# Canada's Rangeland Resources-A Look Ahead<sup>1</sup>

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# Highlight

Canada's cattle population is expected to increase from its present 13.7 million head to about 16.5 million head by 1980. About 5.3 million acres of additional pasture will be required to feed the extra cattle and most of it will come from land presently in grain. Range managers will be more concerned than formerly with cultivated pastures and hayland and the integration of these with native range.

Canada is a very large country in terms of total area. But much of it is inhospitable to human settlement and unproductive of renewable resources. Most of the population of 21.7 million live within one hundred miles of the International border. By the early 1980's the population is expected to increase to about 28.0 million and disposable income to rise about 70 percent. The per capita consumption of beef, now about 87 pounds, is expected to rise to 100 pounds by 1980 and to about 130 pounds by the end of the century. For various reasons, which include an advancing agricultural technology that is expected to accelerate, commodity surpluses, a growth in domestic food demand that is too slow to absorb surpluses, and rising self-sufficiency in less developed countries, farmers of the western prairies must reduce wheat acreage by about 10.0 million acres during the next few years. Present government policies are directed to the seeding of a large portion of this acreage to grass-legume mixtures for livestock production. The Canadian dairy herd must be reduced from its present 2.6 million cows to about 1.7 million by 1980 because of declining milk consumption and increased production per cow. Land and labor will become more costly (Task Force, 1969).

These are some of the forces that will affect the rangelands of Canada in the decades ahead.

Geographically, Canada can be divided into at least seven regions, each making its own distinctive contribution to the national scene. These are: the Atlantic Region; southern Quebec; southern Ontario; the Boreal Forest Complex; the Arctic Tundra; the Interior of British Columbia; and the Prairie Region (Warkentin, 1968) (Fig. 1).

The first six regions will be discussed briefly and then, in more detail, the Prairic region in which almost all of the rangelands of Canada lie.

# The Atlantic Region

The Atlantic provinces of Canada have been for the last 100 years a region of emigration. Agriculture is based upon a narrow range of cool season crops and a limited amount of arable land. Acreage of improved land reached a peak in 1891 but, soon after, pastures and hayfields were allowed to revert to brush. The trend continues. Various efforts have been made to interest farmers in beef production but with indifferent success. For example, at least three schemes involving the practical raising of cattle or sheep by western ranch techniques have failed. The Canadian government developed an extensive pasture acreage on tidal marshlands but local farmers have shown little interest in the work. Agricultural research stations in the region have solved such problems as trace element deficiency, growing forage crops on bog lands and organic soils, increasing the productivity of pasture and hayland, and establishing grazing systems for cattle or sheep. But the solutions seem to

have had little impact on the agriculture of the region.

The raising of domestic livestock has been of minor importance in the Atlantic provinces since the American Civil War; sheep numbers in Nova Scotia, for example, have declined steadily since 1872. The Atlantic provinces will have little or no effect on Canadian rangelands in the next 30 years.

# Southern Quebec

Southern Quebec is a riverine province. The population is largely French-speaking, with a culture that was transplanted from France to North America over 300 years ago. Cattle were first introduced to southern Quebec in 1628 and an early agriculture, which was secondary to the fur trade, was based on the growing of spring wheat, barley, and peas.

Agriculture in southern Quebec today is primarily dairy-oriented. Veal marketings run to over 400,000 head annually of which about 130,000 are exported to the eastern United States. The dairy herd will drop from 1.0 million cows to about one-half that number by 1980. Provincial policies, in an effort to diversify and expand agriculture, are directed to the encouragement of beef cattle production and to the feeding of dairy calves to heavier weights before slaughter. Western producers are watching these developments because about 40 percent of Alberta's finished cattle are marketed in Montreal, which is located in southern Quebec.

# Southern Ontario

Southern Ontario was a child of the American War of Independence, the backbone of the settlement being made up of British North Americans who were opposed to republican institutions and wished to remain under the British crown. The "United Empire Loyalists," as they were called, brought with them to southern Ontario an agriculture based on the pattern set in the New England colonies.

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FIG. 1. The geographic regions of Canada.

In the early 1800's wheat acreage increased in Ontario, as it had done earlier in New York state, but had later given way to dairying, livestock production, and the growing of feed grains. In 1861 the American Civil War began. By then the prairies of Illinois had been broken and were producing wheat in sufficient quantity to supply the wartime needs of the northern United States and to export considerable quantities to Europe to pay for munitions. At the same time horses and cattle were much in demand; exports from Ontario to the United States consequently rose sharply. After the war, considerable diversification of Ontario agriculture took place. Cheese-making, with a consequent increase in dairy cattle, pasture and hayland, assumed a position of importance. (Livestock and dairy products still account for nearly 60 percent of Ontario's farm cash receipts. Southern Ontario, with Alberta, dominates beef production in Canada.)

The most striking change in the cropping pattern in recent years has been a rapid increase in corn production to a little over 1.0 million acres in 1971. It is expected that the acreage will increase and that much of the 2.0 million acres now producing oats, hay, and pasture will be converted to corn. In a related development, techniques have been worked out whereby a six-fold increase in production on rough or stony grazing lands is possible through the use of birdsfoot trefoil.

The dairy industry of southern Ontario, like that of southern Quebec, is of some concern to western Canadian beef producers, and for a similar reason-the production of dairy beef. In Canada about 90 percent of the veal and about 30 percent of the beef produced comes from the dairy cattle, of which about 80 percent are raised in eastern Canada. And about 20 percent of calves in Canada are surplus male dairy calves. In the past, most of these calves ended up as veal but the trend now is toward feeding calves and finishing them as beef.

During the 1960's beef cattle numbers in southern Ontario increased about 20 percent to 2.3 million head whereas dairy cattle decreased about 12 percent to 895,000 head. These trends will continue. Pastures may be largely eliminated in the more intensive dairy and beef feeding regions of southern Ontario in the next two decades but will increase on rougher, stonier, and marginal lands of the province.

#### **Boreal Forest Complex**

The Boreal Forest, which stretches across Canada in a broad arc from Newfoundland to the Yukon Territory, was a major source of furs during the 200-year fur trading period that began in the middle of the 17th century. During this time the fur traders relied for their meat requirements on the pemmican provided by the buffalo of the southern grasslands.

The Boreal Forest Region is not attractive to agriculture. Winter comes early and stays late. Soils are thin or absent, and often organic, but with pockets of mineral soils. Agriculture has penetrated into the Boreal Forest complex only in the clay soils of the central regions of Quebec and Ontario. Agriculture in this "Clay Belt" is based upon a subsistence type of mixed farming with emphasis on dairy cattle where markets exist. Provincial government policies favor a shift to beef production in these regions also.

There has been some settlement along the southern edge of the Boreal Forest complex where it adjoins the prairie-parkland of western Canada. The Peace River District of northwestern Alberta and northeastern British Columbia might be looked on as a pocket of arable land within the Boreal Forest region. Agriculture in the Peace River District is largely confined to grain and forage seed production. With a long winter feeding period, this district is unlikely to become an important beef producing region in the next 30 years.

The Boreal Forest Region has great recreational potential, particularly for hunting, fishing, canoeing, and other outdoor sports. The region is absorbing, and will continue to absorb, much recreational pressure from the prairie rangelands, from the densely settled regions of Ontario and Quebec, and from the northeastern part of the United States.

# The Arctic Tundra

The tundra, treeless and frozen for much of the year, is perhaps the most distinctive and least known of the Canadian regions. Wild grazing animals, among them the muskox, are present in scattered areas. The muskox may have been approaching extinction when saved by full protection under law in 1917 and the creation of game ranges in 1927. Today the largest herds of muskox are on the northern islands and only scattered groups survive on the mainland. The main interest in muskox today arises from the prospects of domestication and their potential value for meat or wool.

Barren ground caribou are found throughout the Arctic. Caribou herds numbered between 2.0 and 3.0 million head around 1900 but by 1950 excessive slaughter and destruction of winter range by fire had reduced numbers to about 250,000 head. There are indications now that their numbers may be on the increase.

A few small herds of domestic reindeer, about 6,000 head in all, are located on 25,000 square miles of range in the Mackenzie River Lowlands. The reindeer were introduced to the North West Territories in the 1930's for the purpose of making the Eskimo population of the region self-sufficient in meat, but the experiment seems to have been a failure because the people have not adjusted to the life of herders.

The future of the Arctic Region lies in its mineral wealth and energy resources. At present exploration is underway but development and exploitation have hardly begun. Great damage is being done to the environment of the region. Every major Arctic island and the Mackenzie River Lowland bears the marks of resource exploration, most of it in the search for oil. The territorial mainland within the Canadian Shield, as well as Baffin Island, is spotted by mineral resource activity (Muir, 1971). The Hudson Bay Lowland is being investigated for oil and gas. In the future the range manager will be vitally interested in the Arctic because of the great need for ecological repair.

In the next 30 years cities may develop in Canada's Arctic, depending upon the extent of mineral and petroleum discoveries. The city dwellers will eat beef produced on the southern grasslands and even the native population will obtain decreasing amounts of food from the wild grazing animals. Large wilderness areas, possibly one or more National Parks will be set aside in the region in the next 10 or 20 years.

# The Interior of British Columbia

The range livestock industry of the interior of British Columbia owes its start to the discovery of gold in the Cariboo in 1858. The first cattle were trailed in from the United States. Ranches were established and continued to flourish even after gold mining declined in the late 1860's. Ranching was further stimulated by the completion of the Canadian transcontinental railway in the 1880's. By 1900 all readily available range was being grazed and fencing was common. Overgrazing began to show in the form of lowered grazing capacity and in an increase in weedy species. And the resulting shortage of grassy range led to the increased use of timber range for summer grazing.

The region is characterized by a series of irregular plateaus separated by broad, deep valleys and interspersed in places by mountain ranges. Elevations vary from 600 feet in the valleys to 6,000 feet in the southernmost ranges. Precipitation throughout the region is low because of the "rain shadow" effect of the coastal mountains. Locally, at higher elevations precipitation is greater and temperatures are lower than in the valleys. Range vegetation reflects this and changes from sparse grassland vegetation in the dry valleys through various kinds of forest at high elevations to alpine range above 6,000 feet.

Alpine range once was grazed by domestic sheep during a short summer period but is being used increasingly by cattle. In some areas, also, native ungulates are forced by changing range patterns and recreational activities in the valleys to graze alpine vegetation excessively. Because alpine vegetation is limited in extent, it may be necessary to stop grazing domestic stock on it. Conflicts have developed, and there will be increasing recreational pressure on the zone.

There are about 530,000 head of cattle on British Columbia ranges. Grazing there must fit into a pattern of multiple land use that includes timber production, watershed maintenance, wildlife protection, and recreation development. Fire protection has reached a high state of efficiency and considerable invasion of grassy range by trees is occurring. Much of the invading tree growth is of no potential value as timber but the grazing resource is being reduced nevertheless. Reseeding is not extensive and is confined mostly to the overgrazed ranges of the valley bottoms of the lower grassland zone. Recreational use of the rangelands is important and is increasing year by year. All-terrain vehicles, particularly snowmobiles, here as elsewhere, are an ecological disaster. Considerable rangeland is being purchased for summer homes by urban residents, many of the buyers coming from California. Elsewhere strip mining activity is destroying recreational areas and the winter range of wild ungulates.

Developments in the future will be like those of the immediate past—a slow but steady increase in cattle numbers, further decline in sheep numbers, intensification of agriculture in the valleys, increased recreational use, and further subdivision of ranches for summer homes. It is likely that rangeland use will be more closely regulated to permit of orderly multiple use.

# The Prairie Region

The Prairie Region is an eastward-sloping plain between the Rocky Mountains and the Precambrian or Canadian Shield. Vegetation associations include mixed prairie, fescue grassland, and parkland. Groves of aspen distinguish the parkland and white spruce, a characteristic tree of the boreal forest, increases northwards.

The range livestock industry of the Prairie Region was an extension of that in the United States. During the 1870's and early 1880's livestock rolled in a flood from the ranges of Texas to the Bow River of Alberta and beyond. By the 1920's cattle had reached the North Saskatchewan River; today there are herds far beyond it. Now there are about 7.0 million beef cattle in the Prairie Region, about half of them in Alberta. And in 1970, 44.0 million acres of native range, 4.4 million acres of bush range, 6.0 million acres of seeded pasture, and 6.2 million acres of hayland provided feed for the 7.0 million beef cattle in the Prairie Region. About 12 percent of the grazing was obtained from stubble fields and crop residue.

Thus, two-thirds of Canada's beef herd is located in the Prairie Region, where only about one-fifth of the human population of the country live. Traditionally, calves from the Prairies moved east to Ontario for fattening on corn and corn silage. But in the last few years there has been a major switch and the bulk of Prairie cattle are being fattened and killed on the Prairies, then shipped as carcasses to the eastern Canadian and West Coast markets.

The number of cattle on the prairies declined slightly between 1965 and 1968, after a period of depressed prices, but the overall trend has been upward. Most indications are that the trend will continue upward. For example, a recent study (Task Force, 1969) concluded that there was a potential market in the United States for 500,000 feeder cattle annually, all of which would be produced in the West.

Canadian ranchers tend to be suspicious of such conclusions and to feel that the national beef herd should expand slowly and cautiously. They point out that when economic conditions warrant expansion of the industry, then expansion will occur. The economy under which Canadian producers operate is North American rather than Canadian. The U.S. beef herd is about ten times as large as the Canadian beef herd and costs of production both seem to be about the same. Therefore, the U.S. market strongly influences Canadian prices and trends.

Nevertheless, informed opinion is that the Canadian beef herd will expand (Hiscocks, 1971). Therefore, despite the severe climatic limitations of Canada, there is a rising need for forage crop production. In 1951 forage crops in Canada totalled 21 million acres and rangeland about 54 million acres. compared to 26 million acres of forage crops and 52 million acres of range in 1970. All of the expansion occurred in the Prairie Region where the area of forage crops rose from 6.0 million acres in 1951 to 13.0 million acres in 1970. The Prairie beef herd increased about 100 percent during the same period. By 1973 forage crops will account for about 15.0 million acres as a result of various federal and provincial forage crop expansion programs now underway that are designed to take land out of grain production.

The number of dairy cows in Canada reached a peak of 3.5 million head in the 1950's but dropped to 2.6 million head by 1971. Beef cow numbers rose from about 1.0 million head in 1951 to about 3.0 million in 1971. Total cattle numbers in Canada, at 13.7 million head in 1971, declined in the Atlantic region during the previous 20 years, showed no clear trend in direction in Quebec, rose steadily in Ontario and British Columbia, and rose rapidly on the Prairies (Task Force, 1969).

Because of current and projected increases in consumption of red meat, the possibility of expanding export markets, and a change in the size of the national dairy herd, the number of cattle in Canada is expected to increase to about 16.5 million head by 1980, a one-fifth increase over the existing number. Also, the demand for forages will rise about 30 percent during the same period, an increase of about 5.3 million acres. Most of the increase in cattle numbers and forage acreage will take place on the Prairies, and most of the forage acreage will come from land now in grain. The prairies will produce more beef because cattle provide the best alternative to wheat and feed grains. Eastern Canada will produce more beef cattle and less dairy cattle.

The implications for the range manager of the future are obvious. He will have to be more concerned than before with seeded pastures and hayland, and with integrating these with native range. Because much grain land will be going into grass, he will have to be concerned with such things as fencing and water development. The increased numbers of cattle will lead to increased pressure on native range and, hence, to such measures as the application of fertilizer in areas of adequate rainfall, reseeding of the better native range, and weed and brush control. In related developments the number of feedlots will increase throughout Western Canada as ranchers seek to retain control of their animals until finally sold as beef. Environmental considerations will have a marked influence on the location and density of livestock operations, including feedlots. The disposal of animal wastes will be subject to stringent regulations.

The range manager will have fewer ranchers with whom to work, because the number of farms and ranches will decline substantially in the next couple of decades. Some will still be family operations but all will be profit-oriented businesses. Mergers and consolidation will result in units large enough to afford the best management.

Although the urban dweller of

the 1980's will have few direct ties to the land, he will have an ever increasing say in the administration and disposition of public land. Opposition by an increasingly hostile public will bring an end to such things as coyote poisoning campaigns. Grazing of cattle in the forest reserves and provincial parks of Alberta will end in the next 10 years. And while ranchers today assume that grazing on public lands is a right, the possibility exists that, in the future, this may become an unwarranted assumption.

Intensification of ranching operations will lead to more breeding by artificial insemination. Organizations that undertake artificial insemination predict that 20 percent of the Prairie beef cow herd will be bred artificially in the 1980's, compared to the present 5 percent. More attention will be paid to animal nutrition, especially as it relates to reproduction, to fall calving, and possibly to twinning. Researchers believe that by the 1980's about 75 percent of Prairie beef cows will be cross-bred and that greater emphasis will be placed on animal genetics. Leading ranchers in western Canada are using computers now; an increase in computer-centered data processing systems and management assistance plans can be expected in the future.

In some areas of the livestock business of western Canada the trend toward intensification is not yet apparent. Few operators have become involved in environmental control and confinement rearing of sheep, a technique that may represent the last hope for the survival of the sheep industry in western Canada. Still another development is the formation of farmer cooperatives to market grain through livestock, a development that will create an additional market for feeder cattle and, hence, should stimulate basic production.

There is considerable agitation in western Canada for the establishment of grassland wilderness areas and grassland parks. The most re-

cent proposal envisages the creation of a wild horse refuge in the foothills of western Alberta. If the demands are met some rangeland will no longer be available for grazing. Nevertheless, the range manager of the future will be much involved in recreation (Jackson, 1970). In western Canada loans and assistance are available to the farmer or rancher who wishes to attract paying guests to his holdings. In Alberta the trespass law likely will be changed soon to put the onus on the trespasser, rather than the land owner. It will be up to the trespasser to determine who owns the land he intends to enter and to obtain permission to enter it. The new regulations will open the way to paid hunting or paid recreational use of wild lands. Needless to say, the impending regulations are being vigorously opposed by the urban sportsman who still regards the region as an open frontier. But the hiker, the hunter, the photographer, and the seeker after space and solitude, soon will have to pay for the privilege of setting foot on the rancher's land (Hedlin and Hedlin, 1971).

Paid hunting should resolve the hunter-rancher controversy. Every fall the rancher sees his rangeland invaded by an army of hunters. With them comes the possibility of fires, damage to fences, wounding and killing of livestock and disruption of productive activities on the ranch. These occurrences, and the provision of forage for game animals, are positive, measureable costs (Hedlin and Hedlin, 1971). Changes in game laws and game management policies may be needed in support of the objective of paid hunting. The new regulations will apply to leased or Crown land, as well as to deeded land.

A related development of concern to range managers is that of mineral exploitation. In western Canada this primarily takes the form of strip mining for coal, a practice that is already spoiling recreational and scenic areas along the foothills of Alberta. Much of the winter range of bighorn sheep, goat, and Rocky Mountain caribou is being destroyed. Watershed values are being impaired. There is considerable public opposition to the damage being done by resource exploitation and the controversy over it is destined to become much hotter in the future. The demands on range managers and workers in other disciplines for assistance in programs concerned with ecological repair will increase greatly.

A Land Use Planning Committee is at work in Alberta and we can expect to see rural zoning in the next 20 years. Work of the committee will be helped by the launching of the first Earth Resources Technology Satellite, which will make available detailed pictures of the entire province taken at 18-day intervals. These data will be used by the land resource administrator although it is difficult even to speculate as to how the information will be used. And it appears possible that farmers and ranchers may become direct users of remote sensing photographs to detect diseased vegetation, to determine range condition, to locate springs and seeps for water development, and in other practical ways.

The year 1980 is only 8 years away, about 1.5 generations in the cattle population (Slen and Cameron, 1969). The establishment of new systems of management will take time to achieve. But by 1980, according to current projections, the cattle population in Canada will be about 16.5 million head, about one-fifth more than now. The range manager will have to provide about 5.3 million acres of additional forage to feed the extra cattle. Most of the increase in cattle numbers, and in forage acres, will occur in the Prairie Region-the southern part of the provinces of Alberta, Saskatchewan, and Manitoba. Ranches will be fewer but larger. The intensification of methods will mean more feedlots, greater use of techniques such as

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artificial insemination, crossbreeding, and fall calving. New methods of increasing production from range and tame pasture will have become common. The rancher will have become involved in providing various recreational facilities that will contribute a significant percentage of his income. The range technician will find himself deeply involved in ecological repair of damage caused by resource exploitation and an ever-increasing urban population.

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