

RANCHING IN THE SEMIARID NATIVE GRASSLANDS OF SOUTHERN SASKATCHEWAN, CANADA

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ABSTRACT

Ranching in the semi-arid native grasslands of Saskatchewan is governed by numerous factors that are not much different from those influencing ranching elsewhere in the semi-arid regions of North America. While the impact of some factors can be controlled or minimized at the ranch level, many of the factors, such as the price of fuel, trade rules, livestock markets and environmental pressures, are external to the ranch and the individual rancher has little or no control over them. Such factors may be best addressed in a cooperative and coordinated fashion by both government and industry organizations. At the ranch level, an effective strategy is needed to successfully face the present challenges and to take advantage of the present and future opportunities. Such strategy should aim at achieving specific ranch goals, including economic and ecological sustainability. Emphasis should be on reducing input costs and on exploring potential diversification avenues. This can be done through an integrated planning and monitoring approach, such as Total Ranch Management.

INTRODUCTION

Cattle ranching in the semi-arid grasslands of southern Saskatchewan is a recent activity that followed the decimation of the indigenous buffalo herds and the promotion of European settlement in the region in the late 1880s and early 1900s. This paper describes the ecology of the region and discusses ranching history, practices, issues and opportunities, with special reference to the Block Ranch located in the heart of Canada's Mixed Grassland Ecoregion.

RANCHING AND LAND USE HISTORY

Early ranching in the Northwestern Territories, which included the present borders of Saskatchewan, started in the late 1800s. That era was characterized by very large cattle ranches formed by absentee owners from the United States and Great Britain. Examples of such ranches are the 76 Ranch, the Turkey Track Ranch, the Gull Lake Ranching Company, the Fenton Ranch and the Matador Ranching Company. During that period, ranching and other agricultural settlements were encouraged by such measures as the signing of treaties between the Dominion Government and Plains Indian Tribes, the public land survey, and the completion of the first transcontinental railway by the Canadian Pacific Railways in 1885. By the early 1900, however, most of those ranches failed due to mismanagement, adverse weather conditions and economic depression; and were replaced by numerous smaller ranches.

Nevertheless, the region experienced a rapid growth of population between 1901 and 1916 due to such factors as the rapid expansion of railways and the "free homestead" policy. The drought and the Great Depression of the 1930s coupled with farming practices unsuited for the semi-arid region of the province led to the abandonment of many homesteads. Soil erosion was particularly severe in the Brown Soil Zone which is part of the dry area commonly known as the Pallisar Triangle. The Land Utility Act was passed in 1935 to deal with farmland abandonment and associated environmental problems. Shortly after, the Prairie Farm Rehabilitation Administration (PFRA) was established to carry out the act's responsibilities, including soil erosion control. Much of the abandoned land was taken over by PFRA and the Province to convert into community pastures.

Breaking of land for farming left only 6.3M ha of native prairies in Saskatchewan, mostly in the southwest area. About 44% of that is owned by the Crown and is administered by the Lands Branch of Saskatchewan Agriculture and Food. The majority of the Crown grazing land is leased to individual ranchers or farmers or grazing cooperatives. Crown land lease rates are based on grazing capacity but is indexed to cattle prices. In addition, there are 130 community pastures, with a total area of 1.04 M ha, that are administered by the Lands Branch and PFRA.

Total area of tame pastures in the province is 1.08 M ha. Many perennial tame forage species are seeded for pasture including crested wheatgrass, Russian wildrye and alfalfa in the south and smooth brome, meadow brome, creeping red fescue and alfalfa in the north.

Although grazing lands of Saskatchewan represent a relatively small portion of the total agricultural area of 27 M ha, they contribute about \$995 M annually to the farming economy. Total cattle and calves in 1995 reached 2.8 M, a 17% increase over the previous 5 year average.

THE PRAIRIE ECOLOGICAL ZONE

The Prairie Ecozone represents the northern extension of the North American Great Plains. The landscapes of this ecozone have been highly modified by glaciation about 10,000 years ago. Four ecoregions varying in climatic characteristics and the dominant vegetation are recognized in this zone: (1) Mixed Grassland; (2) Moist Mixed Grassland; (3) Fescue-Aspen Parkland and (4) Cypress Hills (Figure 1). The Grassland Ecoregions are located in the southern part of the province and are the driest and warmest of all the Ecoregions. The Fescue-Aspen Parkland Ecoregion is located north of the Grassland Ecoregions and receives an average annual precipitation of 450-550 mm and has a precipitation : evaporation ratio of about 1.00. Vegetation is a mosaic of rough fescue prairies and aspen groves. The Cypress Hills Ecoregion is located in the southwest corner of the Mixed Grassland Ecoregion, but it is characterized by much higher precipitation and greater precipitation : evaporation ratio due to its higher elevation (400-500 m above the surrounding plains). Vegetation ranges from a lodge-pole pine forest community at the higher elevation to a rough fescue prairie at the intermediate elevations.

While 20% of Canada's Mixed Prairies remained in a native state, less than 5% of the Fescue Prairie-Aspen Parkland missed the plow. Although breaking of much of the remaining areas is limited due to such factors as roughness, stoniness, erodibility and salinity, ranching has been recognized as an important factors for retaining them in a native state.

This paper deals mainly with the Mixed Grassland Ecoregions. The Mixed Grassland Ecoregion roughly coincides with the Brown Chernozemic Soil Zone of the Province. Annual precipitation averages 250-350 mm and precipitation : evaporation ratio is 0.5 or less. The dominant grasses here are needle-and-thread, blue grama, western wheatgrass, and northern wheatgrass. The Moist Mixed Grassland Ecoregion forms a strip north of the preceding Ecoregion and coincides with the Dark Brown Chernozemic Soil Zone. The

average annual precipitation is 350-450 mm and the precipitation : evaporation ratio is 0.6-0.9. The dominant grasses are western porcupine grass, northern wheatgrass and western wheatgrass. Rough fescue occupies the more favourable positions while needle-and-thread is found on the drier positions and coarse textured soils.

The main productivity constraints in the Mixed Grassland Ecoregions are the low precipitation, low precipitation : evaporation ratio, and the short growing season. Nitrogen is the second most important limiting factor. The regions are characterized by recurring droughts and by substantial variations in the seasonal distribution of precipitation. The grazing capacity of the normal upland range sites range from 0.25 AUM/acre in the Mixed Grassland Ecoregion to 0.45 AUM/acre in the Moist Mixed Grassland Ecoregion.

No province-wide range condition surveys have been conducted in Saskatchewan. However, spot surveys suggest that about 50% of the Province's rangeland is in the good range condition class or higher. Range condition strongly influences the recommended stocking rate.

Native prairies also provide habitat, water and food for an array of mammals, birds, insects, reptiles and amphibians. Common wildlife species include: pronghorn antelope, white-tailed deer, mule deer, water fowl, and a variety of songbirds.

RANGELAND AND PASTURE MANAGEMENT

Two broad types of livestock operations exist in the province: (1) Ranches with relatively large areas of native rangeland and little or no cropland, and where livestock, mainly cattle, is the main source of income; and (2) Mixed farms with livestock and field crops where cattle numbers are smaller and the proportion of income from field crops is usually greater than that from livestock. However, the livestock component of the mixed farms has been steadily growing in recent years.

Prior to the start of the Grazing and Pasture Technology Program (GAPT) around the mid 1980s, range management extension in the province was lacking. This program, which is administered by the Saskatchewan Stock Growers Association, has played an important role in increasing the awareness of the importance of proper range management, in providing range evaluation training to producers and others and in helping many individual producers apply the principles of range planning and management.

The Permanent Cover Program, which is administered by the PFRA, has resulted in seeding more than 200,000 ha of marginal cropland to perennial forages. This new source of forage has helped to lessen grazing pressures caused by the increase in animal numbers.

In the south, the seeded pastures are used mainly for spring and/or fall grazing in conjunction with native prairie which is usually the main grazing resource. In the north, seeded pastures constitute a major source of grazing and may be used throughout the grazing season. The grazing season in the south can vary from 6 months (May to September) to 10 months. In the north, the grazing season is much shorter, often around 5-6 months. Grass, alfalfa or grass-alfalfa hay or fall rye greenfeed are used for winter feeding. Hay prices fluctuate considerably depending on such factors as the growing season's conditions as well as winter weather conditions. Silage is also used to a much lesser extent than hay and greenfeed.

Saskatchewan producers employ a number of grazing systems including: (1) season-long grazing; (2) tame pasture/native prairie complementary system; (3) short-duration; (4) seasonal and (5)

deferred rotation. The number of operations adopting the last four systems has been steadily increasing over the last ten years due mainly to the efforts of the Grazing and Pasture Technology Program.

Although the "Save-Our-Soil" program of the late 1980s and early 1990s focused mainly on cropland, it was followed in 1993 by the Canada-Saskatchewan Green Plan which included rangeland and pasture management efforts. More marginal cropland was seeded to perennial forages and many range and pasture demonstrations were established. On-the-farm planning was encouraged. More recently, the Canada-Saskatchewan Agri-Food Innovation Agreement is supporting a province-wide extension program entitled "Sustainable Forage Systems" which is being delivered jointly by the Saskatchewan Stock Growers Association and Saskatchewan Agriculture and Food since April, 1997.

CURRENT ISSUES AND OPPORTUNITIES

Most ranchers in southern Saskatchewan has learned to deal with the ecological or natural constraints such as the semi-arid conditions, the inherent low productivity of the remaining native prairies and the recurrent droughts. However, there are many other external factors that influence their operations and their profitability, including:

- (1) the rising input costs (e.g. fuel, machinery, lease rates, labour);
- (2) the increase in the native rangeland property taxes due to a 30-year assessment update which reflects a partly "artificial" increase in the value of native rangeland;
- (3) the fluctuating livestock prices;
- (4) the land use conflicts resulting from multiple uses such as hunting, resource extraction and recreation;
- (5) the declining Canadian per-capita beef consumption, perhaps due to misconceptions about the nutritional aspects of beef and/or environmental effects of cattle ranching; and
- (6) the multiplicity of factors influencing the livestock/beef export opportunities.

The individual producer has little or no control over most of the above issues. However, most of those issues are being addressed by the industry through joint producer-government organizations or producer groups or institutions, such as the Beef Development Centre, the Beef Information Centre, the Beef Export Development Federation, the Saskatchewan Stock Growers Association and the Canadian Cattlemen Association.

There are also a number of opportunities that are available to the Saskatchewan Ranchers including:

- (1) diversification opportunities, including sheep, bison, elk, deer or ecotourism enterprises;
- (2) the globalization of livestock/beef markets with the high export potential to the Pacific Rim countries;
- (3) the recent changes in the grain transportation policies and the railway short-line abandonment which may encourage expansion in grazing resources and maintain or lower feed grain costs;
- (4) the trend towards converting marginal croplands to permanent pastures; and
- (5) the potential for applying techniques for extending the grazing season.

THE BLOCK RANCH DESCRIPTION

The Block Ranch is located about 85 km northwest of the city of Swift Current. It is situated in the northeastern corner of the Great Sand Hills within the Mixed Grassland Ecoregion of Saskatchewan. It is managed by the Block family with a limited additional hired help. The ranch consists of about 22,700 ha of native rangeland and

about 1,200 ha of farmland used mainly for green-feed and silage production.

CLIMATE

The climate of the area is semi-arid with average annual precipitation of 342 mm (Maple Creek data). About 68% of the precipitation takes place during the growing season, i.e. April-September. June is the rainiest month with long-term average of 63.5 mm. The average daily temperature is 20C and -10.6C in July and January, respectively. The average daily maximum temperature is 27.7C and -3.8C in July and January, respectively; while the average minimum temperature is 11.7C and -17.2C in July and January, respectively.

THE BASIC RANGE RESOURCE

The main range sites in the ranch are dune sands and sands. About 75% of the total area is classified as dune sands range site. Topography is mostly moderately to strongly rolling with some dune areas having very steep slopes. Inter-dune areas are generally gently sloping or depressional. About 8% of the area is classified as "waste" lacking significant vegetation cover due to salinity or active soil erosion.

With the exception of the farmland, the areas suitable for seeding to tame grass are very limited. The main factors limiting cultivation in the area are: (1) insufficient soil moisture holding capacity; (2) susceptibility to erosion by wind; (3) unfavourable topography; and (4) excessive soil salinity.

The main range type in the ranch is a native grass-shrub kind associated with the dune sands range site. The principal grasses in this type are sand grass, a warm-season grass and needle-and-thread (common spear grass), a cool-season grass. Other grasses include northern wheatgrass, June grass, sand dropseed and Indian rice grass. The main forbs are lance-leaf psoralea and golden aster. The dominant shrubs are silver sage (sage brush), pasture sage and rose. Other shrubs commonly found in this type are choke cherry, creeping juniper, western snowberry, willows and buffalo berry. Active dunes may have a sparse cover of Indian rice grass, lance-leaf psoralea, sand dropseed, sand grass and six-week fescue.

Small wooded areas are scattered throughout the dune sands range site, occupying about 10% of the total area. Aspen is the principal tree with an understorey consisting mainly of sand grass, needle-and-thread, creeping juniper, western snowberry, and woods rose.

The vegetation of the inter-dune areas varies depending mainly on the degree of soil salinity and moisture regime. The highly saline areas supporting plant growth have a very sparse cover of salt tolerant plants such as red samphire, Nuttall's alkali grass and salt grass. Relatively dry areas with moderate salinity support western wheatgrass, salt grass, and blue grama. Prairie cordgrass and mat muhly are often found in moderately saline areas with higher soil moisture supply. Lightly saline and nonsaline areas that are subirrigated support little bluestem, kentucky blue grass and/or Baltic (wire) rush. Sand grass, creeping juniper, low sedges and northern wheatgrass are found on coarse-textured, nonsaline flats.

Typical native mixed prairie is found in small areas associated with sands, sandy and loamy sites. The main plants here are needle-and-thread, northern wheatgrass, June grass, blue grama, low sedges and pasture sage.

Based on a reconnaissance survey conducted in 1991, about 75% of the native range is in good range condition. About 25% is in the fair

or fair-good range condition classes. The larger fields exhibit better range condition than the smaller fields which are used for special purposes such as holding and calving. The main plant increasers on the dune sands range site are sand grass, pasture sage, silver sage and golden aster. On the sands range site, the principal increasers are sand grass, blue grama, pasture sage and low sedges. The increasers in the sandy and loamy range sites include pasture sage, low sedges and blue grama.

The ranch, being located in the Great Sand Hills area, supports a variety of wildlife species. It is very popular for mule deer hunting. The most recent survey (1995-96) reported a mule deer population of 4600 animals in all the survey blocks in the Great Sandhills area. The most recent survey (1995-96) indicated a mule deer density of 3.7 deer/km² in the immediate area of the Block's Ranch (Zone 10). This represents a slight increase (3.%) over the 1994-95 level. Average density for the years 1989-1996 is 5.2 deer/km².

White-tailed deer and pronghorn antelope may also be found but they are not as common as mule deer. Sharp-tailed grouse is an important game bird here. The area is also rich in songbirds. Several species of hawks are observed, including Ferruginous hawk. Both golden eagle and bald eagle inhabit the area.

PLANNING AND MANAGEMENT

Carl Block has a post secondary background in range management and has enthusiastically participated in many conferences, seminars, workshops and field days (some of which was sponsored by his ranch) on range management and total ranch management. The Blocks recognize that many of the challenges discussed above are external to their operation. However, given the above background, they felt that integrated ranch planning, or total ranch management, may be the best approach to properly face the above challenges and to take advantage of potential opportunities. This planning process involves a comprehensive evaluation and analysis of all ranch resources and is goal-directed. The family has defined their main family/ranch goals as follows:

- (1) to continue the ranching business/lifestyle through retaining the ranch lease/ownership;
- (2) to provide for secondary education of their kids;
- (3) to improve the bottom line through diversification and reduced input costs; and
- (4) to improve and maintain range condition to enable expanding their cow-calf operation.

The grazing capacity of the native range is estimated to be 10,600 Animal Unit Months (AUM). An AUM is the amount of forage required by a 1000 lb cow with or without an unweaned calf for a month. At present, the ranch supports 900 Angus-based cow-calf pairs and about 200 yearlings for replacement or sale. Following the drought of the mid 1980's, the stocking rates were kept at or below the 850 cows level until recently to allow for range recovery.

The ranch is divided into 6 main grazing fields ranging in size from 1800 to 6000 ha. Livestock water is provided by a series of dugouts, wells and windmills with a density of one watering point per 2.5 sections of land. The first priorities in the late 1980s and early 1990's were to improve range condition through conservative stocking and to improve stock water which contributed significantly to improved grazing distribution and perhaps to animal performance. The cattle is divided into two herds grazing the six main fields in a deferred rotation and wintering takes place near the ranch's headquarters. Deferred rotation involves delayed grazing and rotating grazing time among a number of fields. Calving takes place mostly during April-

May to avoid adverse weather conditions of late winter and to allow for grazing on good quality forage during most of the lactation period.

The present management priorities centres around two inter-related changes:(1) establishing crested wheatgrass pastures on suitable land for early grazing to delay grazing on the native prairie; and (2) gradually “retiring” the farmland by establishing tame forage that will extend the grazing season and save on the costs of fuel, machinery maintenance and labour as well as provide for soil conservation. As a start, a 40 ha area was seeded to crested wheatgrass. Eventually, 1600 ha, including all farmland, will be seeded to perennial forages for grazing and/or hay production. A range monitoring program has been initiated in 1993 to assess the effects of management changes.

Despite the large fields and the rough topography, grazing distribution problems are surprisingly fewer than expected. The strategic placement of water and salt appeared to have contributed to improved grazing distribution. Further improvement in grazing distribution has been achieved by a 6 km cross fence established recently in the largest field.

The family enjoys the wilderness, the variety of native plant species and wildlife species and the sand dune landscape. They welcome hunters and they even offer them a map of the ranch and some directions. However, due to cattle winter grazing, hunters are expected to:

- (1) pre-report their presence in the ranch;
- (2) stick to the trails;
- (3) refrain from starting open fire; and
- (4) not to leave trash behind.

The family has been concerned with the disturbances associated with the exploration and production of natural gas in the Great Sand Hills, their ranch included. Due to their concern and their interest in diversification, they have decided to form a reclamation company utilizing native plant species and specializing in sandy site reclamation. The company has been involved in revegetation projects in the area for several years.

CONCLUSIONS

Ranching in the semi-arid native grasslands of southern Saskatchewan is governed by numerous factors. Many of those factors are not much different from those influencing ranching elsewhere in the semi-arid regions of North America. While the impact of some factors can be controlled or minimized at the ranch level, many factors, such as the price of fuel and machinery, trade rules, livestock markets, and environmental pressures, are external to the ranch and the individual rancher has little or no control over them. Such factors may be best addressed through joint efforts among government and industry organizations.

At the ranch level, an effective strategy is needed in order to successfully face the present challenges and to take advantage of the present and future opportunities. Such strategy should aim at achieving specific ranch goals, including economic and ecological sustainability. Emphasis should be placed on reducing input costs and on exploring various diversification options. This can be done through a comprehensive, integrated, proactive planning and monitoring approach. Programs applying such an approach exist and are being employed in the U.S and have been introduced recently in Western Canada. Total Ranch Management and Integrated Western Ranch Education are examples of such programs. Those programs rely less on technology and more on information and management to achieve the most important short-term and long-term ranch goals.

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Figure 1
Ecoregions of Saskatchewan

