

## **Relating Agricultural Land Practices to Landscape Characteristics: the Prairie Perspective**

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This paper is an excerpt from the *Executive Summary of Prairie Agricultural Landscapes - A Land Resource Review*, prepared by PFRA. The Prairie Agricultural Landscapes (PAL) report includes a unique regional analysis, to the array of resource assessments performed on the Prairie region over the past two decades. In addition to a discussion of the Agricultural Land Practices, the report provides an overview of the *State of Land and Water Resources*, by addressing the issues of Soil Erosion, Salinity, Organic Matter, Water Quality, Riparian Areas, Rangeland and Seeded Forages. A discussion of the *Issues Facing Management of Land Resources* looks at decision making in the Public Level, Community Level and On-Farm as well as in the Environment. *Prairie Agricultural Landscapes - A Land Resource Review* will be available from PFRA in June, 2000. **(March 26, 2000)**

### ***Introduction***

The Prairie Agricultural Landscapes (PAL) study is designed to help focus and direct PFRA's future programs and activities centred on sustainable land use, specifically in the area of healthy and productive agricultural lands.

Resource conservation and economic viability are paramount to the long-term prosperity of the agriculture industry and rural areas of the Prairie provinces. Economic factors – as the dominant forces driving change on the Prairie agricultural landscape – will spur the growth in demand for primary and processed goods.

The Canadian Agri-Food Marketing Council (CAMC) has set an ambitious target for the agricultural industry. CAMC has challenged primary producers, processors and governments to significantly increase Canadian agriculture and agri-food exports to 4% of the global agri-food market share by the year 2005. To achieve this goal, the export mix must change from 60% primary product and 40% processed product to 40% primary products and 60% value added products.

Much of the primary production growth needed to meet the CAMC trade target is expected to come from the Prairies, which comprise more than 80% of Canada's agricultural land base. The increase in production and processing of goods in the Prairie region will pose numerous challenges for the sustainable management of the resource. The land base required to meet these targets is forecast to come from improved crop management, reduction of summerfallow, and increased pressure to cultivate environmentally sensitive lands. The implications of these changes in the agriculture and agri-food industry must be evaluated from economical, sociological, and environmental perspectives.

To be successful, Prairie producers have adjusted to different climates and soil types, and adapted to changing markets, technology and transportation systems. The relationship between current land use and farming practices in the many Prairie landscapes can be used to evaluate the potential of these landscapes to adapt to future economic and environmental scenarios.

### ***Recent Land Use Changes***

For the period 1971 to 1996, the total land reported on farms has remained relatively constant, however the reduction in summerfallow area since 1981 has allowed for additional land in crops. A positive sign for soil conservation has been the significant acceptance of reduced tillage technologies.

Cattle populations have been increasing since 1986, with production dominated by Alberta. Hog production, meanwhile, has undergone rapid increases in Manitoba and Alberta since 1976, with Manitoba surpassing Alberta in 1996. Poultry populations have remained relatively constant, however, the concentration of production has increased significantly. Livestock populations, with the associated demands for pasturing cattle and increased competition for land to produce feed grains, may impede efforts to increase the value of agricultural exports.

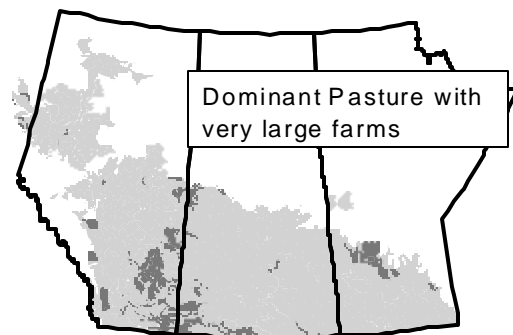
### ***Defining Land Practices Groups***

It has long been understood that agricultural land use is related to landscape characteristics, and further, that the opportunity and ability of agricultural systems to change is limited by landscape. In the PAL study, areas with similar agricultural practices and land uses are grouped together, then the soil and landscape types found within each group are characterized. This approach identifies the range of landscapes which can support a given set of farming practices.

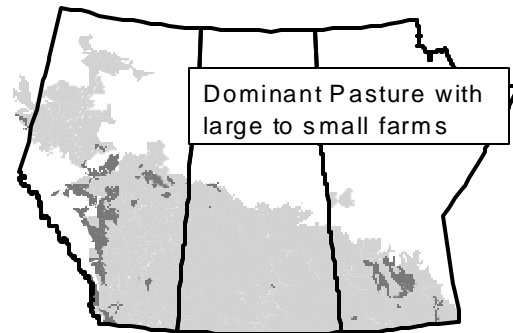
The Land Practices Groups were defined using a statistical analysis of the 1996 Census of Agriculture compiled by Soil Landscape of Canada (SLC) polygon. Distinctive soil landscape types from the SLC data were developed and the proportion of these landscapes in each Land Practices Group was determined. The combination of soils and land use helped relate the specific SLC polygon to the issues described in the State of Land and Water Resources.

### ***Land Practices Group Descriptions***

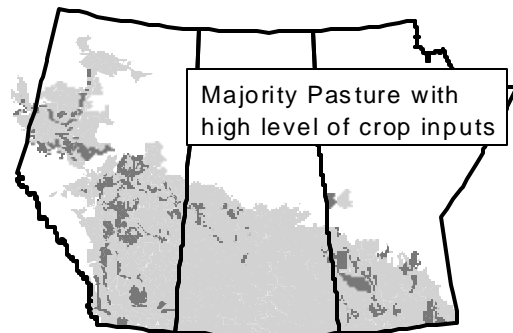
*Dominant Pasture with very large farms* has 81% of the land in pasture or hay, and are found in the drier areas and along the geographical limits of agriculture. These groups have mainly marginal land for cultivation. Farm size is almost three times the Prairie average at 1131 ha. This group is a very important area of natural biological diversity. Nearly three quarters (71%) of farmland in this group was in native vegetation in 1996, representing one-fifth of all native vegetation in the agricultural lands of the Prairies.



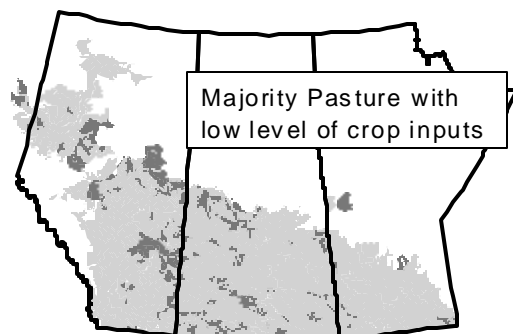
The *Dominant Pasture with large to small farms* group is found mainly along the fringe of agriculture in the foothills of Alberta and the Interlake in Manitoba. Farm size is significantly smaller than the Prairie average at 275 ha. This area has 78% of the land in pasture and hay, but more of the land is in tame hay and alfalfa than in the previous group. Input costs for this group are much higher than average for the Prairies, and summerfallow represents only 17% of cultivated land. Cereals dominate the cropping, with barley the most common grain.



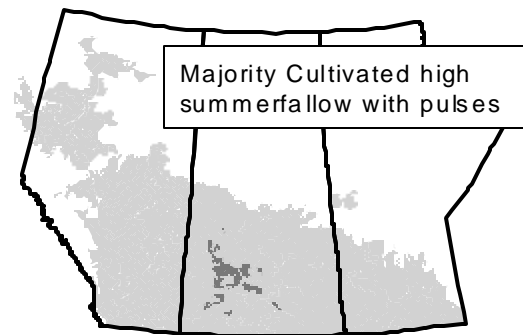
More than 10% of Prairie agricultural land is in the *Majority Pasture with high level of crop inputs* group. Over half of this land is in pasture and hay, but relatively intensive cultivation is practiced. These areas are found near Edmonton, in southern Alberta, and northwestern Manitoba. Parts of the irrigated areas of Alberta are also included in this group. Almost two-thirds of the pasture and hay land is cropped as alfalfa or tame hay. Annual cropping in this group is characterized by high cereals (mostly barley), low summerfallow and significant (13%) oilseeds.



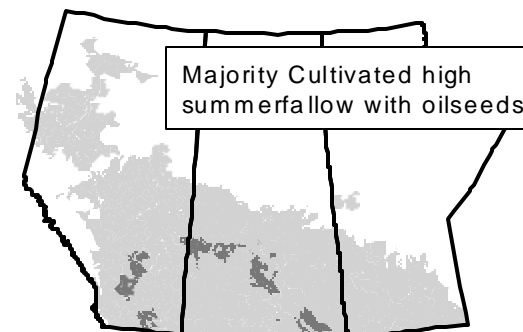
The *Majority Pasture with low level of crop inputs* group is generally found in drier areas than the previous group. Significant soil landscapes in this group include the hummocky topography of the Missouri Coteau and the cooler, wetter soils along the margin of cultivation. Nearly half of the pasture land is on native vegetation.



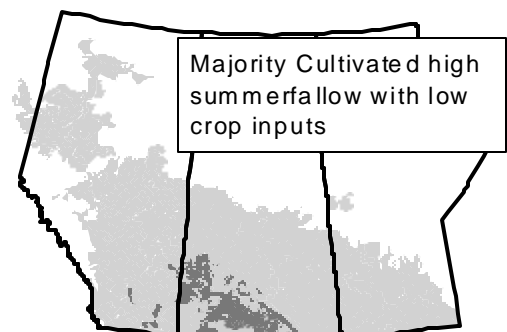
The *Majority Cultivated high summerfallow with pulses* group has 19% pasture and hay, with one-third of cultivated land in summerfallow. These areas are in the more productive areas of the Dark Brown soils between Rosetown and Saskatoon, and Brown soils near Swift Current. A quarter of the farms grew lentils, comprising a significant portion of the 6% pulses. Another 6% of the land was cropped to oilseeds that included canola and mustard.



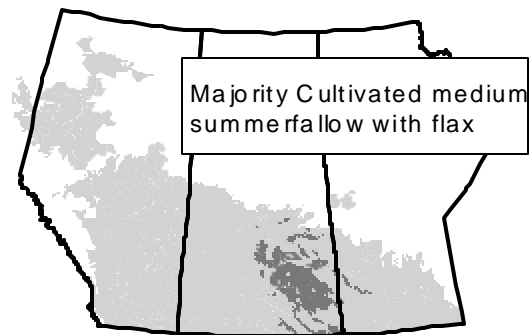
The *Majority Cultivated high summerfallow with oilseeds* group is found almost exclusively in the Dark Brown soils in Alberta near Drumheller, Vulcan and Warner, and in Saskatchewan near Unity, Davidson and Estevan. Although only 20% of the land is in pasture or hay, 46% of the farms have cattle. Most of the non-cereal annual crop is oilseed, and fallow is an important part of the crop rotation on most farms. Typical rotations include summerfallow-cereal-cereal, and summerfallow-oilseed-cereal-cereal.



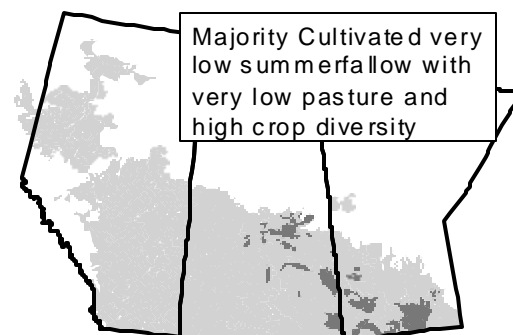
The *Majority Cultivated high summerfallow with low crop inputs* group is almost exclusively in the Brown soil zone, and has traditionally been the wheat-fallow land of southern Saskatchewan and southeastern Alberta. This area is a blend of summerfallow-wheat, and summerfallow-wheat-wheat rotations. Crop inputs in this group are less than half of the Prairie average.



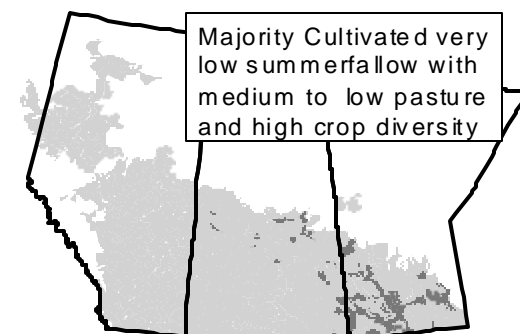
The Black till plain of east central Saskatchewan around the Indian Head area, is a good example the *Majority cultivated, medium summerfallow with flax* group. Two-thirds of the soils are fairly uniform, well-drained Black Chernozems developed on undulating till plains. Two-thirds of the farms with cropland reported summerfallow, a higher proportion than groups on similar soils. The area has a significant percentage of land in oilseeds (13%) and in flax (4%).



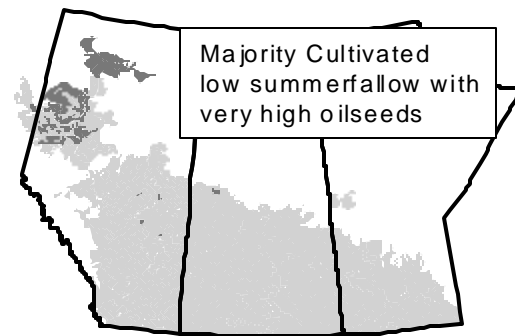
The most diverse and intensive cropping on the Prairies occurs in the *Majority cultivated, very low summerfallow with very low pasture and high crop diversity* group, which contains some of the most productive lands on the Prairies, and includes the Red River Valley, the Brandon area, parts of southwestern Manitoba and in the Carrot River Valley of Saskatchewan. This group had the lowest percentage of land in forages, and lowest number of cattle per farm on the Prairies. Crop production was the most intensified and diversified on the Prairies, with a mix of oilseeds, flax and pulses.



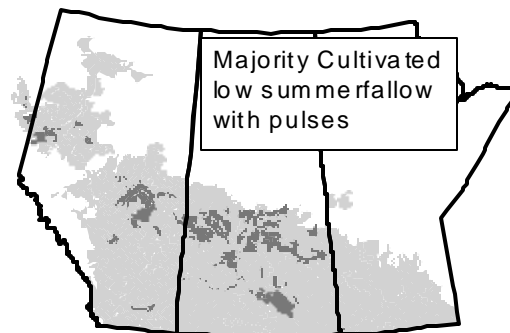
The *Majority cultivated, very low summerfallow with medium to low pasture and high crop diversity* group is mainly found in Manitoba, on the more variable soils that surround the previous group. This group had twice the proportion of farms reporting cattle and pasture than the previous group, and a very high proportion of farms had alfalfa and hay. Continuous cropping was commonplace, with typical rotations including cereal-cereal-canola/flax/pea, or cereal-cereal-cereal-canola/flax/pea.



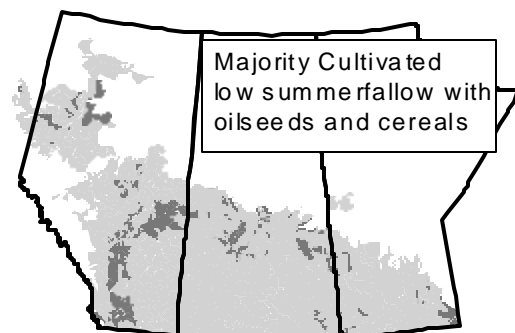
The *Majority cultivated, low summerfallow with very high oilseeds* group is almost exclusively confined to the Peace River district, and consists mainly of level or nearly level Dark Gray and Gray soils. The amount of land in oilseeds (31%) in 1996 exceeded the recommended rotation guidelines of one in four years.



The *Majority cultivated, low summerfallow, with pulses* group is one of the largest groups, and is found in the moister areas of the Prairies. Although more than half of the group is found in the Black soil zone, it extends from the Dark Brown to the Dark Gray soil zones in southeastern Saskatchewan to the Peace River district. Annual cropping in this group is highly diversified, with oilseeds and pulses being significant components of the cropping system.



The *Majority cultivated, low summerfallow, with oilseeds and cereals* group are dominantly in the Black soil zone and represent the “typical” Prairie farmland found near Red Deer, Lloydminster and similar areas in Saskatchewan, but is not found in Manitoba. Annual cropping in this group is primarily cereals and oilseeds. This group had the highest cattle numbers per farm of all the majority cultivation groups in 1996, suggesting that diversification to livestock has been more common than diversification of cropping.



The identification of Land Practices Groups provides a basis to predict changes in cropping, grazing and hay production over the Prairies. Each of the groups will behave differently to the changing pressures due to commodity prices, market opportunities, transportation changes, technological advances and environmental concerns. The Land Practices Groups can be used to identify where changing agricultural practices may present conditions that threaten the agricultural land resource.