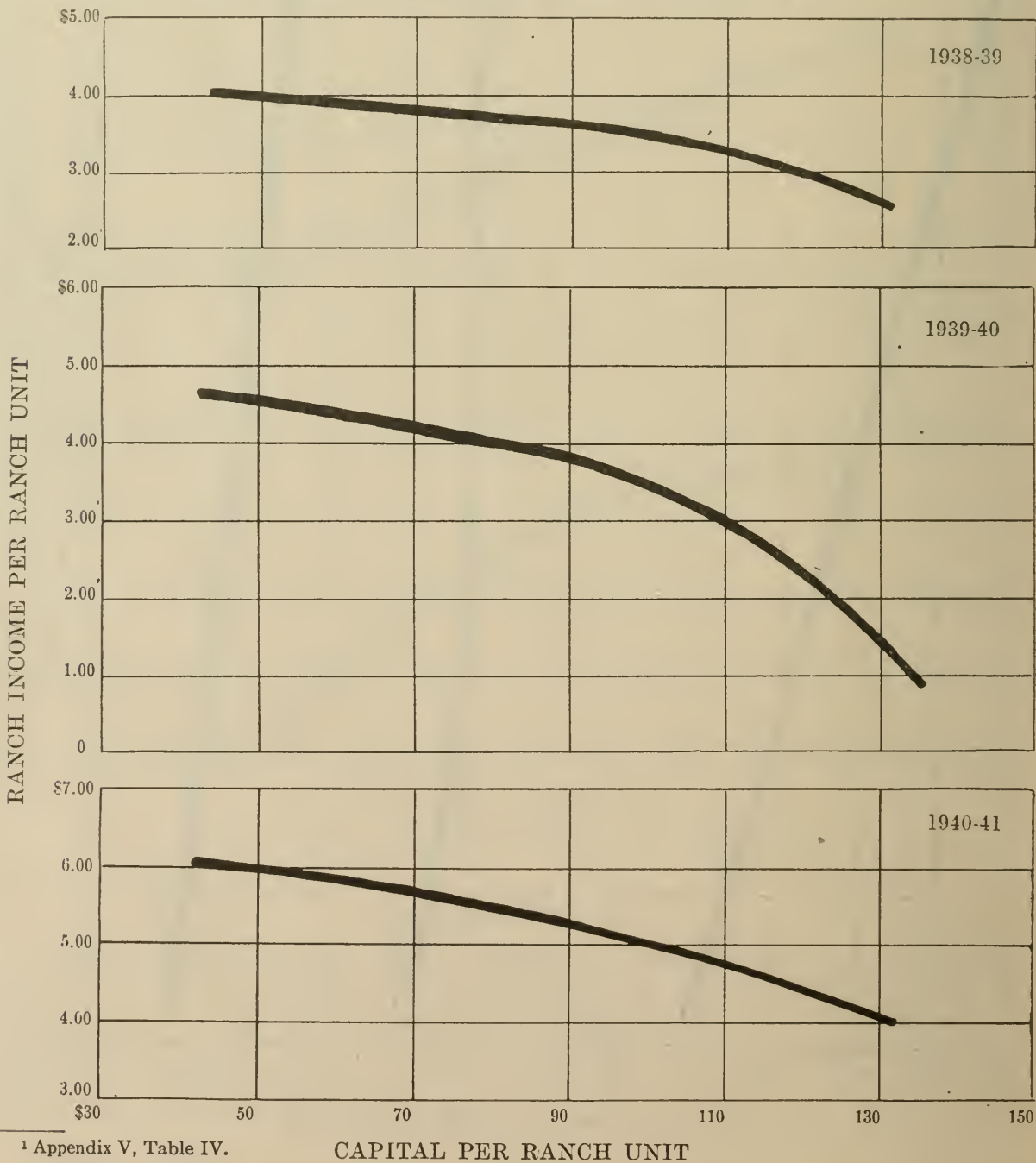
Fig. 11.—Relation Between Labour Efficiency and Ranch Income.

Capital Per Ranch Unit

**Interrelation between Capital Per Ranch Unit and Other Factors.**—Some relation exists between capitalization and both degree of specialization and labour efficiency.<sup>1</sup> The relation between capital per ranch unit and degree of efficiency has been referred to in the section dealing with degree of specialization; and the relation to labour efficiency was noted in the discussion of labour efficiency. The latter relation is more pronounced when ranches are sorted, on the basis of capital per ranch unit. Under these circumstances the conclusion is that operators tending to be inefficient in one factor are also inefficient in the other. They do not attempt to replace units of labour with capital nor do they obtain the production which might be anticipated from a more intensive enterprise.

**Relation between Capital Per Ranch Unit and Ranch Income.**—As capital per ranch unit increased ranch income per ranch unit decreased (Figure 12). In the first two years the decrease in ranch income became more rapid when

Fig. 12.—Relation Between Capitalization and Ranch Income.



<sup>1</sup> Appendix V, Table IV.



capitalization reached a point of about \$90 to \$100 per unit. In the third year this point was reached at about \$80 per unit, but the decline in income beyond this was not as pronounced as in the earlier years. While it is desirable to keep capitalization as low as possible, investment greater than \$90 per ranch unit is likely to have particularly adverse effects on returns. As a general guide it may therefore be said that capitalization should not exceed \$90 per ranch unit.

### Feeding Practices

**Interrelation between Feed and Other Factors.**—It has already been pointed out that feed used is associated with size of ranch and degree of specialization. The larger and more specialized ranches feed less heavily than do the smaller and more diversified ranches. High labour efficiency is evident on ranches feeding less than three-quarters of a ton of hay or its equivalent.<sup>1</sup>

**Relation between Feed and Ranch Income.**—The effect of feed used per animal unit on ranch income per ranch unit was different in each year of the study (Figure 13). In the first year, income increased when more feed was fed, although the rate of increase was slow. In the second year, income declined steadily as the amount of feed increased. In the third year, there was a rapid reduction in income up to approximately one ton of feed per animal unit. Beyond that point the decline in income was much slower.

The direct relation between feed and income in the first year appeared to be connected with cattle losses. In that year heavier feeding resulted in appreciably lower losses. Further, ranchers feeding more heavily in that year obtained prices substantially higher than the average, because of the better condition of their cattle following the drought of 1937 and the spring storm of 1938. This price advantage was not apparent in either the middle or final year.

### Summary of Factors Affecting Ranch Income

The affect of the factors, dealt with in the foregoing, on ranch income indicates that at least two, if not three, of these are within the immediate control of the rancher. Calf crop, the amount of feed used and labour efficiency may be influenced directly by management. On small ranches it may be most difficult to attain a higher degree of labour efficiency as a result of the limitation of size. However, where low calf crops are being obtained, the corrective is generally possible and similarly where unnecessarily large amounts of feed are being used.

The addition of a rider for the few months during the critical breeding season may substantially increase the calf crop percentage and this gain may be balanced against the cost of labour involved. Similarly, the addition of capital in the form of fencing, if it has the desired result of higher calf crops, may be balanced against the higher capitalization. The increased ranch income brought about by higher calf crops would make worthwhile considerable effort on the part of ranchers to eradicate infectious abortion where it was known to exist.

In the case of the amount of feed used per animal unit, the savings are two-fold. There is, in addition to the saving of the feed itself, the economy in the use of labour. For very small diversified ranches with considerable by-product feed available, such as straw, greater efficiency in the use of this feed may be attained by taking in a neighbour's stock for wintering.

However, the results obtained during the first year of the survey indicate that substantial feed reserves should be held. This is particularly applicable to those areas where the risk of drought or bad winter storms is great. These reserves would be invaluable if used to advantage in emergency periods. Under

<sup>1</sup> Appendix V, Table V.

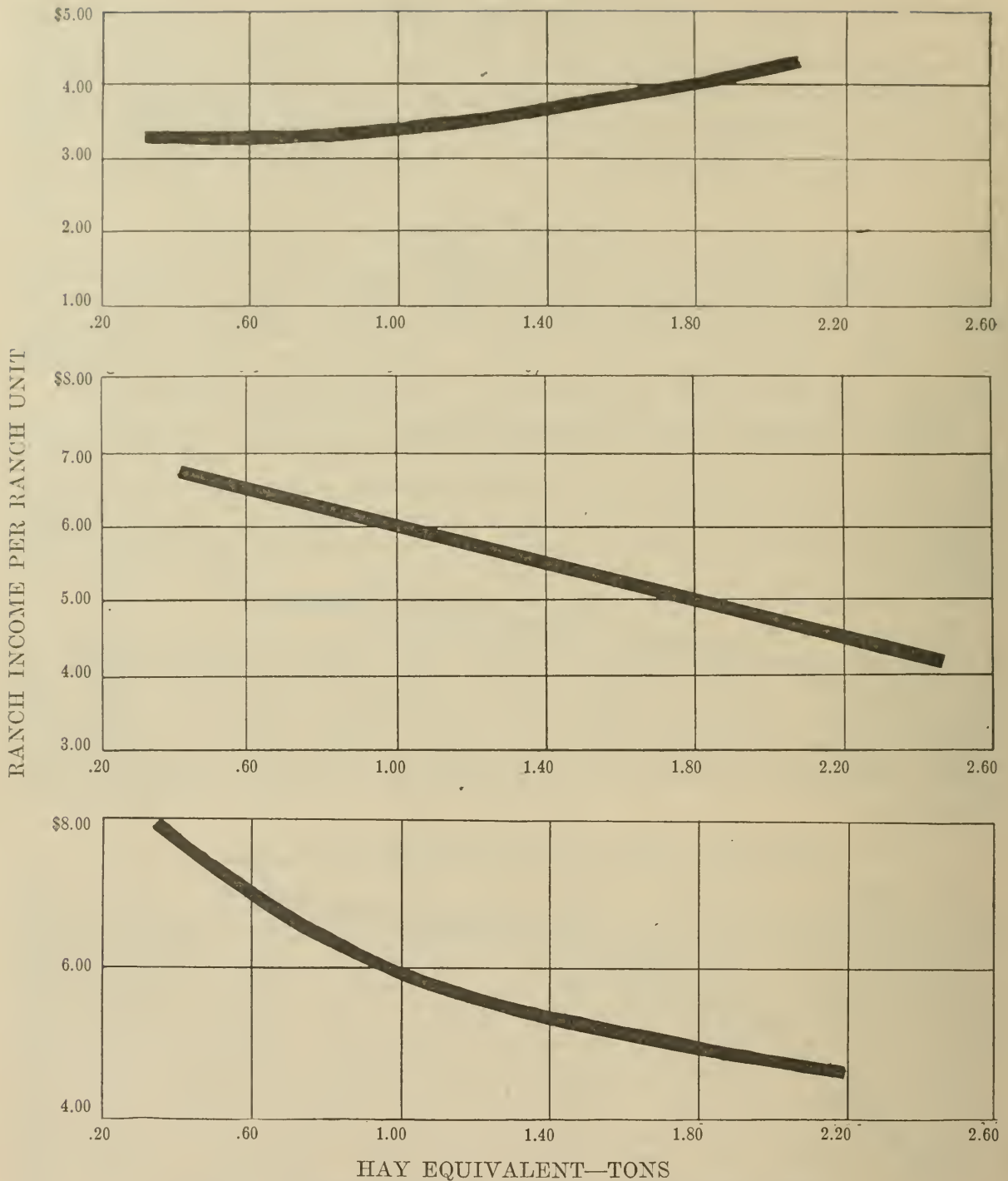


Fig. 13.—Relation Between Feed Used and Ranch Income.

normal circumstances, however, the results obtained substantiate the experiments at the Manyberries station. These indicated that it does not pay to winter range animals beyond the point of maintenance.

With respect to capital per ranch unit there may be little that the rancher can do to improve his position. The addition of cropland at a low value may reduce the average capital per unit but at the same time would disturb the organization and so might not be desirable. In some cases ranches were bought at prices above the real value of the properties. In situations such as this the only course is to write down the value of the assets. This would be of no direct benefit to the operator but might affect materially the position of his heirs or assigns.



Ranch organization may be altered by the addition or deduction of cropland where the amount of range pasture is limited. The only advantage of greater diversification is in the stability of income. On the other hand specialization in cattle reaps its rewards in large profits when cattle prices are relatively high. In any case the physical characteristics of any ranch may be such as to fairly rigidly determine the degree of specialization.

It is obvious that there are a multitude of other factors which may affect ranch income and in any individual case one or more of these may be limiting. However, if a rancher attains a suitable degree of specialization, a high calf crop, efficient use of labour and capital, and utilizes an optimum amount of feed—then he has made great steps toward a high ranch income. This does not imply that these factors should be improved and all others ignored. For example, poor salesmanship could easily wipe out all gains. It does mean, however, that these were responsible for a large part of the success or failure of most ranches included by this survey.

## APPENDIX I

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### BOTANICAL NAMES OF GRASSES IN WESTERN RANGE LANDS

#### **Shortgrass Zone**

##### *Shortgrass Prairie*

Blue grama grass .....	Bouteloua gracilis
Speargrass .....	Stipa comata
Bluejoint or western wheatgrass .....	Agropyron smithii
Junegrass .....	Koeleria crisata
Sandberg's bluegrass .....	Poa secunda

##### *Mixed Prairie*

Short-awned porcupine grass .....	Stipa spartea var. curtiseta
Northern wheatgrass .....	Agropyron dasystachyum
Speargrass-sandgrass .....	Stipa-Calamovilfa species

#### **Cypress Hills Zone**

##### *Sub-Montane Mixed Prairie*

Rough fescue .....	Festuca scabrella
Oatgrass .....	Danthonia species
Awned wheatgrass .....	Agropyron subsecundum
Junegrass .....	Koeleria cristata

#### **Foothills Zone**

##### *Sub-Montane Mixed Prairie*

Oatgrass .....	Danthonia parryi
	Danthonia californica
	Danthonia intermedia

#### **British Columbia Zones**

##### *Lower Grasslands*

Bluebunch wheatgrass .....	Agropyron spicatum
Speargrass .....	Stipa comata
Dwarf bluegrass .....	Poa secunda
Dropseed grass .....	Sporobolus cryptandrus

##### *Shrubs and Forbs*

Sagebrush .....	Artemisia tridentata
Rabbit bush .....	Chrysothamnus species
Dwarf everlasting .....	Antennaria dimorpha
Cactus .....	Opuntia fragilis

##### *Middle Grasslands*

Downy brome .....	Bromus tectorum
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##### *Upper Grasslands ....*

Columbia speargrass .....	Stipa columbiana
Kentucky bluegrass .....	Poa pratensis
Rough fescue .....	Festuca scabrella

##### *Montane Forest*

Pinegrass .....	Calamagrostis rubescens
Dwarf sedge .....	Carex concinnoides
Rough aster .....	Aster conspicuus
Timber vetch .....	Astragalus serotinus

##### *Sub-Alpine Forest*

Blueberry .....	Vaccinium species
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##### *Upper Sub-Alpine Forest*

Lupine .....	Lupinus
Lousewort .....	Pedicularis
Valerian .....	Valeriana
Wild oatgrass .....	Danthonia intemedia
Alpine timothy .....	Phleum alpinum



TABLE I.—PRICES OF CATTLE, TORONTO AND CHICAGO, 1927-41<sup>1</sup>

Year	Toronto Good Steers	Chicago Good Steers	Spread	Live Exports to United States
	\$	\$	\$	No.
1927.....	8.20	12.65	4.45	204,336
1928.....	10.48	14.55	4.07	166,469
1929.....	10.16	13.65	3.49	160,103
1930.....	8.78	11.30	2.52	19,483
1931.....	6.22	8.55	2.33	9,159
1932.....	5.56	7.50	1.94	9,010
1933.....	4.63	5.10	0.47	5,686
1934.....	5.54	6.85	1.31	6,341
1935.....	6.46	11.50	5.04	102,934
1936.....	5.51	9.55	4.04	191,149
1937.....	7.40	13.00	5.60	208,522
1938.....	6.27	10.35	4.08	98,408
1939.....	6.89	10.40	3.51	201,065
1940.....	7.83	10.80	2.97	153,856
1941.....	8.90	11.35	2.45	189,896

<sup>1</sup> Data from Annual Market Review, Dominion Department of Agriculture, Ottawa.

TABLE II.—CANADIAN BEEF CATTLE EXPORTS, 1920 TO 1939

Year	Shipped to Great Britain		Total Exports	
	Dressed <sup>1</sup>	Alive	Dressed <sup>1</sup>	Alive
	No.	No.	No.	No.
1920.....	24,316	320	134,056	240,660
1921.....	11,259	33,053	64,286	174,552
1922.....	12,464	18,475	52,682	212,772
1923.....	12,465	57,672	45,544	160,771
1924.....	12,729	79,435	46,414	183,242
1925.....	20,847	110,868	69,255	204,378
1926.....	7,034	79,985	54,468	176,343
1927.....	1,162	8,263	113,484	216,209
1928.....	1	405	94,273	169,276
1929.....	12	.....	62,133	162,632
1930.....	486	5,400	16,173	27,554
1931.....	1,048	27,149	7,513	40,217
1932.....	2,957	16,568	8,933	28,464
1933.....	14,346	50,317	20,015	59,158
1934.....	23,882	53,852	30,184	63,673
1935.....	7,635	6,704	27,025	112,771
1936.....	12,803	38,495	24,833	233,631
1937.....	19,476	9,610	34,530	222,112
1938.....	4,096	27,307	11,385	129,800
1939.....	1,739	4,274	8,704	208,800

<sup>1</sup> Converted to numbers on the basis 500 pounds beef equal one head.

## APPENDIX II

TABLE I.—AVERAGE RANCH CAPITAL PER RANCH, 1938-41, BY ZONES

Class of Capital	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cattle.....	15,068	11,495	6,318	20,461	14,614	17,092
Other Livestock.....	3,012	2,018	2,528	2,212	1,430	1,926
Land.....	6,932	6,608	4,476	18,328	12,556	11,142
Buildings and Improvements.....	3,421	3,558	3,292	5,120	3,428	3,104
Machinery.....	2,950	2,088	2,825	2,330	1,856	2,238
Feed and Supplies.....	826	575	940	962	672	1,160
Fences.....	1,972	1,202	1,427	1,671	1,968	1,982
All Capital.....	34,182	27,542	21,807	51,084	36,523	38,643

TABLE II.—AVERAGE CHANGE IN CAPITAL PER RANCH, 1938-41, BY ZONES

Class of Capital	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cattle.....	6,549	3,852	2,768	6,446	4,211	6,286
Other Livestock.....	126	86	40	279	190	300
Land.....	391	29	69	19	119	132
Buildings and Improvements.....	-344	-481	-520	-235	-549	-393
Machinery.....	-75	-139	-369	96	-175	-353
Feed and Supplies.....	854	590	-95	597	817	1,124
Fences.....	-255	-168	-202	-190	-156	-91
All Capital.....	7,249	3,771	1,692	7,013	4,458	7,006

TABLE III.—AVERAGE RECEIPTS PER RANCH, 1938-41, BY ZONES

Class of Receipts	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	\$	\$	\$	\$	\$	\$
Cattle.....	4,822	3,530	2,881	7,916	5,655	6,185
Other Livestock.....	572	268	307	404	274	93
Crop and Feed.....	830	87	1,460	362	684	99
Buildings and Machinery...	181	172	119	147	65	75
Ranch Produce Sales.....	33	15	54	61	165	103
Custom Work.....	37	.....	83	18	54	24
Use of Pasture.....	53	6	11	31	17	11
Road Work.....	22	34	19	4	25	61
Board of Paying Guests.....	.....	4	.....	2	9	177
Other Receipts.....	8	.....	4	25	3	38
All Receipts.....	6,559	4,118	4,938	8,970	6,951	6,867

TABLE IV.—AVERAGE RECEIPTS PER RANCH, BY YEARS, BY ZONES

Class of Receipts	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
1938-39—	\$	\$	\$	\$	\$	\$
Cattle.....	3,295	2,386	2,004	6,024	4,627	4,802
Other Livestock.....	533	194	301	278	354	118
Crop and Feed.....	952	169	1,658	557	866	144
Buildings and Machinery...	166	136	117	149	16	75
Ranch Produce Sales.....	30	31	66	61	189	110
Custom Work.....	42	.....	52	14	88	11
Use of Pasture.....	54	12	18	34	11	19
Road Work.....	23	16	17	7	12	58
Board of Paying Guests.....	.....	.....	.....	.....	.....	139
Other Receipts.....	3	.....	10	27	3	47
Total Receipts.....	5,097	2,945	4,244	7,150	6,165	5,523



	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
	\$	\$	\$	\$	\$	\$
<i>1939-40—</i>						
Cattle.....	5,178	3,716	3,527	7,932	5,879	6,752
Other Livestock.....	609	288	265	393	217	70
Crop and Feed.....	792	88	1,223	257	664	67
Buildings and Machinery.....	224	78	120	158	127	87
Ranch Produce Sales...	42	12	61	68	175	114
Custom Work.....	42	.....	87	30	38	3
Use of Pasture.....	34	7	14	50	25	14
Road Work.....	24	69	35	4	24	80
Board of Paying Guests .....	.....	13	.....	.....	17	242
Other Receipts.....	10	.....	.....	28	2	30
Total Receipts.....	6,956	4,272	5,331	8,920	7,167	7,458
<i>1940-41—</i>						
Cattle.....	5,993	4,489	3,112	9,792	6,459	7,002
Other Livestock.....	575	322	355	540	250	92
Crop and Feed.....	746	5	1,500	271	523	86
Buildings and Machinery.....	154	301	120	134	53	63
Ranch Produce Sales...	26	3	34	55	132	86
Custom Work.....	27	.....	110	10	37	58
Use of Pasture.....	72	.....	1	9	15	.....
Road Work.....	19	18	4	1	38	45
Board of Paying Guests .....	1	.....	.....	7	10	150
Other Receipts.....	10	.....	4	21	3	36
Total Receipts.....	7,625	5,138	5,240	10,841	7,522	7,619

TABLE V.—AVERAGE OPERATING EXPENSES PER RANCH, 1938-41, BY ZONES

	Short-grass	Cypress Hills	Northern Prairie	Foothills	Kamloops-Nicola	Cariboo-Chilcotin
	Ac.	Ac.	Ac.	Ac.	Ac.	Ac.
Taxes.....	166	161	229	320	172	189
Lease Rental.....	428	109	127	238	142	111
Rent and Water Rent.....	76	.....	114	6	28	12
Grazing Permits.....	53	70	1	146	58	108
Wintering, Feed.....	610	133	323	736	246	150
Repairs to Buildings and Fences.....	107	52	82	136	86	67
Repairs to Machinery.....	178	126	179	133	155	139
Threshing and Binder Twine.....	190	84	215	144	60	50
Tractor Costs.....	130	45	183	61	19	31
Truck and Automobile Costs.....	214	150	157	174	196	206
General and Miscellaneous.....	188	121	155	230	164	240
Contract Labour.....	65	4	47	170	95	375
Paid Labour.....	785	334	701	874	1,492	1,431
Board of Paid Labour.....	248	93	184	256	276	435
Board of Unpaid Labour....	53	37	63	53	53	64
Total Cash Expenses.....	3,491	1,519	2,760	3,677	3,242	3,608
Unpaid Family Labour.....	199	177	250	251	214	176
Total Operating Expenses..	3,690	1,696	3,010	3,928	3,456	3,784

APPENDIX III

ANIMAL UNITS, RANCH UNITS, AND FEED EQUIVALENTS

**Animal Units.**—Numbers of cattle, horses and sheep were converted into equivalent units on the basis of the estimated range or feed required per head. Cattle and horses were taken to represent one animal unit. It appeared that five sheep were then approximately equal to one unit. Hogs provided a more difficult problem. Where hogs were recorded in the inventories, the numbers at the beginning and end of the year were averaged; and five hogs were considered to be equal to one animal unit. However with the rapid turnover of hogs and the high feed consumption of fattening pigs, it was apparent that some consideration should be given to hogs raised and sold during the year. Ten hogs sold or eaten during the year were taken to be equal to one animal unit.

**Ranch Units.**—In view of the diversification of enterprises on some ranches, neither cattle numbers nor animal units could be used, for purposes of comparison, as a measure of size of ranch. To arrive at a measure for combining crop acres with livestock, a comparison was made of the labour on highly specialized cattle ranches with information from other surveys indicating the amount of labour on highly specialized grain farms. From this comparison it appeared that the labour per head of cattle was equivalent to the amount of labour for each one and one-half acres of saleable crop. In calculating the number of crop units on each ranch, saleable crop acres were used. Saleable crop included all wheat, rye and flax sown for grain; and, where other crops were sold, the acres of saleable crop were derived from the proportion of the crop sold. Total ranch units included both animal units and crop units.

**Feed Equivalents.**—The following standard was used for the calculation of hay equivalents.

CALCULATION OF HAY EQUIVALENTS<sup>1</sup>

Wheat.....	Bu.	13	Hay, any kind.....	T.	1
Oats.....	Bu.	24	Straw, any kind.....	T.	2
Barley.....	Bu.	17	Oat Hulls.....	T.	1
Rye.....	Bu.	14	Roots, any kind.....	T.	2
Flax.....	Bu.	5	Mixed Chop.....	Lb.	752
All Grains mixed.....	Bu.	16	Shorts.....	Lb.	752
Wheat and Oats mixed.....	Bu.	17	Screenings.....	Lb.	752
Oats and Barley mixed.....	Bu.	20	Bran.....	Lb.	600
Wheat and Barley mixed.....	Bu.	15	Cottonseed.....	Lb.	100
Wheat and Rye mixed.....	Bu.	14	Oilcake or Linseed Meal.....	Lb.	100
Oats and Rye mixed.....	Bu.	18			
Barley and Rye mixed.....	Bu.	15			

The amounts of different kinds of feed used divided by their appropriate factors=equivalents in tons of hay.  
For cattle wintered outside of the ranch conversion was based on 3.5 head months=1 ton hay equivalent.

<sup>1</sup> Conversion factors based on constants and factors for valuing feeding stuffs. Morrison, F. B. Feeds and Feeding, Appendix, Table 8, pp. 1027-1029. 1936.



## APPENDIX IV

## THE METHOD OF FACTOR ANALYSIS

The object of the efficiency factor analysis was to measure the net effect of a change in each of the independent variables (degree of specialization,  $X_2$ , calf crop,  $X_3$ , labour efficiency,  $X_4$ , capital per ranch unit,  $X_5$ , and feeding practices,  $X_6$  on the dependent variable (ranch income per ranch unit,  $X_1$ ).

Where the number of records is sufficiently large the net effect of any one independent variable may be obtained by tabular analysis of group averages. For example, the records might be sorted on the basis of degree of specialization, and the average ranch income per ranch unit obtained for each group. Provided the numbers are sufficiently large errors of estimate are eliminated, and, except where the other factors are related to degree of specialization, the group averages would indicate the relation between degree of specialization and ranch income per ranch unit. Where any of the factors are related their effects can be eliminated by sub-sorting; but this requires a large number of records. In this study there was substantial evidence of interrelation between some of the factors, and the number of records available was too small to use the sub-sorting method. Some alternative method had to be employed.

The procedure followed in this study was suggested by the method of short-cut graphic correlation outlined by Ezekiel,<sup>1</sup> and may be described as follows:

The first step is to sort for each of the independent variables. A free-hand curve is then fitted to the group averages (ranch income per ranch unit,  $X_1$ ) obtained from sorting on the first independent variable (degree of specialization,  $X_2$ ). The sort on the second independent variable (calf crop,  $X_3$ ) is then considered, and the group averages of the dependent variable (ranch income per ranch unit,  $X_1$ ) are adjusted for variations between the calf crop groups of the  $X_2$  factor (degree of specialization). These adjustments are determined from the first regression ( $X_{1.2}$ ). For example, Table II, Appendix V, indicates that, comparing the group with less than 50 per cent calf crop and the group with 50-59 per cent calf crop, the increase in calf crop from 39 per cent to 54 per cent was associated with an increase in degree of specialization from 71 per cent to 81 per cent. The average ranch income per ranch unit in these two groups was \$0.03, in the first group, and \$1.47 in the second group; but this difference is partly the result of differences in degree of specialization. By reference to the curve  $X_{1.2}$ , it appeared that, as a first approximation, \$-0.30 might be attributable to the difference in degree of specialization; therefore, this amount was added to \$1.47. The other group averages from the sort on calf crop were similarly adjusted, and a free-hand curve fitted to the adjusted averages. This procedure is repeated for the sort on each independent variable, adjustment being made for factors previously considered.

At this stage the values of the dependent variable (ranch income per ranch unit,  $X_1$ ) when sorted on the final independent variable (feeding practices,  $X_6$ ), have been adjusted for each of the other independent variables; but, in determining the adjustments for the earlier independents no allowance has been made for those introduced later. For example, the adjustment for  $X_5$  is made without reference to any relation between  $X_5$  and  $X_6$ ; and the adjustment between for  $X_2$  is made without reference to any relation between  $X_2$  and  $X_3$ ,  $X_4$ ,  $X_5$  and  $X_6$ . The process is therefore reversed adjusting  $X_{1.5}$  for  $X_6$ ,  $X_{1.4}$  for  $X_5$  and  $X_6$ , and so on. As this reversal process may materially change the shape of the regression curves, it may be necessary to repeat the entire procedure, until no further adjustments appear necessary, that is, when it does not seem possible to reduce further the residual deviations in ranch income per ranch unit.

<sup>1</sup> Ezekiel, M. *Methods of Correlation Analysis*, Chap. 16. John Wiley and Sons, 1930.

## APPENDIX V

TABLE I.—INTERRELATION BETWEEN SPECIALIZATION AND OTHER FACTORS

	Cattle Units as Percentage of Total Ranch Units			
	Less than 55	55-69	70-84	85 and over
1938-39—				
Number of Ranches..... No.	32	30	38	66
Average—				
Per Cent Cattle of Ranch Units..... %	37	62	77	91
Per Cent Calf Crop..... %	66	60	55	59
Ranch Units per Man Equivalent..... No.	108	91	80	102
Capital per Ranch Unit..... \$	59	71	76	78
Feed per Animal Unit..... T.	0.76	0.98	1.10	0.71
1939-40—				
Number of Ranches..... No.	35	35	33	59
Average—				
Per Cent Cattle of Ranch Units..... %	38	63	77	92
Per Cent Calf Crop..... %	72	71	67	62
Ranch Units per Man Equivalent..... No.	122	104	98	107
Capital per Ranch Unit..... \$	58	73	76	78
Feed per Animal Unit..... T.	1.50	1.24	1.15	0.76
1940-41—				
Number of Ranches..... No.	31	27	35	65
Average—				
Per Cent Cattle of Ranch Units..... %	39	61	78	91
Per Cent Calf Crop..... %	75	78	64	62
Ranch Units per Man Equivalent..... No.	132	113	96	105
Capital per Ranch Unit..... \$	62	67	76	84
Feed per Animal Unit..... T.	1.23	1.01	0.89	0.78

TABLE II.—INTERRELATION BETWEEN CALF CROP AND OTHER FACTORS

	Calf Crop, Per Cent				
	Less than 50	50-59	60-69	70-79	80 and over
1938-39—					
Number of Ranches..... No.	41	38	28	32	27
Average—					
Per Cent Calf Crop..... %	39	54	65	76	89
Per Cent Cattle of Ranch Units..... %	71	81	75	69	63
Ranch Units per Man Equivalent..... No.	92	103	93	100	100
Capital per Ranch Unit..... \$	73	77	71	70	72
Feed per Animal Unit..... T.	0.86	0.99	0.76	0.70	0.87
1939-40—					
Number of Ranches..... No.	15	30	45	35	37
Average—					
Per Cent Calf Crop..... %	43	55	64	76	89
Per Cent Cattle of Ranch Units..... %	80	75	77	71	56
Ranch Units per Man Equivalent..... No.	96	107	99	119	113
Capital per Ranch Unit..... \$	78	75	74	71	65
Feed per Animal Unit..... T.	0.81	1.14	1.07	1.00	1.12
1940-41—					
Number of Ranches..... No.	22	17	42	38	39
Average—					
Per Cent Calf Crop..... %	45	56	64	74	86
Per Cent Cattle of Ranch Units..... %	83	84	74	71	60
Ranch Units per Man Equivalent..... No.	82	122	121	125	102
Capital per Ranch Unit..... \$	88	84	79	70	64
Feed per Animal Unit..... T.	0.92	0.88	0.90	0.80	1.01



TABLE III.—INTERRELATION BETWEEN LABOUR EFFICIENCY AND OTHER FACTORS

	Ranch Units per Man Equivalent				
	Less than 90	90-109	110-129	130-159	160 and over
<i>1938-39—</i>					
Number of Ranches..... No.	53	21	13	10	11
Average—					
Ranch Units per Man Equivalent..... No.	64	102	115	144	187
Per Cent Cattle of Ranch Units..... %	72	60	71	78	75
Per Cent Calf Crop..... %	56	58	61	62	65
Capital per Ranch Unit..... \$	75	75	68	74	65
Feed per Animal Unit..... T.	0.71	0.99	0.66	0.66	0.50
<i>1939-40—</i>					
Number of Ranches..... No.	47	16	17	20	21
Average—					
Ranch Units per Man Equivalent..... No.	63	97	120	145	201
Per Cent Cattle of Ranch Units..... %	78	62	68	67	72
Per Cent Calf Crop..... %	63	68	69	63	67
Capital per Ranch Unit..... \$	84	66	81	64	63
Feed per Animal Unit..... T.	1.22	1.52	0.91	1.18	0.75
<i>1940-41—</i>					
Number of Ranches..... No.	46	13	15	29	19
Average—					
Ranch Units per Man Equivalent..... No.	66	100	122	146	198
Per Cent Cattle of Ranch Units..... %	78	62	70	74	63
Per Cent Calf Crop..... %	66	65	64	67	74
Capital per Ranch Unit..... \$	88	70	65	75	67
Feed per Animal Unit..... T.	1.18	1.36	0.86	0.72	0.68

TABLE IV.—INTERRELATION BETWEEN CAPITAL PER RANCH UNIT AND OTHER FACTORS

	Capital per Ranch Unit, in Dollars				
	Less than 50	50-69	70-89	90-109	110 and over
<i>1938-39</i>					
Number of Ranches..... No.	26	48	52	22	18
Average—					
Capital per Ranch Unit..... \$	42	61	78	101	133
Per Cent Cattle of Ranch Units..... %	59	70	77	81	78
Per Cent Calf Crop..... %	64	59	57	58	61
Ranch Units per Man Equivalent..... No.	132	97	97	76	75
Feed per Animal Unit..... T.	0.83	0.79	0.82	1.06	0.97
<i>1939-40—</i>					
Number of Ranches..... No.	31	47	48	15	21
Average—					
Capital per Ranch Unit..... \$	41	62	78	96	136
Per Cent Cattle of Ranch Units..... %	54	72	78	79	77
Per Cent Calf Crop..... %	69	67	63	70	66
Ranch Units per Man Equivalent..... No.	145	114	96	98	88
Feed per Animal Unit..... T.	1.22	1.03	0.93	0.88	1.30
<i>1940-41—</i>					
Number of Ranches..... No.	26	44	49	16	23
Average—					
Capital per Ranch Unit..... \$	42	62	79	98	132
Per Cent Cattle of Ranch Units..... %	49	70	83	85	76
Per Cent Calf Crop..... %	77	66	65	67	57
Ranch Units per Man Equivalent..... No.	143	121	105	104	74
Feed per Animal Unit..... T.	0.94	0.96	0.87	0.69	0.99

TABLE V—INTERRELATION BETWEEN FEED AND OTHER FACTORS

	Feed Equivalent, in Tons					
	Less than 0.50	0.50-0.74	0.75-0.99	1.00-1.24	1.25-1.49	1.50 and over
<i>1938-39—</i>						
Number of Ranches..... No.	38	42	25	26	20	15
Average—						
Feed per Animal Unit..... T.	0.35	0.64	0.87	1.13	1.37	2.07
Per Cent Cattle of Ranch Units..... %	73	76	74	77	65	57
Per Cent Calf Crop..... %	63	60	59	55	58	57
Ranch Units per Man Equi- valent..... No.	129	107	86	80	82	76
Capital per Ranch Unit.... \$	67	73	81	77	72	72
<i>1939-40—</i>						
Number of Ranches..... No.	20	27	43	26	12	34
Average—						
Feed per Animal Unit..... T.	0.33	0.63	0.90	1.13	1.37	2.37
Per Cent Cattle of Ranch Units..... %	79	75	78	67	74	54
Per Cent Calf Crop..... %	66	64	68	66	62	69
Ranch Units per Man Equi- valent..... No.	145	127	94	94	100	103
Capital per Ranch Unit.... \$	62	72	76	79	68	70
<i>1940-41—</i>						
Number of Ranches..... No.	35	38	22	25	10	27
Average—						
Feed per Animal Unit..... T.	0.35	0.62	0.87	1.12	1.39	2.19
Per Cent Cattle of Ranch Units..... %	78	76	76	78	65	56
Per Cent Calf Crop..... %	66	70	67	62	50	71
Ranch Units per Man Equi- valent..... No.	145	123	95	86	110	91
Capital per Ranch Unit.... \$	71	77	78	80	66	74



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