FORAGE PRODUCTION IN THE INTERLAKE REGION OF MANITOBA

by

David G Armitage

A thesis presented to the University of Manitoba
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ABSTRACT

A total of 120 Interlake forage producers were interviewed using a standardized questionnaire to gather data on their farm operations in general, their forage production systems in particular and personal information such as age, level of education and ethnicity. Data relating to forage production became the base for the development of a Forage Production Classification System. In this system forage producers were assigned to 1 of 4 classes, with Class 1 being an excellent system and Class 4 a poor system. Characteristics of forage producers in each of the 4 classes were then identified using general farm data and personal information.

Class 1 forage producers were dominated by dairymen farming in the land-resource unit of Red River/Osborne and forage-seed producers with farms in Arborg/Peguis. Class 2 producers of forage included cattlemen that farmed in the land-resource unit of Inwood/Meleb and dairy farmers located outside of Red River/Osborne. Class 3 forage producers were concentrated in Red River/Osborne but comprised mainly of cattlemen. The poorest forage producers, those in Class 4, were cattlemen located in either Isafold or Inwood/Meleb.

ACKNOWLEDGEMENTS

Many forage crops have been harvested since I undertook this project, which, at times, seemed to have a life cycle as perennial as grass. I would like to thank Professor J. S. Brierley, my thesis supervisor, for the interest he took in the work, and the support and encouragement he provided along the way. Thanks also to Professor J.I. Romanoski, Geography Department, for his valuable comments and to Professor K.W. Clark, Plant Science Department, for the assistance he provided in both the early and final stages of developing this thesis. In particular, I would like to thank my wife Birdena and our two daughters, Heather Anne and Melodie, for their tremendous assistance, patience and understanding as I plodded through this project.

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CHAPTER 1

INTRODUCTION

Agricultural geographers are distinct from other agrologists in that they seek to identify, measure and explain the spatial differentiation of agriculture. While the study of primary farm commodities has long been a focus of interest in agricultural geography, the literature is dominated by studies of high-value commodities such as milk (Howe 1985:235-52), wheat (Tarrant 1984:47-58) and corn (Keddie 1983:223-39). Forage crops and other relatively low-value commodities have been largely ignored. Indeed, a review of the Canadian agricultural geography literature shows only one study, conducted almost 40 years ago, specifically on forage production (Weir 1952:73-79) and three that make incidental reference to forage production (Troughton 1982:116-117; Kent 1966:117-126; Gentilcore 1952:43-50). An example of just how incidental are these references is provided in the work by Troughton (1982), entitled Canadian Agriculture, where forage crops are identified as the second largest crop in Canada, but are described in less than one full page of a book containing over 200 pages. Consequently, it has been left to forage scientists and agricultural economists to recognize that potential forage crop yields are not realized on most farms in the country, on which the crop is grown. This theme has been expressed by forage scientists and agricultural economists at the national level (Clark 1986:64-65; Winch 1983:57-67), the prairie region level (Howarth and Goplen 1987:15-16; Smoliac and Wilson 1983:35-39; Nickel and Pringle 1983:40-57) and at the provincial level where pasture production was identified in the early 1970s as the most neglected aspect of agriculture in Manitoba (Tsukamoto 1971:53) thus leading to the publication of The Rangeland Manager by the Manitoba Department of Agriculture (MDA) in the 1980s and, eventually, the development of a Forage Strategy for Manitoba (MDA 1987). Finally, at the regional level, documents such as "Grassland Farming the Interlake Way" (FRED 1976) and "Pasture/Livestock Management -Interlake" (MDA n.d.) have been prepared dealing explicitly with forage production in the Interlake Region. Agricultural geographers have ignored this problem of unmet potential with regard to Canadian forage crops even though the subject is well within their ken.

The importance of the Canadian forage crop is demonstrated by its areal extent (Table 1.1). The 1986 census indicates that for the nation as a whole, 37.5 percent of all farmland is under forage. In the prairie provinces the proportion of land producing forage is slightly less, at 35.5 percent, and slightly less again in the province of Manitoba

TABLE 1.1

AREAL EXTENT OF FORAGE CROPS IN CANADA, THE PRAIRIE PROVINCES, MANITOBA AND THE THE INTERLAKE REGION, 1986

	Farm area (ha)	Forage area (ha)	Forage area as % of total farm area
Canada	67,825,756	25,436,478	37.5
Prairies	54,994,920	19,497,313	35.5
Manitoba	7,740,226	2,597,938	33.6
Interlake	952,596	558,517	58.6

Source: Census of Canada. Ottawa, Ontario. Catalogue 96-109, Tables 2 and 6, 1986.

where it is 33.6 percent. In each of the aforementioned political units, the relative area devoted to forage production is similar, although in the Interlake region of Manitoba, the region under study in this thesis, forage production dominates the agricultural landscape, utilizing 58.6 percent of the farmland base.

It is the objective of this thesis to use the methods of agricultural geography to study a region in which producers depend upon forage crops for their livelihood, and determine to what extent forage-production techniques vary between various farming enterprises within the region.

The Interlake region of Manitoba was chosen as the study area for the following reasons:

i) The region is geographically defined in such a way that it simplified data collection and analysis. In this respect the Interlake has been referred to as a 'beautiful laboratory' (Matviw and Nickel 1975:27).

ii) From 1967 to 1977 the region had an infusion of $85 million under the Fund for Rural Economic Development (FRED) program, almost $15 million of which were channelled into agricultural development. The study provided an opportunity to assess the impact of the FRED program on this segment of the agricultural economy.

iii) Because of the relatively high percentage of Interlake farmland devoted to forage production (Table 1.1) it was viewed as a most suitable location for conducting a survey of forage producers.

In 1984 a field survey was conducted in which 120 forage producers were asked to describe their farms in general, their forage production operation in particular, and provide personal information such as age, level of education and ethnicity. In order to appreciate the context in which the survey was undertaken, this thesis first examines the physical geography of the region in Chapter 2, followed in Chapter 3 by a discussion of agricultural developments in the region. Chapter 4 describes forage- production techniques recommended to farmers by agricultural extension agents and provides a backdrop against which the observed production techniques can be compared and contrasted. The methodology of the survey is described in Chapter 5 after which the observed forage-production techniques on beef, dairy, and other farms are outlined in Chapter 6, 7 and 8, respectively. In Chapter 9 a system of classifying forage producers is outlined and demonstrated using survey data. The final chapter contains conclusions and recommendations drawn from the questionnaire data.

CHAPTER 2

THE PHYSICAL SETTING OF THE INTERLAKE REGION

Location and Areal Extent of The Interlake Region

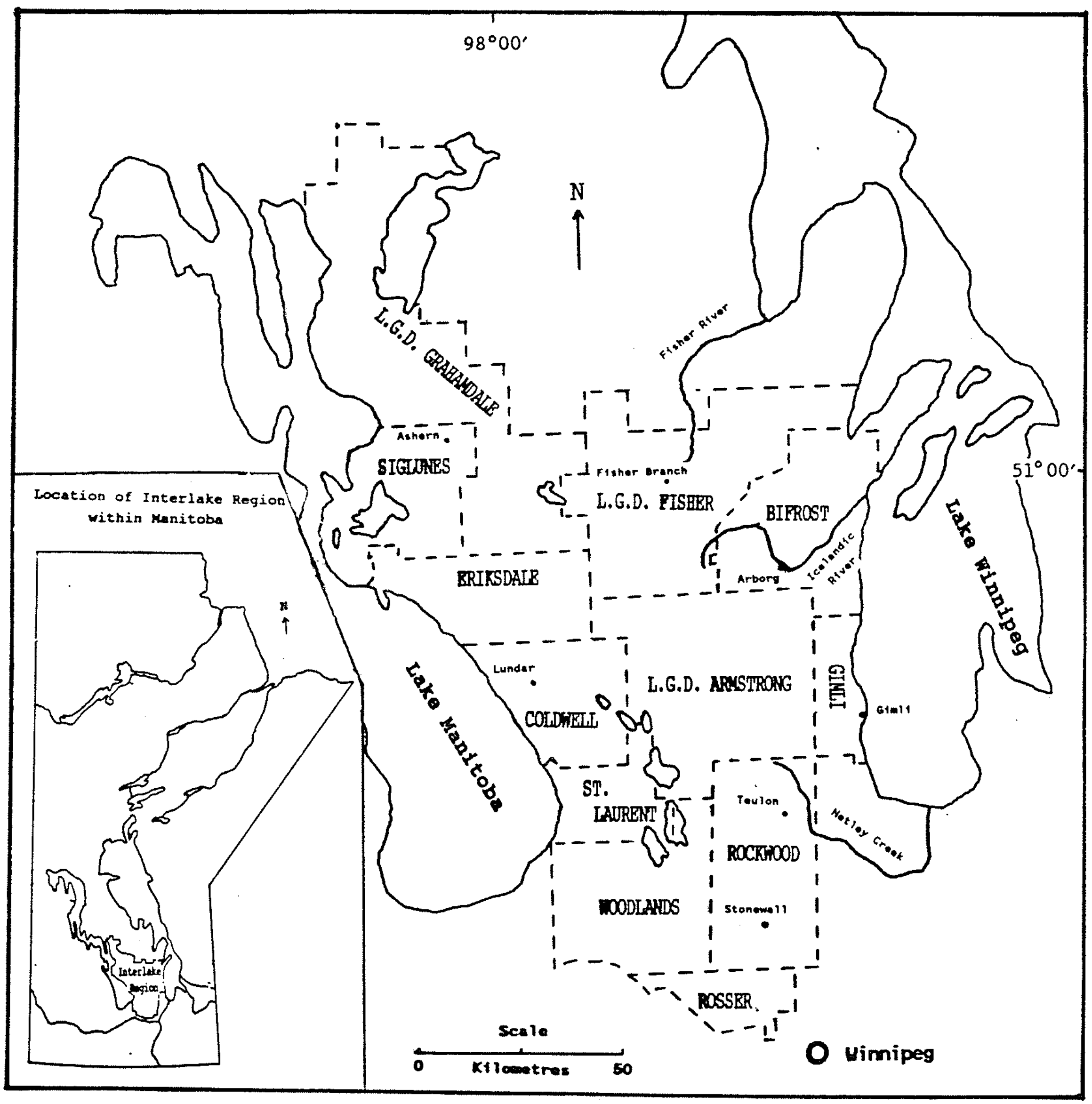
For the purpose of this study the Interlake region is considered to coincide with the 1981 Census Divisions 14 and 18 (Figure 2.1). Using these boundaries the region has an area of 14,547 km. It is comprised of nine Rural Municipalities (RMs), namely Bifrost, Coldwell, Eriksdale, Gimli, Rockwood, Rosser, St. Laurent, Woodlands and Siglunes, and three Local Government Districts (LGDs), Armstrong, Fisher, and Grahamdale (Manitoba Municipal Affairs 1983). The region is bounded on the east by Lake Winnipeg, Lake Manitoba on the west, the city of Winnipeg on the south and extends north to latitude 51° 53' N.

Physical Geography of the Interlake Region as it Relates to Forage Production

Smith (1981:1) in Forage Management in the North states that "a large proportion of the land in the North is better suited to the growing of forages than to the growing of cultivated crops". While his observation was directed

FIGURE 2.1

THE INTERLAKE REGION OF MANITOBA



specifically to American locations, it applies equally well to the Interlake region. In this section, physical factors predisposing the region to livestock production based on perennial forage crops will be subsequently discussed under the headings of soils, natural vegetation and climate.

Soils

Limitations associated with Interlake soils have been frequently expounded upon. Ellis (1941:29) described the Interlake as having "young, feebly developed soils characterized by high lime conditions, shallow depth and low available phosphorus". In his view these soils were either too stony or too wet, depending on their location, for arable cultivation, but were nevertheless useful for dairying, livestock production and forestry. Thirty-five years later Eilers et al. (1977:47) adopted the nomenclature of the Canadian System of Soil Classification to classify Interlake soils as Rego Black Chernozem and Gleyed Dark Grey Chernozem, respectively. The same problems of poor drainage, stoniness and phosphorus deficiency were identified and, again, the land-use suitability was given as mainly livestock and forage crops.

Land-Resource Units in the Interlake Region (Table 2.1) consist of groupings of closely related soil associations or

TABLE 2.1

LAND RESOURCE UNITS OF THE INTERLAKE REGION

UNIT NAME	DOMINANT SOILS	TOPOGRAPHY	MATERIALS	SOIL PROBLEMS	LAND-USE SUITABILITY
Inwood-Meleb	Gleyed Dark Grey Chernozems	Ridge And Swale	Calcareous Stony Till	Stoniness Poor drainage	Tame Hay & Pasture
Isafold	Rego Black Chernozems	Undulating	Calcareous Stony Till	Stones Low fertility	Livestock and Forage
Red River - Osborne	Gleyed Rego Chernozems	Level	Calcareous Lacustrine clay	Poor internal drainage	Grain and Forage
Arborg - Peguis	Gleyed Dark Grey Chernozems	Level	Lacustrine clay over loam till	Poor drainage	Mixed Farming

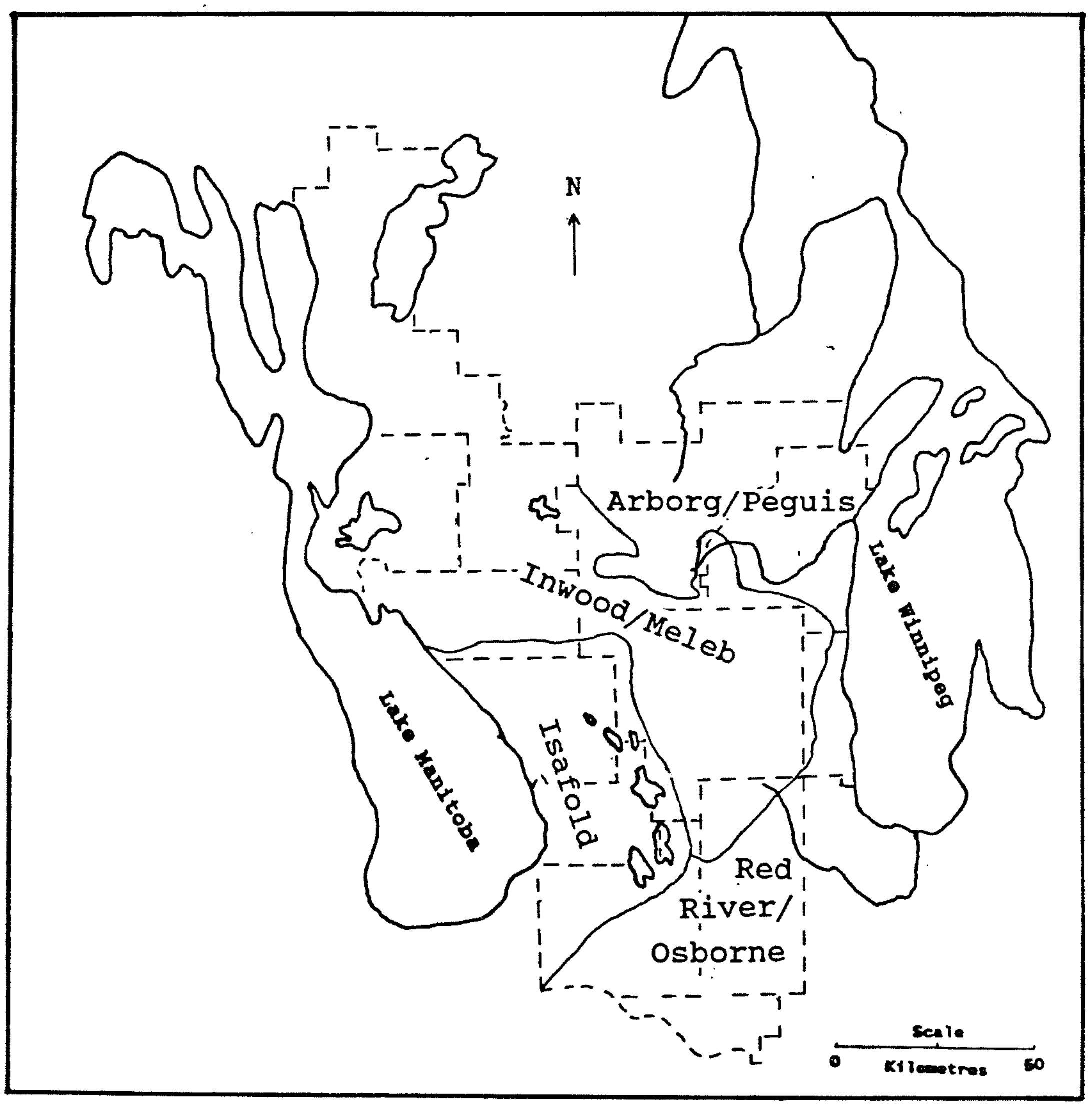
Source: Eilers, R.G. et al. "Soils" in Manitoba Soils and Their Management 1977:46-7.

series suitable for similar types of crop production and requiring similar management practices. This organizational system was adopted by the MDA in 1975 and assembles information from Canada-Manitoba Soil Surveys, Canada Land Inventory Reports, The Productivity Rating Index and other sources (Mills 1975:99-104). It is these units which are detailed in the following discussion.

The Inwood/Meleb unit occupies almost 50 percent of the Interlake region, thus qualifying as the dominant land resource unit as far as areal extent is concerned (Figure 2.2). Soils of the Inwood Series are Gleyed Dark Grey Chernozems, while those of the Meleb Series consist of Carbonated Rego Humic Gleysols. Both were developed on extremely calcareous medium-textured till and result in the thin, stony, poorly-drained soils that are so often associated with the low ridge and swale topography of the Interlake (Mills and Smith 1971:52-62; Eilers et al. 1977:47). Twenty-five years ago these soils were generally not cultivated in forage or grain crops, but with a government-funded land-clearing program (infra, p.34), the advent of mechanical stone pickers and attractive grain prices of the 1970s many farmers on Inwood-Meleb soils chose to utilize them for grain production. However, during an interview (May 1988) with Gordon Mills, a soil specialist with the MDA, it was pointed out by Mills that on soils of

FIGURE 2.2

AREAL EXTENT OF LAND-RESOURCE UNITS OF THE INTERLAKE REGION



Source: Eilers, R.G. et al. "Soils" in Manitoba Soils and Their Management, 1977:Plate 3.10.

this type the growing of a perennial forage crop is considered the most suitable land use, because it removes the necessity for annual cultivation and, when reseeding does become necessary, there are shallow seeding techniques available for forages that are adapted to soils having thin A and B horizons.

Approximately 15 percent of the Interlake region lies within the Isafold unit: one roughly coinciding with the RMs of St. Laurent and Coldwell. It is similar to the Inwood-Meleb unit, in that it is characterized by stony soils developed on extremely calcareous, medium-textured till. It differs, however, in that the dominant soils are Rego Black Chernozems. Nevertheless its limitations are the same, namely poor drainage and excessive stoniness. Consequently, the recommended land use throughout the Isafold unit is livestock production based on forage crops (Eilers et al. 1977:47).

A vastly different situation occurs with respect to the Red River/Osborne unit. This unit, which is located in the southern Interlake and occupies Rosser, Woodlands and much of Rockwood, provides soils that are not only the most productive in the Interlake, but are among the best agricultural soils in the province (Weir 1960:12). Both Red River and Osborne soils developed on deep, weakly to moderately calcareous lacustrine clay and, as a result, are virtually free of stones and high in fertility. The fine texture of these soils does present drainage problems, particularly on the Osborne clays, but the installation of drainage ditches throughout the unit's area allows for the production of good crops of forage and grain, with the latter predominating. These soils are, however, considered to be too heavy and too wet for root crops, such as potatoes and sugar beets (Ehrlich et al. 1976:21-2).

The remaining land-resource unit located in the Interlake is the Arborg/Peguis unit. The unit has been described as being a northward extension of the Red River clays along the west side of Lake Winnipeg to Arborg and the Icelandic River (Weir 1960:10). The Gleyed Dark Grey Chernozems of the Peguis Series represent the largest area of good soils in the northern Interlake (Pratt et al. 1961:66). These soils are suited to both grain and forage production and, consequently, support a mixed farming economy. Soils in the Arborg Series also serve as a base for mixed farming, but present formidable problems of management owing to their clay texture, poor structure and very slow permeability. For example, tillage on Arborg soils is difficult at the best of times and is often restricted to only a few days each year when they are neither too wet nor too dry for cultivating. Drainage projects in the area have reduced these problems thereby expanding the area under cultivation. Nevertheless, they remain difficult soils to crop on an annual basis, thus making perennial forages an important component of the crop rotation sequence (Eilers et al. 1977:47).

Natural Vegetation

The presence of naturally occurring vegetation is not an important factor in the land-resource units of Red River/Osborne and Arborg/Peguis, because the majority of soils in both these units have been cleared of trees and are under cultivation. Such is not the case, however, in the Interlake's other two land resource units. In these units the natural vegetation takes the form of either tree cover (Inwood/Meleb) or grasslands (Isafold), of which the former is a hindrance to agricultural development, while the latter is of some importance when managed correctly.

With regard to tree cover it has been indicated that "tree covered rangeland does not support the number of grazing animals that it should" (Manitoba Agronomists' Proceedings 1982:34). It has been demonstrated by the Agricultural Crown Lands Section of the MDA that when treed land is cleared and a seeded forage established, the grazing capacity per unit area can be increased tenfold. To this end, the MDA introduced a number of programs advocating the clearing and seeding of suitable lands (Manitoba Agronomists' Proceedings 1982:35).

Naturally occurring grasslands, or native grasses, are often characterized as being low both in yield and quality. (Manitoba Agrologists' Proceedings 1982:34). Smoliac and Wilson (1983:35) have observed, however, that throughout the Prairie provinces native grass provides more than a million calves per year from land that otherwise would have little value. Also, the thrust of much extension work has been to demonstrate the extent to which native stands can be improved with the adoption of good management techniques. For example, Lahaie (1982:42) conducted a study to determine the effect of managed grazing on native pasture from 1977 to 1982. The response to management was measured by taking annual yield samples and resulted in yields increasing almost tenfold, from approximately 373 kg/ha in 1977 to nearly 3700 kg/ha in 1982. Hence, the forested and natural grassland areas of the Interlake region have the potential to support a livestock industry based on the production and careful management of both native and cultivated forage crops.

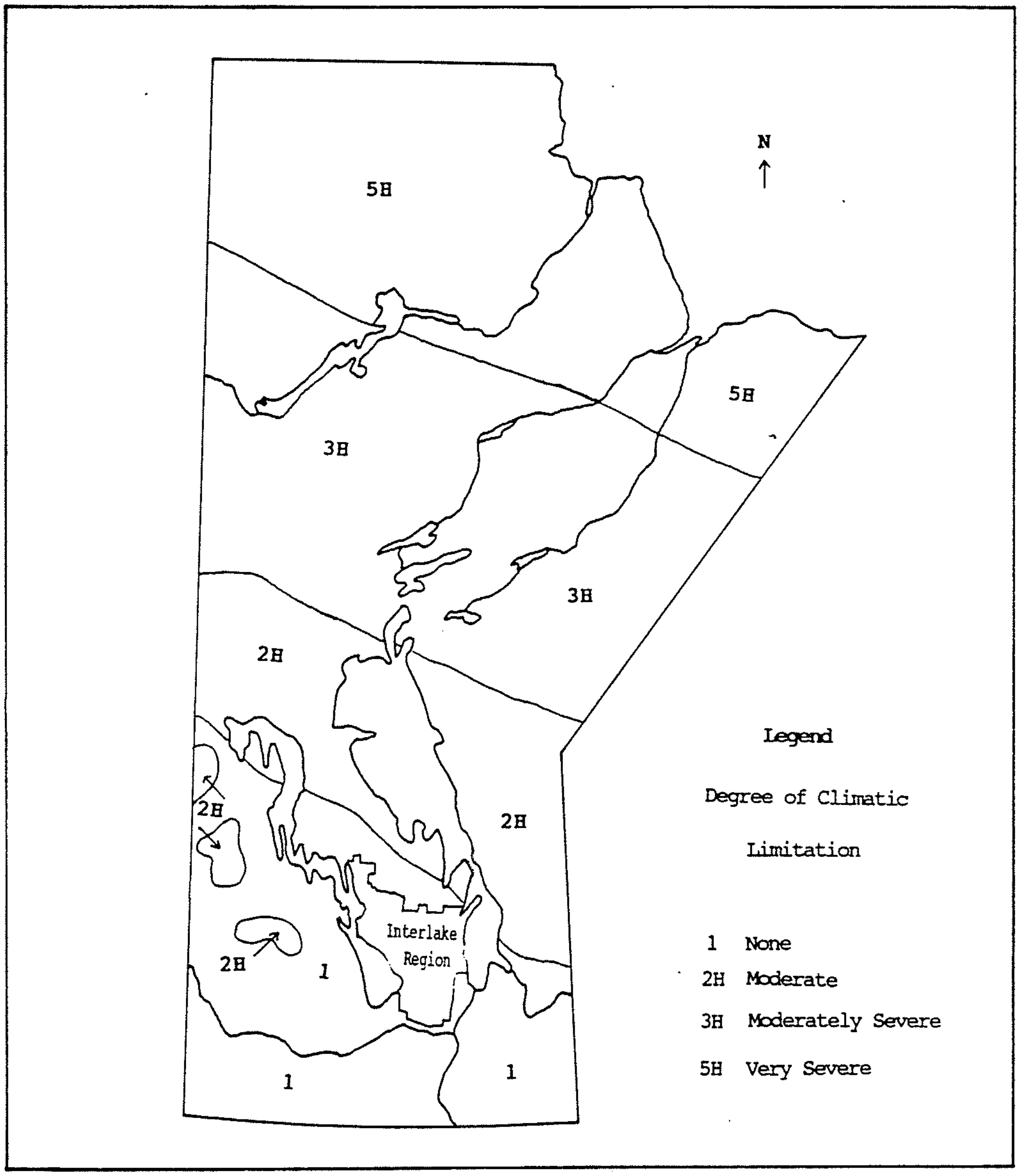
Climate

The most significant aspect of the Interlake region's climate is that it presents no limitations for regionally adapted crops (Figure 2.3). The northern edge of the study area, however, is contiguous with an agroclimatic subregion which experiences moderate or slight climatic limitations (Mills 1980:24-5). To a large measure the region's favourable agroclimate results from the modifying influence of what Shaykewich and Weir (1977:9-10) have termed the "great lakes" of central Manitoba.

Its juxtaposition between Lakes Winnipeg and Manitoba serves to extend the Interlake's growing season. Fisher Branch, a farming area located in the northern Interlake, serves as an example of this phenomenon in that it generally receives as many growing degree days (1525) as does Brandon (Dunlop and Shaykewich 1984:25). Dunlop and Shaykewich (1984:36-7) developed a model in which the soil-water status of the province was calculated after theoretically removing a first crop of alfalfa, thereby demonstrating that soils of the Interlake region are better able to withstand the high moisture requirements of perennial forage crops than soils of the Red River Valley south of Winnipeg and soils in the area circumjacent to Brandon as they have an average soil water status of less than -25 mm (Figure 2.4).

FIGURE 2.3

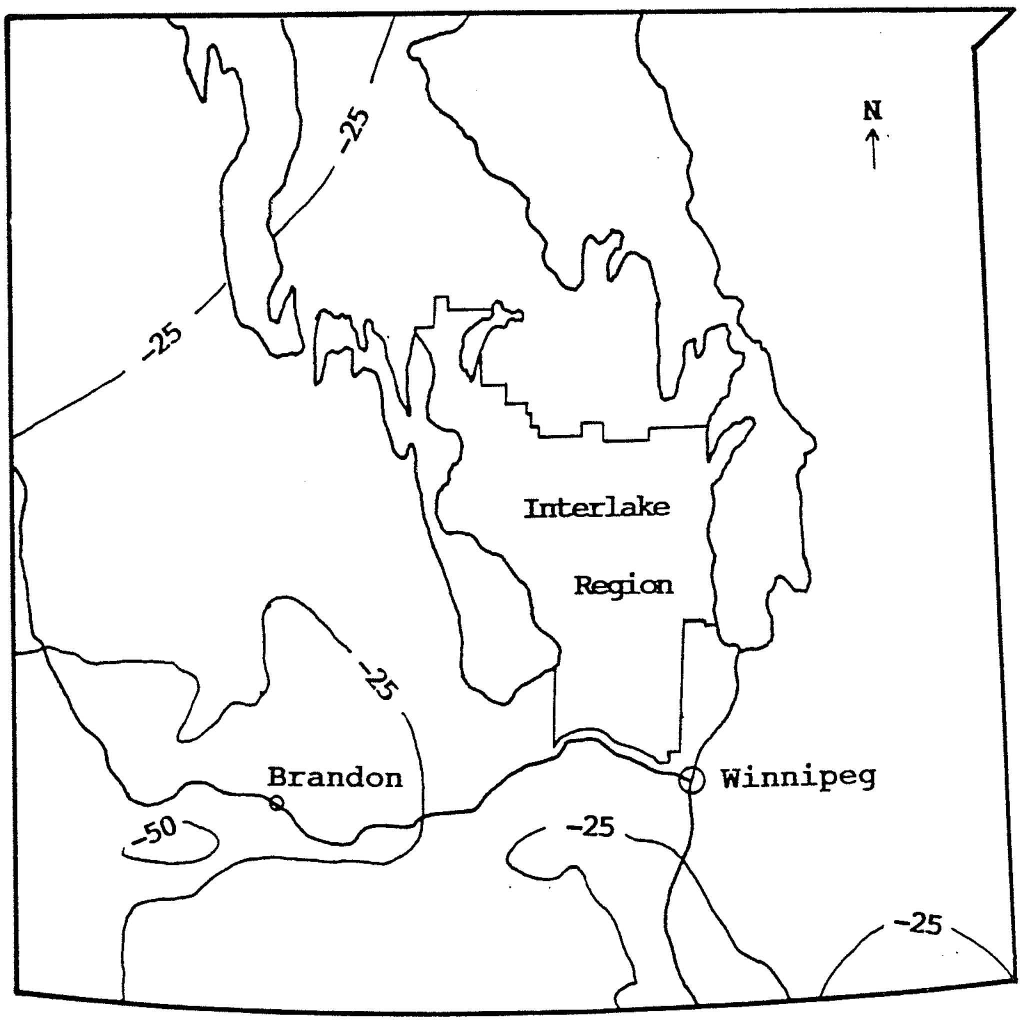
AGROCLIMATIC REGIONS OF MANITOBA



Source: Mills, G.F. "Climatic Limitations for Agricultural Land Development in Manitoba" in Manitoba Soil Science Proceedings, 1980:33.

FIGURE 2.4

AVERAGE SOIL WATER STATUS (mm) IN AGRO MANITOBA
AFTER REMOVING A FIRST CROP OF ALFALFA



Source: Dunlop, S. and C.F. Shaykewich. Southern Manitoba's Climate and Agriculture, 1984:37.

Summary

Throughout much of the Interlake, stony fields or drainage problems prohibit annual cultivation of the soil, and, therefore, the production of cash crops is not an option available to many of the region's farmers. The perennial life cycle of forage crops mitigates the problems of stoniness and poor drainage in that cultivation is only required once every five to ten years depending on the longevity of the forage stand. In areas where even periodic cultivation of the soil is not appropriate native grasses can be used for grazing or, when conditions allow for the operation of cutting and baling equipment, stored as winter feed. Because Interlake soils are best suited for the production of forage crops and forage crops are best marketed through livestock, the Interlake emerges as a region of livestock production based on perennial forage crops.

Haggett and Meyer (1980:9) have shown that physical factors play a more important role in the fashioning of agriculture patterns than they once did owing to the diminishing cost of transportation. The extent to which physical factors impact on forage production systems in the Interlake, a region having areas of land with relatively high agriculture capabilities located a distance from the city of Winnipeg and, also, areas of low agriculture capability closer to the city, will be addressed in Chapter 9 by including both land-resource unit and distance from Winnipeg as variables in the analysis of factors influencing forage production.

CHAPTER 3

AGRICULTURAL DEVELOPMENT IN THE INTERLAKE REGION

In the preceding chapter it has been argued that the environmental characteristics of the Interlake region are ideal for the support of a livestock industry based on forage crops. However, the physical environment rarely acts in a deterministic manner (Tarrant 1974:11). Instead, patterns of agricultural land use are determined by the interaction of physical and human factors. The absolute necessity for considering human factors when describing an area's agricultural geography is made clear by Harvey (1966:373) when he stated,

> If we recognize that all important fact that geographic patterns are the result of human decisions, then it follows that any theoretical model developed to explain agricultural location patterns must take account of psychological and sociological realities ....

In this section, agricultural development in the Interlake region since European settlement began in 1870 will be explained with reference to socio-economic and political factors, particularly ethnicity and institutional arrangements.

Early Settlement

The Interlake region of Manitoba was similar to other areas of the Canadian prairies in that it was settled by groups of people who brought to the region their cultural baggage, which was highly variable in terms of educational qualifications, working skills, religious beliefs and agricultural experience. Because of their markedly different cultural backgrounds some settlers found themselves well equipped to cope with the hardships associated with establishing a farm, while others lacked the skills required for successful homesteading (Todd and Brierley 1977:238). The impact of ethnicity on the agricultural land-use patterns established in the Interlake during the settlement phase will be demonstrated by describing the agricultural systems associated with each of the principal settling groups. The region's predominant groups are British, Icelandic, Ukrainian, French and German (Weir 1960:24-36).

British settlers, most of whom came from southern Ontario, began establishing farms in the area around Stonewall during the 1870s (Weir 1960:28). These settlers brought with them a tradition of farming and came into the area specifically to grow grain for the export market (Richtik 1964:25); a strategy that had been successfully employed in the settlement phase of Ontario counties during the first half of the nineteenth century (Jones 1946:17-35; Kelly 1971:95-112; McCallum 1980:9-24). Given that this group was familiar with the principles of grain production and settled on fertile grassland soils easily brought under cultivation (and among the best agricultural soils in the province), they were able to prosper and become a dominant force in the agricultural circles of Rosser, Rockwood and Woodlands. By 1911, indicators of the progressive nature of the British group included their support of farming courses offered in Stonewall and their willingness to organize and participate in contests encouraging better farming techniques and better kept farms (Richtik 1964:227). It should be noted, however, that while the agricultural system established by British settlers emphasized grain production, it was better categorized as a mixed-farming system with the livestock component comprised mainly of dairy cattle, thus reflecting the importance of the Winnipeg milkshed (Richtik 1964:226). Clearly, land-use decisions of the British were a function of their desire to supply grains for the export market and milk for the urban centre of Winnipeg.

Icelandic immigrants began settling the west shore of Lake Winnipeg in 1875. Initially about 1500 Icelanders moved into the area around Gimli giving it one of the densest rural populations in the province (Weir 1960:24). However, the population was a linear concentration along the lake-front indicating the group's desire to perpetuate their fishing-agriculture tradition (Todd and Brierley 1977:240). Like the British, the Icelanders settled on good soils, yet their attempts to grow grain met with little success. The poor performance of Icelandic settlers with respect to grain production can be attributed to a lack of knowledge about grain-growing methods, coupled with the fact that the lands where they sowed grain were adjacent to Lake Winnipeg and subject to flooding. Reports of the Icelandic agent in the years after 1875 indicate fewer and fewer attempts at grain growing with virtually no grain being grown by 1882 (Richtik 1964:68). Having failed at grain production, the Icelanders began to concentrate on the raising of cattle and sheep. Evidence of a dairying emphasis was the establishment of creameries in the area. In 1898 two creameries opened in Gimli and by 1911 three more were in operation further north at Hnausa, Arborg and Riverton (Richtik 1964:167). Further evidence that Icelanders preferred animal husbandry to grain production is provided by the fact that cultivated land along the Icelandic River in Bifrost was sown to forage crops during the 1890s (Richtik 1964:231); a marked contrast to the system used by British settlers where livestock were maintained on native forage while cultivated lands were used for the production of grain.

Both the British and Icelandic groups were fortunate to have the opportunity of establishing their farms on the limited area of soils with relatively high agricultural capabilities in the Interlake. By the time large numbers of Ukrainian settlers began arriving in 1901 most of the quality land had been occupied, leaving to them the task of "carving farms out of the bush" (Weir 1960:28). As the majority of Ukrainians arriving in Manitoba were of peasant stock with limited means, their social and economic progress was slow. Specific reasons for this slow achievement include difficulties in clearing the forest (although timber did provide an additional source of income) (Todd and Brierley 1977:248) and a lack of money for purchasing horses and machinery (Richtik 1964:237). Whereas British and Icelandic settlers entered into commercial agriculture almost immediately upon their arrival, typical Ukrainian farmers in Armstrong or Fisher practised a semi-subsistence form of mixed farming many years after clearing commenced (Weir 1960:27; Richtik 1964:167).

French settlers in the Interlake came from Quebec and began farming in St. Laurent on the southeastern shore of Lake Manitoba in the years prior to 1870, thus establishing themselves as the region's earliest European farmers (Warkentin and Ruggles 1970:333). The fact that cattle were the mainstay of their agricultural economy can be attributed to physical factors, such as the area's abundant grasslands and local soils that were generally too wet for grain cultivation (Richtik 1964:116). Nevertheless, a human factor can be identified in that the French group's preference for cattle production rather than grain cultivation reflected a degree of self-sufficiency formerly typical of the isolated rural areas of Quebec (Hatzipanayis 1980:84).

German settlement was concentrated in Eriksdale, Siglunes and Grahamdale (Weir 1960:36). As late as 1911 this area was still in a pioneer stage of development, with cattle being much more important than grain. Most farmers in this group, however, were attempting to reduce their dependency on cattle and increase the area under cultivation (Richtik 1964:237-8). German settlers were among those who came well equipped to cope with the hardships of pioneer life. They had farmed successfully in Europe and were familiar with physical condition encountered in a mid-latitudinal grassland environment (Todd and Brierley 1977:239). In addition, they had sufficient capital to purchase cattle and develop their farms in relatively short order.

Ethnicity has been shown by Todd and Brierley (1977:245) to have fundamental functional linkages with regional economic structure. Specifically, in a Manitoban study, the British group was associated with above-average education and prosperous farming, while the Slavic group was denoted by low levels of education and poor farming. This was evident in the

Interlake where the various ethnic groups that settled had a distinct influence on the agricultural location patterns which emerged. At one extreme there were British settlers who came into the area with the intention of supplying grain for the export market and establishing viable commercial farms. At the other extreme, there were Ukrainian settlers who arrived undercapitalized and were forced by the time of their occupancy to develop marginal lands and practise a system of agriculture best categorized as semi-subsistent.

The impact of ethnicity on forage production systems will be described more fully in the analysis provided in Chapter 9.

Later Settlement and Agricultural Development to 1960

The early 1920s have been identified by Barto and Vogel (1978:13) as the period in which the agricultural limits to settlement in Manitoba were reached and, in some areas, exceeded. Without a doubt, it is into this latter category that parts of the Interlake region fall. By 1920 there were over 6,400 farms in the Interlake (<u>Census of Canada</u> 1921:416). However, having this many farms in a region where large areas possessed a limited resource base capable of profitably supporting only an extensive system of agriculture, created a number of economic problems. Evidence of these problems is provided by the fact that the region had over 2,000 vacant or abandoned farms by 1930, an unreasonably high number which accounted for approximately 30 percent of all such farms in the province (Census of Canada 1931:561). It is noteworthy though, that concerns over "unwise settlement policies" in the Interlake were expressed sixty years ago in a study by Murchie and Grant (1926:4) and in a report by Manitoba Municipal Affairs and Agriculture (1939:6).

The province's "soldier settlement policy" serves as an example of inappropriate settlement. This policy allowed for the placement of World War I veterans on land in Eriksdale with neither consideration being given to the mens' capabilities with regard to agriculture nor to economic factors such as transportation costs (Barto and Vogel 1978:13). Another unwise settlement policy involved the opening of odd-numbered sections for homesteading in Armstrong, an action which created considerable difficulties within the municipality (Armstrong was a municipality until 1944) because its farmers had become dependent upon Crown Lands for their hay supplies (Richtik 1964:239). Thus, farmers in Armstrong had realized the physical limitations of the area and, therefore, moved toward an extensive system of agriculture that relied upon use of Crown Lands. Their efforts, however, were thwarted by the government's desire for a more intensive pattern of settlement.

Agricultural activity within the Interlake continued to vary with respect to the ethnicity of an area's settling group and the agricultural capabilities of the land settled. The extent of areal differentiation within the region is demonstrated by comparing census data from 1941 with that of 1961 for the four municipalities of St. Laurent, Rosser, Armstrong and Bifrost (Table 3.1).

Data from 1941 indicate that the farmers of St. Laurent had adopted an extensive system of agriculture based on livestock production - the system considered (both then and now) to be best suited to the region. These farms, which averaged over 150 ha were large by both Interlake and provincial standards of 97 ha and 120 ha, respectively, were located on natural grasslands and supported a substantial cattle population on land that was over 95 percent unimproved. By contrast, farms in Rosser at 135 ha had almost 80 percent of their land base improved, thus indicating the continued efforts of the area's British farmers to participate in the grain trade. While the greater diversification of Rosser farms would suggest greater stability in the event of falling prices (be they grain or livestock), the St. Laurent farms with their relatively large cattle herds and low operating costs would have been quite viable. It is in Armstrong that the 'typical' impoverished Interlake farm was evident. Farms here were inadequate in size (less than 80 ha) and, to make

TABLE 3.1

AGRICULTURAL DEVELOPMENTS FROM 1941 TO 1961 IN FOUR INTERLAKE MUNICIPALITIES

Municipality	Land Resource Unit	Principal Settling Group	Mean Farm size (ha) 1941	Mean Farm size (ha) 1961	% change 1941-61	Improved ha per farm 1941	Improved ha per farm 1961	% change 1941-61	Cattle per farm 1941	Cattle per farm 1961	% change 1941-61
St. Laurent	Isafold	French	151.4	226.9	49.9	3.6	4.8	33.3	26.1	48.8	87.0
Rosser	Red River / Osborne	British	134.6	186.8	38.8	103.9	171.3	64.9	12.0	15.7	30.8
Armstrong	Inwood/Meleb	Ukrainian	79.5	159.8	101.0	13.6	41.9	208.1	11.5	30.9	168.7
Bifrost	Arborg/Peguis	Icelandic	80.2	116.8	45.6	24.0	80.5	235.4	8.8	19.6	122.7
TOTAL INTERLAKE			97.1	166.7	71.7	30.4	70.5	131.9	12.1	26.5	119.0
REMAINDER OF MANITOBA			120.0	170.2	41.8	72.6	116.8	60.9	12.2	22.6	85.2
% Difference Between Interlake & Remainder of Manitoba			-19.1	-2.1	-----	-58.1	-39.6	----	-0.8	17.3	----

Source: Census of Canada, Ottawa, Ontario, Volume 8, Part 2, Tables 51, 52 and 54, 1941
Census of Canada, Ottawa, Ontario, Volume 5, Part 3, Tables 28 and 30, 1961

matters worse, had over 80 percent of their farmland in bush. The area had potential for extensive cattle production, but the undercapitalized Ukrainians farmers could not afford to clear what land they had, let alone, expand their operations and build up cattle numbers. Bifrost offers another scenario in that, while farms were small and the cattle population low, the relatively large area of improved farmland, combined with a dairy specialization, allowed profitable farming to be established.

By 1960, Interlake farms showed increases of over 70 percent in farm size, over 130 percent in the areal extent of improved land and nearly 120 percent in the number of cattle (Table 3.1). The LGD of Armstrong, in particular, showed extraordinary progress in the two decades between 1940 and 1960. However, on comparing the agriculture of the entire Interlake with that of the remainder of the province, it is observed that while farm size in the Interlake was only 2 percent less than that for the rest of the province and herbs had about 4 more cattle than other Manitoba farmers, the region lagged behind considerably in its proportion of improved land and, having 40 percent less improved farmland than did the remainder of the province.

These shortcomings in the Interlake's agricultural economy contributed to its being designated, on the basis of data provided by the Census of Canada 1961, as one of the most economically distressed regions in the nation (Hatzipanayis 1980:4). Two government programs to assist Interlake farmers resulted from this assessment and will be discussed in the following section.

Government Assistance to the Interlake Since 1960

Agricultural and Rural Development Act

The Agricultural and Rural Development Act (ARDA) was established in 1961 in response to the realization that many rural people had a very low level of income and standard of living. The objective of the Act was to ameliorate the lot of such people by supporting projects that would intensify the productivity of land (Todd and Brierley 1982:526).

One project undertaken in the Interlake region was land clearing. In 1961 land-use specialists assessed the productivity of Interlake land and recognized that several hundred thousand acres of potentially productive pasture land lay under aspen-poplar bush. Farmers were encouraged to open up land of this description through the provision of an incentive of $4 per acre ($9.88 per ha) for clearing bush from land capable of forage and pasture production (FRED 1975:23). Under this agreement a total of 8,000 ha of bush were cleared on 476 Interlake farms between August 1964 and April 1968 (MDA

1968:70).

More importantly, than this project or others initiated under the ARDA agreement, was that the research conducted in the Interlake region by ARDA personnel identified the region as,

> ... a rural area where the roots of social stagnation go so deep that the normal programs of governments for rural areas and rural people cannot be expected to bring about a rapid improvement (ARDA 1967:3).

Consequently the Interlake was designated by ARDA as a Special Rural Development Area and became eligible for additional projects under the FRED agreement.

FRED

This act was established by the federal government in 1966. However, it was not until May 16, 1968 that the FRED Interlake Development Agreement was signed at Arborg. In that year's Annual Report of the MDA it was written that, "The planned investment of $85 million in the region should provide the economic stimulus to convert potential to reality" (MDA 1968:16).

Of that $85 million almost $15 million was earmarked for agricultural redevelopments focused upon the following projects:

- Land drainage of several thousand hectares of low-lying, high-capability land to increase the area under crops and improved pasture ($7,000,000 commitment).
- Acquisition of almost 20,000 ha of land with low agricultural capability for the purpose of transforming it into more productive use ($3,995,000 commitment).
- Resource and farm management programs through extension-education services to achieve diversification involving a strong livestock component ($2,970,000 commitment).
- Clearing of bush land to provide more grazing and forage for beef cattle production ($851,000 commitment).
- Veterinary ($150,000 commitment) and farm water services ($420,000 commitment) to accommodate growth in livestock production and establish a secure farm infrastructure (FRED 1975:9)

The motives of the agricultural programs established in the Interlake illustrate the extent to which farmers of the region were encouraged to adopt a farm system involving livestock production or, more particularly, beef-cattle production based on forage crops. The remaining chapters of this thesis describe forage production in the Interlake region emphasizing differences in the forage production systems among and between cattlemen, dairymen and other Interlake farmers.

CHAPTER 4

RECOMMENDED FORAGE PRODUCTION PRACTICES IN THE INTERLAKE REGION

From a management perspective, forages can be divided into three broad, but mutually exclusive, categories: native; tame; and seed crops. Native forage is naturally occurring, herbaceous vegetation of meadows and forested land, while tame forage is sown by the farmer either into a conventionally prepared seedbed or with the aid of a sod-seeder. In the Interlake, both native and tame forages are generally consumed by livestock on the farm upon which they are grown. Any surplus production is either stored and carried over to the next year or sold locally. A forage-seed crop, on the other hand, is a true cash crop with an international market. As a result, it commands the same level of management inputs as grains and oilseeds, the only difference being that a forage seed crop has a perennial rather than annual life cycle. In this chapter, the production practices recommended to Interlake forage producers by MDA extension workers and plant scientists with the University of Manitoba's Faculty of Agriculture and Agriculture Canada will be presented. In subsequent chapters data gathered in the field study will be analyzed to determine the extent to which these various recommendations have been adopted by Interlake forage producers.

Native Forage

Native forages are an important component of the livestock industry in the Interlake region, primarily because of the magnitude of their areal extent. Of the 952,593 ha of farmland in the Interlake in 1986, 513,102 ha or 53.9 percent were in an unimproved or native state (Table 4.1). Because native forage species (Table 4.2) generally provide forage that is lower in both quality and quantity than tame forage, the extension efforts of grassland specialists with the MDA have concentrated on the conversion of native vegetation to tame grasses and legumes. It is recognized, however, that the conversion process is slow (often progressing at a rate of only 15 to 25 ha or less per farm unit per year) (Wilkins 1978:20). Gerald Breakey, an MDA Grassland Agronomist working in Ashern, conceded during an interview (June 1984) that on some class 4 and 5 lands* it is not economically feasible to

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* Class 4 soils have severe limitations that restrict the range of crops or require special conservation practices or both. Class 5 soils have such severe limitations that they are not capable of use for sustained production of annual field crops. However, they may be improved and used in the production of either native or tame species of perennial forage plants (Environment Canada 1972:7).

TABLE 4.1

AREAL EXTENT OF UNIMPROVED LAND IN THE INTERLAKE REGION, 1986

RMs & LGDs	Farm Area (ha)	Unimproved Land (ha)	% of Farmland Unimproved
Armstrong	123 925	94 594	76.3
Bifrost	95 904	22 655	23.6
Coldwell	74 562	55 973	75.1
Eriksdale	49 522	32 446	65.5
Fisher	117 412	55 351	47.1
Gimli	20 506	7 267	35.4
Grahamdale	127 652	89 696	70.3
Rockwood	98 353	23 674	24.1
Rosser	37 963	827	2.2
St. Laurent	27 421	19 765	72.1
Siglunes	83 848	66 223	79.0
Woodlands	95 525	44 631	46.7

Source: Census of Canada, Ottawa, Ontario. Catalogue 96-109, Table 34.1, 1986.

TABLE 4.2

NATIVE FORAGE SPECIES OF THE INTERLAKE REGION

Species	Agronomic Characteristics
Creeping Bent Grass (Redtop) (Agrostis stolonifera)	occupies slough edges low palatability can produce a good crop of hay
Little Bluestem (Andropogen scoparius)	valuable spring fodder provided old and dry growth is burned off once every 3 or 4 years
Junegrass (Koeleria cristata)	occurs with little bluestem palatable during spring and late fall
Kentucky Bluegrass (Poa pratensis)	long-lived, sod-forming perennial grass semi-dormant during hot, dry spells
Prairie Cord Grass (Spartina pectinata)	seldom grazed when other forage is available large quantities cut for hay
Sloughgrass (Backmannia syzigachue)	common in shallow sloughs and marshes prefers to be wet until at least June 15 palatable and fairly nutritious

Source: J. Looman, 111 Range and Forage Plants of the Canadian Prairies, Agriculture Canada Publication 1751, 1983:14,26,32,42,62,100.

incur the cost of preparing land for tame forage. It is not surprising, therefore, that 80 percent of the Interlake's total grazing area is native pasture (MDA, n.d.). Consequently, principles of rangeland management have been put forth by the MDA in an effort to assist farmers in producing greater quantities of higher quality native forage and, therefore, more meat or milk per unit of native land. The principles are as follows:

> - maintenance of proper stocking rate to achieve from 55 percent to 65 percent utilization;
> - defer spring grazing until mid-June;
> - rotate livestock through the entire grazing area and also alternate the season each grazing area is used from year to year;
> - strategically locate watering facilities, salting facilities and drift fences to ensure even livestock distribution over the entire grazing area; and
> - control naturally encroaching woody invaders such as aspen.
>
> (Lahaie 1982:40)

In considering the first principle, it is necessary to define stocking rate as the number of animals of a specified class per unit area of land over a given time (Hodgson 1979:17). The animal unit month (AUM)* system of calculating

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* 1 AUM is the area of pasture required to feed one mature bovine or horse for 1 month.

indication of the range in mean stocking rates throughout the Interlake region on both meadow and wooded lands (Table 4.3). For example, on the native meadows of St. Laurent only 0.46 ha are required to provide 1 AUM of grazing capacity, whereas in the woodlands of Armstrong 3.2 ha provide 1 AUM. Assuming a grazing season of 120 days, then these figures indicate a stocking rate of one mature beef or dairy cow per 1.8 ha of St. Laurent meadow per grazing season, as compared with one mature beef or dairy cow per 12.8 ha of Armstrong bush pasture per grazing season. (Of course the optimum stocking rate for a particular paddock would vary from year to year and even month to month, depending on actual growing conditions.) Proper stocking rates on a native pasture will yield the maximum sustained livestock returns while at the same time conserving the soil and maintaining or improving the species composition and productivity of the site (Clark 1985:28).

The second principle refers to the fact that most native grasses are not well adapted to withstand early spring grazing. Unfortunately, Interlake cattle producers, like producers elsewhere, are usually anxious to turn their cattle onto pastures at the first sign of greenness, despite evidence that on native stands this practice results in a considerable reduction in productivity (Lahaie 1985). For example, the MDA has calculated that if grazing of native forage begins on

TABLE 4.3

HECTARES OF FORAGE NECESSARY FOR THE PROVISION OF 1 A.U.M. OF GRAZING CAPACITY ON WOODLANDS, NATIVE MEADOWS AND TAME FORAGE IN THE INTERLAKE REGION, 1985

	Native Woodlands (ha)	Meadows (ha)	Tame Forage (ha)
Armstrong	3.3	0.5	0.2
Bifrost	6.2	0.4	0.2
Coldwell	2.6	0.5	0.2
Eriksdale	3.1	0.4	0.2
Fisher	4.6	0.5	0.2
Gimli	3.8	0.5	0.2
Grahamdale	2.6	0.5	0.2
Rockwood	2.8	0.4	0.2
Rosser	1.1	0.5	0.2
St. Laurent	2.4	0.5	0.2
Siglunes	3.0	0.5	0.2
Woodlands	2.5	0.5	0.2
Interlake	3.2	0.5	0.2

Source: Unpublished data, Agricultural Crown Lands, MDA 1985:1-5

May 15th - the date most Interlake cattlemen like to begin their grazing programs - yields over the entire grazing season would be reduced by approximately 40 percent, whereas if grazing is deferred until June 15 yields would be maximized. In order that cattle producers may begin their pasture program as early as mid-May and still maximize productivity on native pastures, the concept of complementary grazing has been promoted. Under this system, cattle are turned onto tame pasture in May (timothy, orchardgrass and crested wheatgrass are species well suited to early grazing), moved to native pastures for June, July and August, and then moved back onto the tame pasture, which would have had ample time to recover, for September grazing (Rangeland Manager 1984:1).

The principle of rotation grazing involves sub-dividing a pasture area into several paddocks and then moving the cattle from one paddock to the next about every six days. With the adoption of this system, native pastures are less likely to deteriorate, because the incidence of selective grazing by cattle is reduced and plant species have time to regenerate after having been grazed. Alternating the season during which the grazing area is used provides another important component of rotational grazing, in that, it helps ensure native species set seed and, therefore, reseed themselves (Clark 1985:27). The even distribution of livestock can be further enhanced through the strategic location of salt grounds, watering areas, and shade and drift fences within an enclosure.

The final principle listed, control of encroaching woody species, can be accomplished by using herbicides, burning or mechanical methods: such as mowing or chaining (Manitoba Agronomists' Proceedings 1982:38-9). During an interview in April 1988 with Gil Lahaie, Chief of Agro Land Planning and Management with the Crown Lands Branch of Manitoba Agriculture it was stated that of these three methods, the latter is generally recommended because it least damaging to the environment.

Adoption of these principles and the subsequent improvement in native forage ought to have a significant impact on the livestock industry in areas where there is a high percentage of unimproved land. The RMs of Siglunes, Coldwell and St. Laurent, and the LGDs of Grahamdale and Armstrong fit this description, as in each over 70 percent of farmland is in an unimproved state. On the other hand, the principles would be of less consequence in the RMs of Rosser, Rockwood and Bifrost, where less than 25 percent of farmland is classified as unimproved (Table 4.1).

Tame Forage

In 1986, almost 35 percent of the improved farmland in the Interlake region was under a forage crop; a proportion more than twice that found in the remainder of the province (Table 4.4). Much of the credit for this level of improvement is attributable to the work of extension personnel with the MDA, particularly Mr. Peter Jones, who became the region's forage specialist in 1971. At that time Jones introduced the 'Grassland Society' concept in order to demonstrate to farmers that when forages are managed as carefully as grains and oilseeds, then the extra livestock product produced per hectare makes forage land the most profitable on the farm (MDA 1972:124). The purpose of this society was, and is to put known research findings and recommendations into practice on field-scale projects to demonstrate to producers, extension personnel and agricultural industry representatives the positive and negative aspects of various recommenced practices in the forage-livestock management field (Breakey 1978:69). Evidence of the success of forage promotion in the Interlake is provided by comparing the rates at which forage has been established on improved land in the Interlake vis a vis the remainder of the province. From 1961 to 1986 the area of improved land sown to forage crops in the Interlake increased by 60.9 percent whereas over the same period in the remainder of Manitoba the area under forage crops on improved land increased by only 23.1 percent (Table 4.4).

It must be emphasized, however, that the successful promotion of forage production during this 25 year period was promotion of forage production during this 25 year period was a function of the FRED project. Specifically, the Hayland and Pasture Development program provided funding for the clearing of 26 677 ha from 1965 to 1971, while under the Forage Seed Distribution Policy (1970 and 1971) enough pedigreed seed was provided to sow 13 804 ha.

One of the efforts of extension workers in the Interlake has been to promote recommended forage species other than the widely adopted alfalfa, a perennial legume, and brome, a perennial grass. For example, it is thought that birdsfoot trefoil, a conservation-type pasture legume, may have a role to play in the low-lying areas of the Interlake (Gross and Storgaard 1975:34). With respect to grass species, much effort has gone into promoting intermediate wheatgrass, orchardgrass and timothy. Intermediate wheatgrass is thought to be comparable or superior to bromegrass with regard to its adaptation to the region and productivity (Gross and Storgaard 1975:35). Orchardgrass has the advantage of being one of the first forage species to flower in the spring, maturing two to three weeks earlier than either brome or timothy (Smith 1981:184). During the 1984 interview with Breakey (supra, p.37), timothy was said to be easier to establish, more tolerant forage in the Interlake region the importance of tolerant of moisture and less competitive in a grass-legume mixture than bromegrass. A full description of the 11 grasses

TABLE 4.4

FORAGE PRODUCTION ON IMPROVED FARMLAND IN THE INTERLAKE REGION, 1961 AND 1986

	IMPROVED FARMLAND			IMPROVED LAND SOWN TO FORAGE			% OF IMPROVED LAND SOWN TO FORAGE	
	(ha) 1961	(ha) 1986	% CHANGE 1961-1986	(ha) 1961	(ha) 1986	% CHANGE 1961-1986	1981	1986
Interlake	328462	439483	33.8	94645	152344	60.9	28.8	34.7
Remainder of Manitoba	4513366	5064497	12.2	646207	795705	23.1	14.3	15.7

Source: Census of Canada, Ottawa, Volume 5, Part 3, Tables 28&30, 1961.
Census of Canada, Ottawa, Catalogue 96-109, Table 14.3, 1986.

and five legume species recommended by the MDA for the 1984 crop year is provided in Appendix A.

Another objective of agricultural extension workers has been to impress upon producers of tame purchasing pedigreed seed, fertilizing their forages annually on the basis of soil tests and adopting a system of rotational grazing when the forage is utilized as pasture.

The purchasing of pedigreed seed is associated with the need to choose not just an adapted forage species, but an appropriate cultivar of that species. In Canada, seed must be pedigreed before it can be sold under a variety name and, therefore, only pedigreed seed guarantees the yield, winter hardiness, disease resistance and other characteristics associated with a named variety (MDA 1986:67).

Research studies have shown that annual fertilization of forage produces higher yields of a more nutritious crop which translates into increased carrying capacity and more rapid animal gains (Bailey 1976:29; Gross 1976:39; Ewanek 1986:50). Because of the high purchase costs of chemical fertilizer, proper application rates are vital if producers are to optimize returns. Consequently, it is highly recommended that fields be fertilized on the basis of soil tests. In the establishment year it is recommended that a complete soil test be conducted in which representative soil samples from depths of 0-15 cm and 15-60 cm are required. For subsequent years a single depth (topsoil) test is considered to be sufficient

(McGill 1983:2). Agricultural extension workers anticipated that Manitoba farmers would be reluctant to fertilize their forage because forage is generally marketed indirectly through their livestock, and as a result, it is difficult for a farmer to accurately measure the economic benefits of fertilizing a forage crop. In an effort to overcome this reluctance, extension workers have pointed out that it generally costs farmers less to produce feed than to purchase it (Ewanek 1986:48-50).

Rotational grazing of tame pasture is beneficial for several reasons. First, when alfalfa is present in a pasture the resting of paddocks between grazing periods allows the alfalfa to remain vigorous, thus maintaining or even improving the nutritive quality of the pasture over time. Secondly, when restricted to one portion of the pasture at a time livestock tend to graze more evenly, thereby avoiding the problems encountered with either overgrazing or undergrazing. Finally, when conditions allow for the harvesting of surplus pasture as hay or silage, rotational grazing allows for areas to be set aside for this purpose (MDA 1986:78). A variation of rotational grazing is that of complementary grazing (supra, p.43) which allows a producer to maximize production of both native and tame forage by incorporating the two into a single pasture system.

The rationale for promoting tame forage over native is based on the premise that cultivated forages are significantly more productive. Quantitative evidence supporting this premise is provided by data collected in the Interlake by the Agricultural Crown Lands Department of MDA (Table 4.3). These data indicate that over the entire region tame forage yields consistently outperform native meadows by a factor of 2.5. When the productivity of tame forage is compared with that of bush pasture, the yield of the former is sixteen times that of the latter. Productive tame forages are an important component of the livestock industry in the Interlake region. Clearly, when cattle producers are in a location conducive to the production of tame forage, then that crop will allow them to increase the amount of beef produced per unit area of land.

Forage Seed

While the physical geography of the Interlake is appropriate for a farming system emphasizing livestock production based on forage crops, the region's farmers were understandably interested, nevertheless, in diversifying their operations so as to hedge against the vagaries of the market-place. Consequently, many chose to grow grains or oilseeds as a cash crop. However, as denoted previously, large areas of the region are unsuited to annual cultivation. During the interview with Mills (1988) he stated that in these areas forage-seed production is considered a better choice of cash crop because of its perennial life cycle. There are other advantages of such production, namely, that it fits well into a crop rotation program for those growing conventional cash crops and that forage seed is generally harvested earlier (July) than grains and oilseeds, thereby eliminating any concerns about damage from an early fall frost (Campbell 1984).

Despite these advantages, relatively few livestock producers in the Interlake have become involved in the production of forage seed, primarily because of the level of expertise and commitment required to grow profitably the crop. Johnson (1978:65) observed that,

> ... those who pride themselves as specialists in forage seed production succeed and make good money at it while those who look upon it as a sideline don't do a proper job, get poor returns, and end up dropping out.

Breakey concurred with this view during an interview in 1984 when he inferred that because animal husbandry is usually the primary enterprise on those Interlake farms which have a livestock component, any cash-cropping program becomes a sideline out of necessity. Consequently, there are few examples where farms have successfully integrated livestock and forage-seed production.

Nevertheless, the Interlake region has had an increasing number of forage-seed producers each year since 1980 and has emerged as a leader within the province with respect to forage-seed production (Huebner 1988). This status, however, is due in large measure to the contributions of three large, specialized seed farms, namely Kletke Seed Farm at Teulon, S.S. Johnson Seeds Limited at Arborg and Dueck Seed Farm at Fisher Branch. The predominant forage species grown for seed are timothy, alfalfa and sweet clover, with birdsfoot trefoil, red clover and Kentucky blue grass being of secondary importance.

Summary

While native forage is recognized by farmers and extension workers alike as being inferior in both quality and yield to tame forage species, the majority of dairy and beef-cattle producers in the Interlake region, nevertheless, depend upon native forage as the basis of their operations. Consequently, MDA extension workers have concentrated on developing management techniques that will enable maximum production from native forage stands. With respect to tame forage, Interlake farmers have been encouraged to gradually increase the area devoted to this crop by improving areas under native vegetation. Extension workers have also introduced the concept of 'Grassland Societies' in an effort to have producers view forage crops in the same light as grains and oilseeds and, thus, increase the level of management inputs given to their forage crops. The production of forage seed would appear to have been an ideal cash crop for Interlake farmers who have land that is difficult to cultivate annually, yet relatively few producers have gone this route.

CHAPTER 5

SURVEY METHODOLOGY

The principal research tool used in conducting this survey was a questionnaire (Appendix C). Therefore, prior to the examination and analysis of data concerning forage production in the Interlake, it is relevant to discuss the objectives and design of the questionnaire, the sampling technique and the manner in which the questionnaire was administered.

Objectives and Design of Questionnaire

Moser (1972:348), Sheatsley (1983:200) and other researchers familiar with the subject of questionnaire design are in agreement that, unlike sampling and data processing, questionnaire design is closer to an art than a science or technology. However, while Sheatsley (1983:200) goes on to say that given the same research task six qualified questionnaire writers are likely to come up with six very different instruments, he does suggest that a good questionnaire has to serve three general purposes:

- o the objectives of the research have to be met;
- o complete and accurate information must be allowed; and,
- o objectives 1 and 2 must be fulfilled within the limits of time and resources.

To meet the objectives of this study the questionnaire designed was intended to obtain from each forage producer surveyed relevant information about the farm in general, the forage crops in particular and personal background. It was realized that much of this information is of a personal nature and many questions may be unanswered unless the confidence of the farmer could be gained. Therefore, the questionnaire was kept as short as possible and close attention was paid to question ordering.

The questionnaire was divided into three sections. In section one, questions concerning general farm information were asked because they were considered less sensitive and could be easily answered by the respondent. In section two, more specific questions on forage production were asked. It was expected that respondents would be able to provide thoughtful answers to specific questions having first been given an opportunity to consider the subject in a broader context. Questions that were deemed to be of a sensitive nature were posed in the third section because by this time the respondent had had time to gain some trust and confidence in the researcher who conducted the survey. If these questions had been asked earlier on, then a respondent may have become suspicious or defensive and would have either been unwilling to complete the questionnaire or possibly given false and/or evasive answers.

Before administering the questionnaire it was delivered to Professor Ken Clark, a forage scientist at the University of Manitoba and to Mr. Hilmar Johnson, an Agricultural Representative in the Interlake region. Revisions were made to section two of the questionnaire based on feedback provided by these readers. The questionnaire was subsequently pretested on twelve Interlake forage producers to examine whether:

- the preamble adequately explained the objectives of the survey to respondents;
- questions posed were understood; and,
- the questionnaire was answered in the length of time expected.

Minor revisions were made to the questionnaire as a result of the pretest experience.

Sampling

When collecting data it is seldom possible to survey the entire population under consideration. Instead, a technique is employed whereby a representative sample of the population is surveyed. To accomplish this it is necessary to define the population with respect to of what exactly it consists, where it is located, and the time period to which it belongs (Daugherty 1974:15). For this particular survey the population consists of Interlake farmers producing forage crops in 1984 and thus the sample is limited to farms growing a particular commodity within a well-defined geographic region during a given year.

The sampling procedure employed in the survey was random-point selection. However, because forage-producing farms are not evenly distributed throughout the Interlake it was decided to select sample farms at the census subdivision (census subdivisions are coincidental with RMs and LGDs) rather than the regional level. This method assured that a sample of forage producers from all census subdivisions of the Interlake would be selected and that the density of sample farms within a census subdivision would be relative to the actual number of forage-producing farms known to exist in the census division.

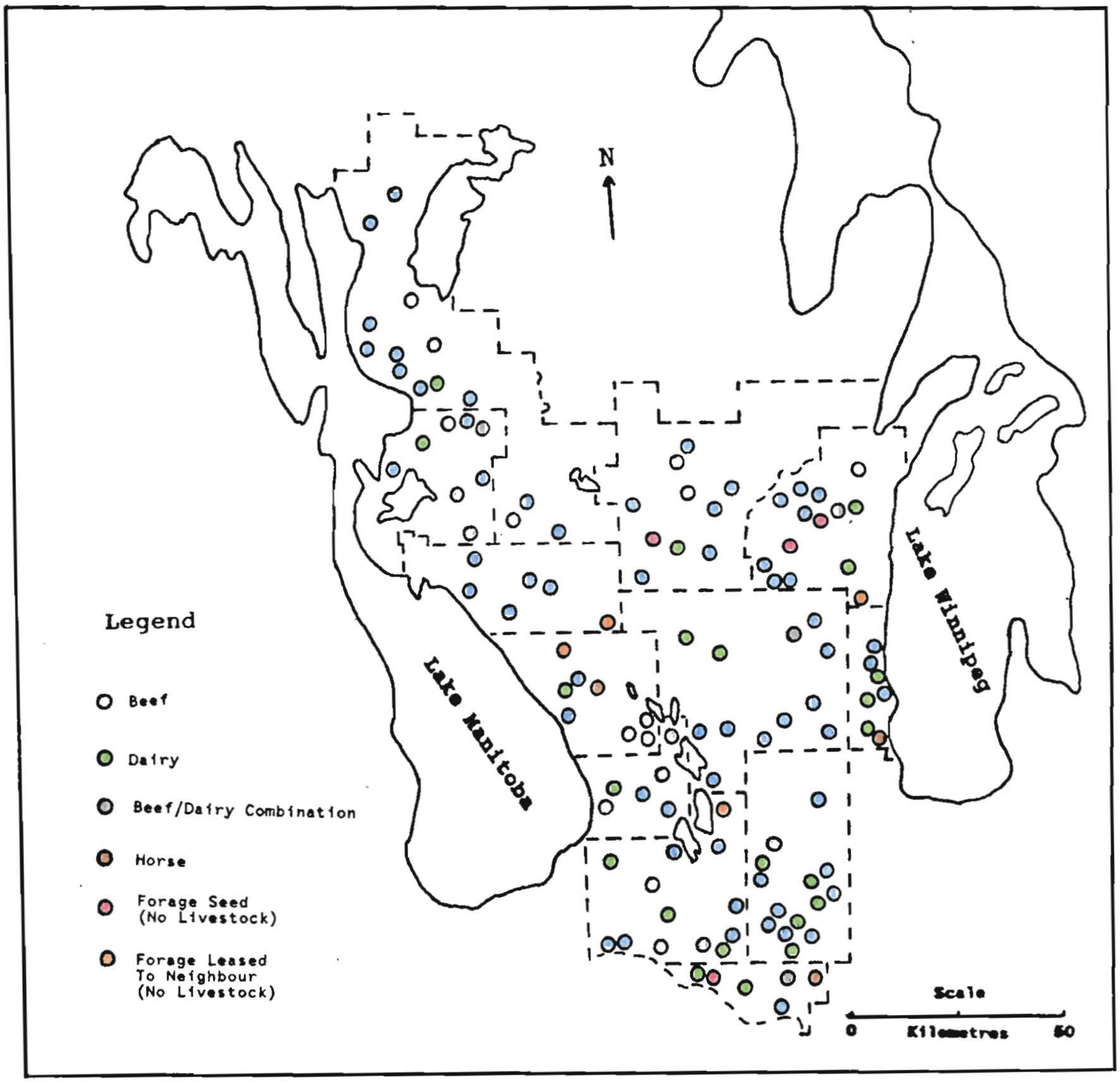
With regard to sample size, the number of forage producers in each census subdivision in 1984 was estimated using an extrapolation technique and census data from 1976 and 1981. A sample size of 6.5 percent was ultimately achieved, a percentage sufficiently high that sampling error was not of concern. Because the estimated number of forage-producers in the twelve census subdivisions varied from a low of 42 in the RM of St. Laurent to a high of 311 in the RM of Rockwood, it was decided to take a larger sampling from census-subdivisions with few forage producers and a smaller sampling from census-subdivisions having a greater population of forage-producers. This technique was applied in order to give greater validity to any statistical calculations that might subsequently be made at the census subdivision level.

Sample farms were located on 1:50,000 Topographic Sheets produced by the Surveys and Mapping Branch of the Federal Department of Energy, Mines and Resources (Appendix E). The sampling procedure was to select the required number of points within each subdivision by superimposing a grid upon each map sheet and generating sets of x and y coordinates using random number tables. Map sheets at the 1:50 000 scale indicated the location of farmsteads and other rural structures, so it was possible to select as part of the sample the closest farmstead to each point generated, providing the farmstead was within a 2.5 kilometre radius of a point. Occasionally a point fell in a remote area where no farm buildings were located within the required 2.5 kilometre radius, in which case the point was omitted and another one generated.

The locations of sample farms used in the analysis are shown in Figure 5.1. Of the 118 forage producers surveyed 71 operated beef-cattle farms, 26 operated dairy farms and 21 were classified as other. In the last category, 10 had beef/dairy combination, 4 produced forage seed but had no livestock, 4 had no livestock but entered into a share-crop

FIGURE 5.1

LOCATION OF 118 SAMPLE FARMS IN THE INTERLAKE



agreement with neighbours, and 3 raised horses.

Administering the Questionnaire

The questionnaire was administered to 120 Interlake forage producers during the months of March and April, 1985. A total of 152 randomly selected farm sites were visited, with 32 being rejected for a variety of reasons; the most common two being that the farmer was either not at home or did not grow a forage crop. From the 120 questionnaires completed, two were discarded - one because the respondent was uncooperative and refused to answer a number of questions; the other owing to inconsistencies in the respondent's answers with regard to absolute and percentage figures. Thus, 118 questionnaires were analyzed.

A face-to-face interview technique was used because it has traditionally been considered the most reliable method for collecting data; whether they be attitudinal or factual in nature (Weinberg 1983:337). Introductory remarks, in which the interviewer gave his name, stated his association and outlined the objectives of the survey (Appendix D) were kept short and to the point and delivered in a relaxed and confident manner. Once the interview had commenced, the researcher had to sustain rapport with the respondent while adhering to the standardization and structure built into the questionnaire.

On average 40 minutes were required to complete a questionnaire with the shortest interview lasting 25 minutes and the longest one hour. Toward the end of the survey the researcher spent long hours in the field and conducted as many as 11 interviews in one day, however, the daily average was five. The actual number achieved in a given day depended on the distance between sample farms and the time taken to locate a respondent on the farm.

The majority of forage-producers were co-operative and patient in supplying answers to the questionnaire. A few participated with reluctance, because the study was perceived to have no direct benefit to their farms. In general, though, respondents appeared to gain some appreciation of the aim and purpose of the research and supported it enthusiastically.

Summary

The success of a survey is directly influenced by the questionnaire and sampling technique utilized. It is hoped that there were no serious oversights or inherent shortcomings in either of these areas and that the survey is reasonably representative of Interlake forage-producers. As there was no satisfactory method of checking the reliability of replies, it was necessary to rely on human integrity and the standardization of technique.

The wide range of forage production techniques reported in the subsequent analysis suggests that producers were indeed honest in their responses and did not resort to providing what they might have considered the "best" answer to such questions as "Do you use pedigree forage seed?", "Do you soil test forage fields?" and "Do you apply chemical fertilizer annually to forage fields?". Consequently, the analysis should provide an authentic picture of forage producers in the Interlake region as they practised farming in 1984.

CHAPTER 6

FORAGE PRODUCTION ON CATTLE FARMS IN THE INTERLAKE

The Interlake's claim to being 'cattle country' is supported by the fact that 71 of the 118 sample farms* (60.9 percent) included in the survey were classified as being beef enterprises (Figure 5.1). In total, these 71 farms occupied 32,959 ha of which 21,392 ha, or 64.9 percent, were utilized in the production of forage. The forage in turn was used to support 9,335 cattle. On average, Interlake cattlemen kept 130 cattle (of which 70 were cows) on a 464 ha holding, of which 300 ha were producing forage. The objectives of this chapter are to describe the various forage types and forage management systems observed on these cattle farms.

Forage Types And Management Systems

Native Forage

Native forage was reported on 61 of the 71 sampled cattle farms (85.9 percent) and was far and away the predominant

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* From this point on the term 'farm(s)' refers specifically to sample farm(s).

forage in terms of areal extent, occupying 14,893 ha or 69.6 percent of the land base devoted to forage production. However, the relatively low nutritional value of native forage is reflected by the fact that the technique used most frequently to harvest the crop was grazing. Specifically, survey data indicate that 98.7 percent of cattlemen with native forage used it in a grazing program, while only 39.3 percent chose to harvest it by mechanical means and store the hay as winter feed (Table 6.1).

While virtually all cattlemen with native forage on their farms used it for grazing, there was no consensus among them with respect to their grazing system in that approximately one-half allowed continuous grazing while the remainder used some form of rotation (Table 6.2). Although rotational grazing is generally touted as being more progressive, this lack of consensus is reasonable given that local field trials comparing grazing systems indicate stocking rates per unit area are more important than the grazing system employed, in terms of maximizing gains on pasture (MDA 1981:45). In fact, Clark (1985:31) cites research indicating that rangeland conditions improve only slightly when rotational and continuous grazing were compared and animal gains were generally lower with rotational than continuous grazing. No mention was ever made by respondents of the complementary grazing system described in Chapter 3, although 32 producers did claim to graze both native and tame forage. However, all

TABLE 6.1

UTILIZATION OF NATIVE FORAGE BY CATTLEMEN

	Native Pasture	Native Hay	Either Native Pasture or Hay
Cattle Farms	59	24	61
% of Cattlemen With Native Forage	96.7	39.3	100.0

- -

TABLE 6.2

GRAZING SYSTEMS USED BY CATTLEMEN WITH NATIVE FORAGE

	Rotational Grazing	Continuous Grazing	Total
# Of Cattlemen	27	34	61
% of Total	44.3	55.7	100.0

but one producer reported that cattle were allowed onto native pasture in mid-May, thus indicating that the most important component of complementary grazing - the deferred grazing ofnative forage - had not been adopted.

Cattlemen who chose to store native hay used one of three different handling systems (Table 6.3). Two-thirds of producers made large, round bales, one-third made stacks and another one-third made conventional square bales. (One producer often had two or even three handling systems.) The advantage of round bales over the other two systems, most frequently cited by respondents, was that more hay can be put up in a shorter period of time with less labour. Similarly, the time and labour necessary for feeding were also reduced. These savings of both time and labour are of particular importance when storing and feeding a relatively low-value crop such as native forage. Cattlemen who made stacks of native hay claim that the quality of hay from a stack was

TABLE 6.3

NATIVE HAY HARVESTING SYSTEMS USED BY CATTLEMEN

	Round Bale	Stack	Square Bale	Total Cattlemen
Number	16	4	4	24
% Of Total	66.6	16.6	16.6	99.8

superior to that in a bale and, to them, worth the extra labour required. This claim is supported in the forage literature (Ensminger and Olentine 1978:265) and these non-adopters of round-bale technology are, therefore, not to be faulted. On the other hand, the few cattlemen who stored native hay in conventional square bales did so because they either lacked the capital resources to purchase round balers or were unwilling to modify their forage handling system so as to accommodate this newer technology.

Tame Forage

Although nearly 95 percent of the Interlake cattlemen reported growing tame forage, the areal extent of this crop (5,959 ha) was only 40 percent that of native vegetation. The tame-forage crop was dominated by three species: alfalfa, timothy and brome, with twelve other species being reported (Table 6.4 and Appendix A). Alfalfa was the most widely adopted legume in the region, occupying 95 percent of the total area in tame forage by Interlake cattle producers. With regard to tame-grass species, the fact that the area under timothy was only slightly less than that sown to bromegrass indicates the success of the MDA in promoting timothy, as an alternative to brome, in low-lying areas. On the other hand, orchardgrass, which was promoted by the MDA as an early-maturing species well suited to Interlake pasture programs,

TABLE 6.4

FORAGE SPECIES REPORTED BY INTERLAKE CATTLE FARMERS

Forage Species	Area (ha)	Areal Index (Alfalfa = 100)
MAJOR		
Alfalfa	5661	100.0
Brome	4440	78.4
Timothy	4202	74.2
MINOR		
Orchardgrass	720	12.7
Reed Canary Grass	382	6.7
Birdsfoot Trefoil	332	5.9
Crested Wheatgrass	259	4.6
Russian Wild Rye	206	3.6
Alsike Clover	188	3.3
Red Clover	162	2.9
Sweet Clover	83	1.5
Meadow Fescue	65	1.1
Peas	49	0.9
Oats	49	0.9
Corn	40	0.7

was only reported on four farms. Two other cattlemen had attempted growing orchardgrass in the past, but found it to be highly susceptible to winter injury which reduced its persistence in the forage stand.

In view of the fact that the total area under tame forage was only 5,959 ha, it is evident from Table 6.4 that on over 80 percent of farms several forage species were grown simultaneously in a forage mixture. These mixtures, however, were invariably anchored by alfalfa with fully 100

TABLE 6.5

DEGREE TO WHICH TAME FORAGE SPECIES WERE SOWN INTO AN ALFALFA BASED MIXTURE

Species	Total Sown (ha)	Sown With Alfalfa (ha)	% In Alfalfa Of Total Sown
GRASSES			
Bromegrass	4440	4440	100.0
Timothy	4202	4028	95.9
Orchardgrass	720	720	100.0
Reed Canary Grass	382	382	100.0
Crested Wheatgrass	259	251	96.9
Russian Wild Rye	206	198	96.1
Meadow Fescue	65	65	100.0
LEGUMES			
Birdsfoot Trefoil	332	257	77.4
Alsike Clover	188	176	93.6
Red Clover	162	162	100.0
Sweet Clover	83	65	78.3

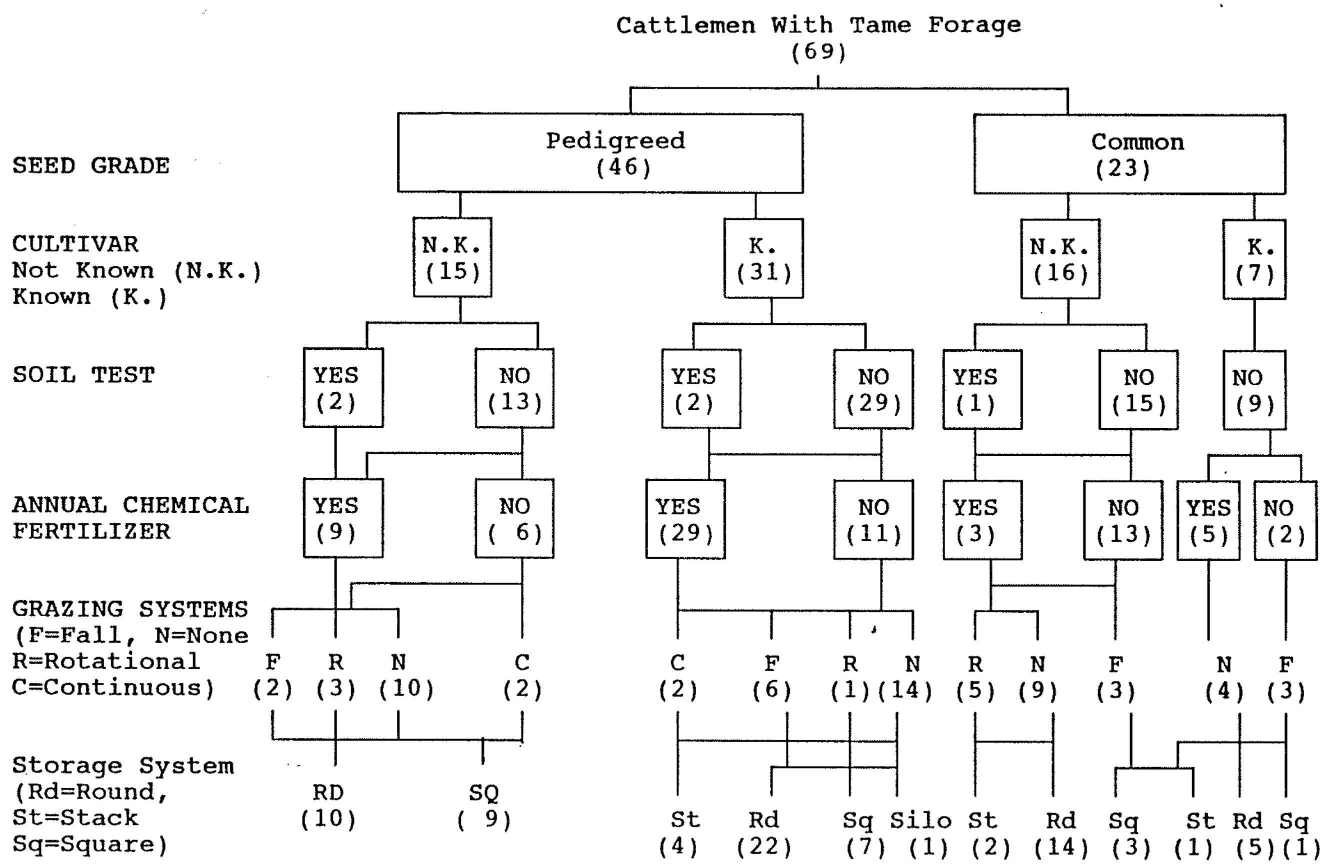
percent of the bromegrass, orchardgrass, reed canary grass and red clover sown into an alfalfa mixture (Table 6.5). Alfalfa is recognized as having the highest feed value of allcommonly grown crops and has consistently outyielded other forage crops in Manitoba field trials. These positive aspects of alfalfa have impressed Interlake cattlemen to the extent that they rely upon it more heavily than any other species of tame forage.

Ideally, production of tame forage required considerably more input from producers in terms of both management and materials than does native forage. For this reason discussion on tame-forage management systems will consider the decisions made by surveyed cattlemen with regard to seed grade, cultivar selection, soil testing and the annual application of chemical fertilizer, as well as grazing and storage systems. The variety of choices made and the number of cattlemen making each choice are illustrated schematically in Figure 6.1.

It is on the basis of forage-seed grade that Interlake cattlemen are divided into two groups: those who sowed pedigreed seed; and those who sowed common seed. The larger group is comprised of those using pedigreed seed, thus indicating that two-thirds of cattlemen recognize the importance seed quality plays in establishing a good forage stand. Producers who chose to sow common forage seed took the approach that 'forage is forage' and were not convinced that they would or could benefit through the use of pedigreed seed.

In considering tame-forage cultivars, a distinction was made between producers who knew what variety of tame forage they grew and those who did not. Fifty-five percent of respondents were aware of at least one tame-forage cultivar grown on their farms, which, while not necessarily implying that seed was selected on the basis of cultivar characteristics, nevertheless does indicate a high level of cognizance of their forage production systems. An inconsistency does exist, however, in that 10 percent of alfalfa producers claimed to know the variety of common seed; an odd situation given that it is forbidden by law under the

FIGURE 6.1
FORAGE PRODUCTION AND HARVESTING SYSTEMS ADOPTED BY INTERLAKE CATTLEMEN WITH TAME FORAGE



Canadian Seed Act to sell common seed by cultivar name. How, or if, these producers came to know the dominant cultivar contained in their common seed was not investigated, but the seed would certainly not have been of pedigreed calibre. A more surprising revelation than knowing the cultivar of common seed was that 22 percent of the cattlemen were ignorant of the cultivar of their certified forage seed. While forgetting the name of a forage variety is of no real significance in and of itself, nevertheless, it suggests a lack of interest on the part of cattlemen for the forage-production component of their livestock enterprise.

Soil testing and the annual application of chemical fertilizer will be considered jointly, because the former ought to largely dictate the recommendation of the latter. No evidence of this ideal situation was provided by the survey data. Indeed, 53.6 percent of respondents did apply chemical fertilizer annually, yet only 7.2 percent elected to base their fertilizer type and application rates on soil tests.

In general, cattlemen viewed soil testing as an exercise more appropriate for grain fields than those producing forage. For instance, of the 64 cattlemen who used commercial fertilizer without first conducting a soil test, all applied 110 kg of 11-55-0 (a high-phosphate fertilizer) per hectare. Inevitably the question arises: how did these farmers determine the type and quantity of fertilizer to apply? The most reasonable explanation is that forage fertilization was promoted by the MDA in the 1970s. At this time trials conducted in the Interlake found that the application of 110 kg/ha of high-phosphate fertilizer (11-48-0) increased forage yields in a cost-effective manner (FRED 1976:4). Interlake cattlemen appear generally to be satisfied with this recommendation and therefore not anxious to identify actual soil-nutrient requirements at the field level through soil testing.

With regard to the grazing of tame forage 53.6 percent of Interlake cattlemen with tame forage crops had stands which they did not graze at all. Another 20.3 percent permitted only fall grazing after a hay crop had been removed. Of the 23 cattlemen who did establish a grazing system on their tame forage, 19 opted for rotational grazing, with only four endorsing continuous grazing. These management decisions vis-a-vis the grazing of tame forage indicate that the crop is generally considered by Interlake cattlemen to be too valuable for grazing and certainly too valuable for extensive grazing. Previously it was stated that native forage was primarily used for grazing (supra, p.64). It is apparent that tame forage is the primary source of stored winter feed in the Interlake. This dichotomy with respect to the utilization of native and tame forage provides further evidence that the complementary system of grazing has not been adopted to any significant extent by Interlake cattlemen.

Tame forage harvested for winter feed was stored in round bales on 81.2 percent of the region's cattle farms, square bales on 30.0 percent, stacks on 16.6 percent and vertical silos on 1.4 percent. As stated in the discussion on native forage, the popularity of round bales is a function of their time- and labour-saving attributes (supra, p.66). Indeed, the fact that 30.0 percent of Interlake cattlemen used a square baler is misleading because only 15.9 percent of respondents used exclusively a square baler. On the remaining farms the square baler was an adjunct to the round baler, used mainly as a back up should the round baler breakdown. The few Interlake cattlemen who chose to store hay in stacks all claimed that they were unwilling to sacrifice quality for the savings in time and labour offered by the round-bale system. Their opinion with regard to the high quality of stacked hay was shared by several Interlake cattlemen who had converted from a hay-stack system to a round-bale system. The one respondent who reported an upright silo (actually two upright silos) operated a feedlot. Because a feedlot operation lends itself to high levels of mechanization, it is possible that the high capital investment required to erect a vertical silo ($100,000+) would eventually be recovered. Such would not be the case on typical cow-calf operations. Hence, silos are rarely found on the region's cattle farms.

Figure 6.1 reveals that cattlemen with certified forage seed are likely to nurture the crop with an annual application of chemical fertilizer, which is not selected on the basis of local soil tests. With respect to forage harvesting the majority of this group chose not to utilize tame forage as pasture, but rather cut it for winter feed and store it in a round bale. Most Interlake cattlemen using common forage seed neither soil tested nor applied chemical fertilizer annually.

Forage Seed

Ten of the surveyed cattle farms produced a forage seed crop. The total area harvested as forage seed was 655 ha, ranging from as little as 8 ha to a high of 154 ha on a farm producing three different forage seed crops (Table 6.6). Timothy was the most prevalent forage species grown for seed, occupying 500 ha or 76.3 percent of the area producing forage seed. Alfalfa cultivars were produced on 132 ha or 20.1 percent of the area devoted to forage seed, while the remainder produced seed crops of birdsfoot trefoil and bromegrass.

As stated previously (supra, p.51) forage-seed production is seldom successful when integrated with a livestock operation. While this survey was not designed to determine the success or failure of a particular enterprise, data

TABLE 6.6

FORAGE SEED PRODUCTION ON INTERLAKE CATTLE FARMS

Area In Forage Per Farm (ha)	Forage Species (ha)				Soil Test	Annually Apply Chemical Fertilizer
	Timothy	Alfalfa	Birdsfoot Trefoil	Brome		
154	89	59	--	6	YES	YES
121	121	--	--	--	NO	YES
95	95	--	--	--	YES	YES
65	--	65	--	--	NO	YES
56	40	--	16	--	YES	YES
40	40	--	--	--	NO	YES
40	40	--	--	--	YES	YES
40	40	--	--	--	NO	YES
36	36	--	--	--	YES	YES
8	--	8	--	--	NO	YES
655	501	132	16	6	50% YES	100% YES
% Of Total Area	76.5	20.2	2.4	0.9		

collected on the habits of the forage-seed producers with respect to soil testing and the annual application of chemical fertilizer indicate the level of management given to the crop. For example, all ten forage seed producers applied chemical fertilizer to their crops each year. Soil testing, however, was conducted by only five of the ten producers. Those not soil testing forage-seed fields would not likely adhere to the rigorous herbicide and harvesting schedules necessary to ensure an acceptable yield of forage seed.

CHAPTER 7

FORAGE PRODUCTION ON DAIRY FARMS IN THE INTERLAKE

While Manitoba's Interlake region is renowned as 'cattle country', a number of forage producers in the region are engaged in other operations. Data from the 1981 Census indicate that for every 100 cattle farmers in the region there were 32 dairy operations. These census data are consistent with those obtained through the survey where the ratio of cattle farms to dairy farms was 2.81 to 1.

The 26 dairy farms sampled (Figure 5.1) occupied 10,055 ha with 4,446 ha or 44.2 percent being utilized in the production of forage. This forage was used to support 2,086 dairy cattle. Thus, the average Interlake dairy farm had a dairy herd of 80 animals, on a land base of 386.7 ha of which 171 ha was devoted to forage production. In other words, their farm size was 16.9 percent smaller but their forage-producing area 43.2 percent less than cattle farms (supra, p.63). Why dairymen were able to operate with fewer hectares of forage than cattlemen will be made evident in the discussion on native and tame forage.

Native Forage

As a group, dairy farmers were less dependent upon native forage than cattlemen. For example, 17 farms or 65.3 percent of the 26 dairy farms reported native forage, whereas the crop was present on over 85 percent of cattle farms. The areal extent of native forage on dairy farms was also significantly less. Specifically 1,747 ha or 39.3 percent of all land devoted to forage on dairy farms was under native grass, while on cattle farms almost 70 percent of the area under forage was producing native vegetation. Further evidence of native forage not playing as important a role in the forage systems of Interlake dairy farms is that 13 producers, or 76.5 percent of the 17 with native grass, chose not to store the crop for winter feed. Eight producers did not rely upon native forage as a feedstuff at all, viewing native land as simply an area upon which animals could 'exercise'.

The attitude of the region's dairy farmers toward native forage differed from that of their cattle-producing counterparts who, while not generally harvesting native forage for winter feed, nevertheless relied upon it for summer grazing in order to preserve tame forage stands for winter feed. The explanation for the apparent dismissal of native forage by dairy farmers is that they adopted a forage system that provided ample tame forage for year-round feeding.

Tame Forage

Just over 96 percent of the sampled dairymen produced tame forage, a proportion comparable to cattlemen (supra, p.68). However, when considering the ratio of tame to native forage, dairymen were more inclined to produce tame forage, in that, the 2,699 ha of tame forage on dairy farms provided a tame to native ratio of 1.5:1, whereas on cattle farms the same ratio was 0.4:1. As was the case with cattle producers, the dairymen's forage crop was dominated by alfalfa, brome and timothy (Table 7.1).

The importance placed on alfalfa by Interlake dairymen is demonstrated by the fact that 93.4 percent of the total area sown to a tame forage crop was producing alfalfa. As for brome and timothy, they were not as well represented as they were on cattle farms. For example, on dairy farms the areal index of brome to alfalfa was 60.5 whereas on cattle farms it was 78.4. In the case of timothy the difference was even more dramatic with the respective indices being 48.2 and 74.2. (Table 7.1).

Alfalfa was the preferred tame forage crop on dairy farms just as it had been on cattle farms and for the same reasons (supra, p.69). The difference was that dairymen who grew alfalfa devoted 56.7 percent of their forage land to the cultivation of an alfalfa based crop, while cattlemen grew

TABLE 7.1

FORAGE SPECIES REPORTED BY INTERLAKE DAIRY FARMERS

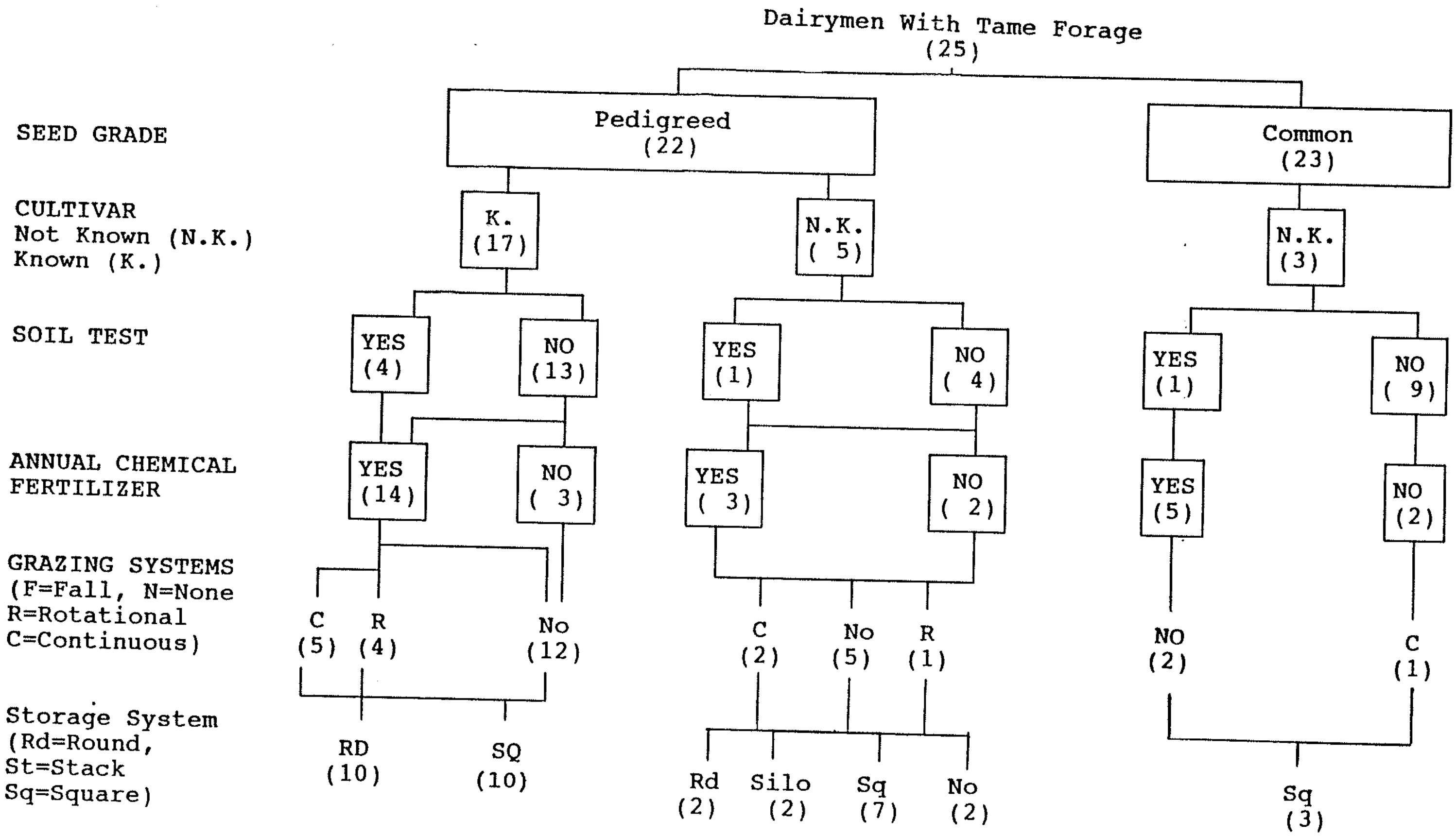
Forage Species	Area (ha)	% of All Tame Forage	Areal Index (Alfalfa = 100)
MAJOR:			
Alfalfa	2521	93.4	100.0
Brome	1526	56.5	60.5
Timothy	1214	45.0	48.2
MINOR:			
Orchard Grass	71	2.6	2.8
Sweet Clover	53	2.0	2.1
Corn	43	1.6	1.7
Meadow Fescue	26	1.0	1.0
Barley	12	0.4	0.5
Oats	12	0.4	0.5

alfalfa on only 26.4 percent of the land used in forage production.

Decisions made by dairy farmers with regard to the management of their tame forage are shown schematically in Figure 7.1. When considering the first four techniques dairymen clearly emerge as more committed to forage management than cattlemen. For example, 88 percent of dairy farmers sowed pedigreed forage seed compared with only 55.7 percent of cattle producers. Sixty-eight percent of dairymen could name at least one forage cultivar found on their farms as opposed to only 55 percent of cattlemen. Eighty-one percent of dairymen subscribed to the strategy of fertilizing forage,

FIGURE 7.1

FORAGE PRODUCTION AND HARVESTING SYSTEMS ADOPTED BY INTERLAKE DAIRYMEN WITH TAME FORAGE



whereas only 54 percent of cattlemen went through this procedure. Although few dairymen based their selection and application rates of fertilizer on soil tests, the proportion of the total who did so was higher than cattlemen; 24 percent against 7.2 percent.

The majority of dairymen (76 percent) reported that they did not permit grazing on tame forage. Continuous grazing systems were employed by 28 percent of dairymen and rotational grazing by 20 percent. By and large they downplayed the importance of forage as a pasture crop, but placed great importance on forage as a stored feed.

Storage of feed crops on Interlake dairy farms was quite different than on cattle farms with the emphasis being on conventional square bales rather than large round bales because on farms where individual stall feeding of cows was practised or where cows were housed in stanchions neither round bales nor stacks were practical. Twenty or 80 percent of the 25 dairymen storing tame hay used square bales and, of those, 11 stored all of their winter feed as small bales. Round bales were used exclusively by 3 dairymen and in combination with other storage methods by another 6 dairymen. Only one respondent reported using stacks. As the nature of most dairy operations was not conducive to the adoption of round-bale technology, storing forage in a silo became the best indicator of progressive behaviour. Silo technology was used on 6 dairy farms.

Forage Seed

Only one of the 26 dairy farms reported a forage seed crop and the presence of forage seed on that particular farm was a function of the owner's son being an Agricultural Representative with MDA. Of the 26 dairymen surveyed, 5 had relatively large cash crop enterprises but they were dominated by grains and oilseeds.

CHAPTER 8

OTHER FORAGE-PRODUCING FARMS IN THE INTERLAKE

In Chapters 5 and 6 the farms under consideration were classified as either cattle or dairy, respectively. However, 21 of the 118 sample farms (Figure 5.1) satisfied neither of these classifications because there were ten farms with both a beef and dairy component, three involved in the raising of horses, four carried no livestock but produced forage as a seed crop, while the remaining four leased their forage-producing land to neighbouring farmers. This chapter provides a synopsis of forage-producing techniques utilized by farmers in each of these groups.

Beef/Dairy Combination

Ten of the farms surveyed, or 8.5 percent of the total survey, had a combined beef and dairy operation. These farms are referred to collectively as beef/dairy operations because on 7 of the 10 farms the beef herds were over twice as large as the dairy herds, while on the remaining 3 farms the beef and dairy herds were approximately the same size.

The mean size of these operations was 431.5 ha, while mean herd size was 73 animals, of which 51 were beef cattle and 22 dairy cattle. The mean area under forage was 347.5 ha, which amounted to 80.5 percent of the land base. When compared with single enterprise beef or dairy farms, it was observed that the average beef/dairy combination had the fewest cattle, was midway between dairy and beef in terms of farm size and devoted more land to forage production than either of the other two operations. As well as devoting more of their land to forage production, beef/dairy operators produced more native forage than their beef or dairy counterparts. Specifically, 79.6 percent of all forage produced on farms with beef/dairy enterprises was native whereas native forage accounted for 69.6 and 39.3 percent of the forage crop on beef and dairy operations, respectively.

How farms with a dairy component could manage to meet production quotas, while relying almost entirely on native vegetative as a foodstuff, is answered by the fact that 7 of the 10 producers had cream quotas. Shippers of cream have less stringent requirements when it comes to regulating daily milk production and can actually achieve their entire annual quota during the grazing season, if they so desire.

Of the 10 forage producers managing both a beef and dairy herd, only 3 used certified seed and, of those, just 1 could name a forage cultivar seeded on the farm. None of the producers did any soil testing, although five applied chemical fertilizer. As for the winter storage of forage, a variety of systems were used. On four farms round bales were used exclusively, three farms used only square bales, while both round and square bales were used on two farms. The operators of these two farms specifically stated that round bales were prepared for beef cattle while square bales were fed to dairy cattle. One farm, located on the natural grasslands of St. Laurent, stored hay in stacks. Forage sees was not produced on any beef/dairy farm surveyed. The strategy adopted by these farmers was to use cultivable land not producing tame hay in the production of feedgrains for on-farm use rather than a cash crop.

Horse Farms

Of the three horse farms surveyed, one was involved in the sale of pregnant mare's urine (PMU), a substance used by the pharmaceutical industry in the production of oral contraceptives, and the other two in the breeding of thoroughbreds.

The PMU farm was located in the RM of Coldwell on a land base of 1600 ha, 95 percent of which was producing native vegetation. The farm supported approximately 200 horses. Rotational grazing was practised on this farm with round bales used for storing native hay as winter feed. Chemical fertilizer was not applied to the native forage.

The farms producing thoroughbreds were located in Rosser and the southern most part of Gimli. The farm in Rosser was comprised of 235 ha of which only 55 ha, or 23.4 percent of the farm's land base, was devoted to forage productions. It maintained 20 horses. All of the forage was tame, 40 ha being an alfalfa/brome mixture while the remaining 15 ha was a purestand of bromegrass. Grazing on this farm was continuous, with hay being stored in square bales for ease of stall feeding.

On the farm located in Gimli, 35 horses were kept on 55 ha. Of the 55 ha, 25 ha were sown with an alfalfa-timothy mixture using pedigree seed. The resulting crop was stored in round bales, but because the land base was inadequate for the support of 35 horses, an additional 3000 square bales were purchased each year. The remaining 30 ha were in a native state and used to exercise horses in both summer and winter. The native forage produced on this farm was not considered by the operator as a feedstuff, an attitude shared by many dairy producers (supra, p.79), presumably because of the lower nutritive value of native forage compared to tame. A forage-seed crop was not produced on any of the three horse farms.

Forage Seed (No Livestock)

Four farms included in the survey had no livestock, but did grow forage solely as a seed crop. These cash crop farms had a mean areal extent of 404.7 ha. The proportion of each farm devoted to forage production ranged from 13.3 to 25.2 percent.

On three of the four farms forage seed was managed as carefully, if not more carefully, than grain and oilseed crops. Indications of the high level of management given to forage-seed crops include: soil testing on land intended for forage-seed production; the sowing of foundation seed; and the application of chemical fertilizer to the specifications recommended in the soil test results. One of the three farms was located in the RM of Fisher, while the other two were in the RM of Bifrost. Both these RMs had local MDA offices which actively promoted forage-seed production. A further locational advantage to farmers in Fisher and Bifrost was the presence of seed-cleaning plants in Fisher Branch and Arborg willing to purchase the crop at competitive prices.

On the other cash crop farm, located in Rosser, the forage-seed crop harvest was incidental, however, in that sweet clover was planted as a plough down crop to improve soil tilth. As an intended plough down crop, the producer elected to plant common seed and neither soil test nor apply chemical fertilizer.

Forage Land Leased To Neighbour (No Livestock)

In this category, each of the four farms occupied a quarter section of land (64.8 ha). Two of these quarters were entirely in native land, while on the other two the area under tame forage was 35 and 43 percent, respectively. Improvements on the latter two farms were by the landowners, but certified seed was not used, nor was the forage crop fertilized. All four owners had arrangements with a neighbour, whereby the forage crop could be harvested either through grazing or by mechanical means. It is noteworthy that three of the four owners were over 65 and had retired from active farming. The fourth was under 35 and hoped to use his quarter section as the basis for a larger farming operation in the future.

CHAPTER 9

CLASSIFICATION OF FORAGE PRODUCERS

Classification System

The classification system developed for this chapter required each of the 118 forage producers surveyed to be assigned a score of from 0 to 10, based on the answers to 9 questions on forage production asked during the interviews (Appendix C) and a subjective evaluation by the researcher of their farm operations. Before embarking on the analysis, the scoring procedure utilized will be outlined in detail.

Of the 9 questions used to score forage producers, 5 were binary while the remaining 4 allowed a range of answers. Binary questions were answered either in the affirmative or negative with 1.0 point being awarded if the producer had adopted a given forage production technique and no points in the event of non-adoption. These questions asked producers to name forage cultivars found on their farms (only one point was awarded regardless of the number of cultivars named) and to state whether or not they sowed pedigreed forage seed, soil tested their forage fields, applied chemical fertilizer annually and practised rotational grazing (rotational grazing was not considered on farms without livestock).

For each of the other 4 questions a range of answers was possible. Therefore, respondents could score between 0.0 and 1.0. These questions enquired about harvesting systems, the percentage of forage sown to tame species, forage species grown other than alfalfa and brome, and the number of information sources consulted regarding the management of forage crops. Under harvesting systems, 1.0 point was awarded to producers with a silo, 0.8 to those with round bales and 0.4 to those having either small bales or stacks. While using either a silo or round bale did not necessarily imply that a producer managed his forage well, it did indicate a progressive nature. In scoring producers for the percentage of forage which was tame, the procedure was to divide the percentage of cultivated forage by 100 and round to the nearest tenth. Here, producers were rewarded for choosing to sow tame forage rather than rely on native grass. Awarding points for each forage species grown, other than alfalfa or brome, reflects the MDA's emphasis on promoting other forage species recommended for Manitoba. In scoring, 0.3 points were given for each forage species, other than alfalfa or brome, grown on the farm with 1.0 being the maximum score attainable. (No producer scored over 0.9.) The use of a variety of information sources to learn about new forage cultivars and production methods was an indicator of farmers who were both good managers and progressive in their thinking. The maximum score allowed was 1.0, with 0.2 points being awarded for each information source consulted.

The final point used in the scoring of a forage producer involved an evaluation by the researcher of the overall farm operation. Scores could range from 0.0 to 1.0 with intervals of 0.1. A score of 0.0 would indicate an extremely poor farm operation, whereas 1.0 would be an excellently managed operation.

Once all producers had been given an overall score, the scores were placed in sequence and quartiles determined. Each farm's forage-production system was then classified as 1, 2, 3 or 4 based upon the quartile into which it fell, with Class 1 comprising the upper quartile and Class 4 the lower. Qualitatively, Class 1 producers can be described as excellent; Class 2 producers good; Class 3 producers fair; and, Class 4 producers poor. Because of the frequency of tied scores and the need to place all farms with equivalent scores in the same class, the actual percentage of producers in each class ranged from 22.0 to 28.9.

In the following analysis the characteristics associated with producers from each of the four forage classes will be described, with the emphasis being on intraregional differences. Frequent references will be made to the four land-resource units of the Interlake, discussed in Chapter 2 (supra, pp.8-14).

Analysis

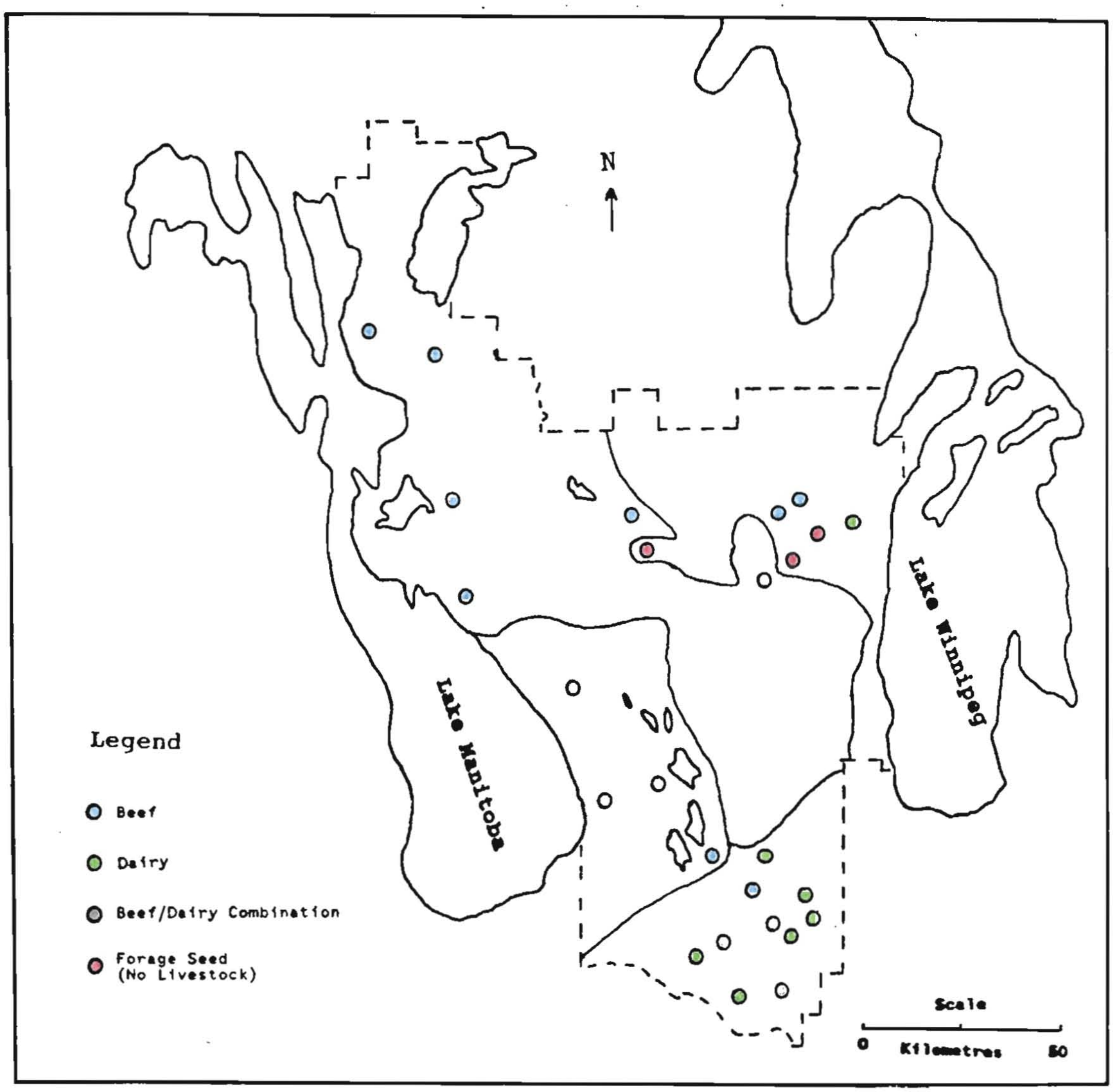
Class 1 Forage Producers

A total of 26 Interlake forage producers, or 22.0 percent of all forage producers surveyed, fell into the highest quartile. The areal distribution (Figure 9.1) of the top forage producers indicates clusterings in those areas with the region's best agricultural land, namely the Red River/Osborne and Arborg/Peguis land-resource units, whereas a more dispersed pattern is observed in Inwood/Meleb and Isafold, land-resource units characterized by poor drainage and stony soils. Specifically, 35.7 percent of all Red River/Osborne forage producers and 24.0 percent of those in Arborg/Peguis fell into the Class 1 category, compared with only 18.2 percent and 14.0 percent of forage producers in Isafold and Inwood/Meleb, respectively.

As well as illustrating the location of Class 1 forage producers, Figure 9.1 indicates that 65.4 percent of the top forage producers were engaged in either dairying, a farm enterprise that requires a consistent supply of high-quality forage in order that milk quota requirements be met on a daily basis, or forage-seed production, an enterprise similar to grain and oilseed production with regard to the high levels of purchased inputs and management skill necessary for a crop

FIGURE 9.1

THE LOCATION OF CLASS 1 FORAGE PRODUCERS IN THE INTERLAKE REGION



to be profitable. The type of farm enterprise on which forage was grown also had a strong spatial component. Over 75 percent of Class 1 forage producers who had either a dairy or beef-dairy operation were farming in Red River/Osborne, while 65.2 percent of top forage producers with a forage-seed component as part of their farming enterprise were located in Arborg/Peguis.

The high percentage of top forage producers in Red River/Osborne is a function of historical inertia given the need, years ago, to produce a perishable commodity like milk close to the consuming population in Winnipeg. Today, with on-farm coolers and refrigerated trucks, proximity to large cities is not as important, but, nevertheless, these data indicate that Class 1 forage producers tend to operate farms in the original Winnipeg milkshed. As for forage-seed producers, the land-drainage program under FRED (supra, p.34) allowed for the cultivation of thousands of additional hectares. This in turn resulted in the construction of large forage-seed plants in both Arborg and Fisher Branch which provided a ready market for farmers in Arborg/Peguis with an interest in growing a forage-seed crop.

Figure 9.2 indicates the x scores attained by Class 1 forage producers for each of the ten production variables measured. Producers falling into this quartile had an overall $\overline{x}$ score of 7.7 with individual scores ranging from 6.8 to 8.7.

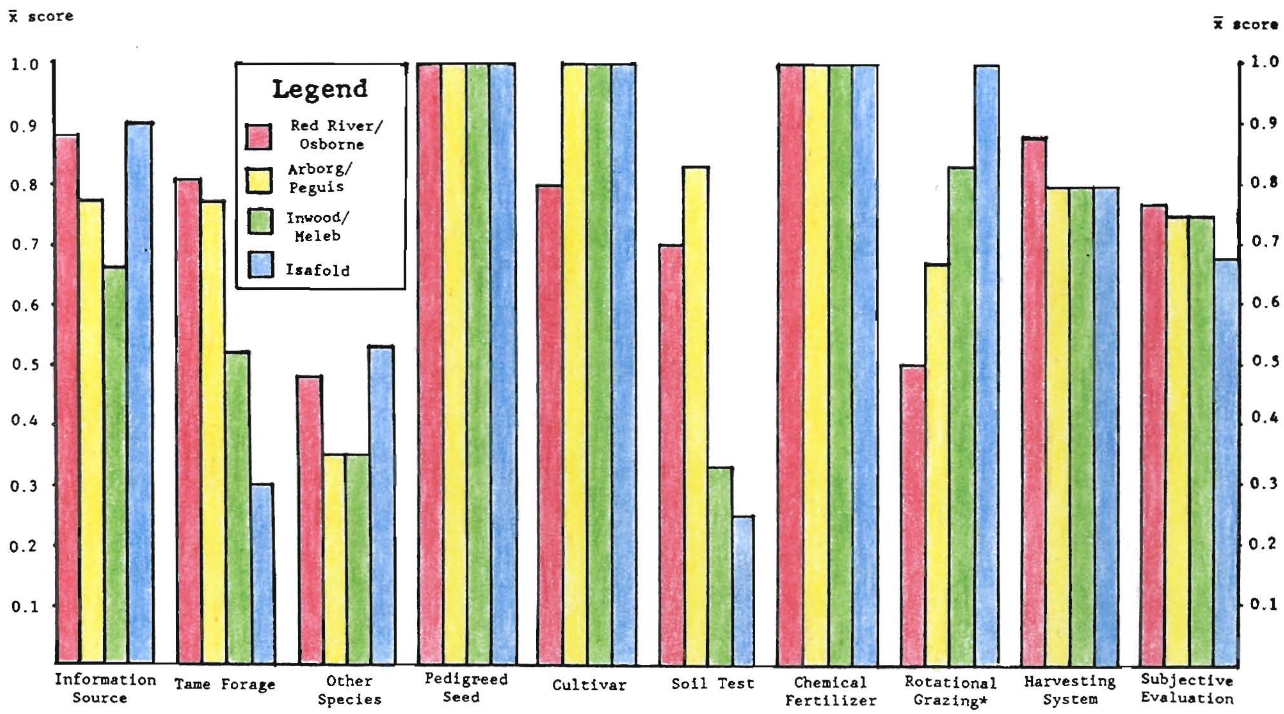
While all Class 1 producers, regardless of their location or farm enterprise type, sowed pedigreed forage seed when establishing a crop and nurtured the crop with annual applications of chemical fertilizer, there were considerable intraregional differences for some of the other variables.

Tame hay, for example, was associated more with the dairy enterprises of Red River/Osborne and forage-seed producers of Arborg/Peguis than the cattlemen of Inwood/Meleb and Isafold. On the other hand, rotational grazing scores were highest in Isafold and lowest in Red River/Osborne. In both cases the resultant scores were a function of the availability of cultivated land. In the first instance, tame hay scores were high in land resource units where cultivated land was abundant and quite low in those units where native grass or bushland dominated. As for rotational grazing, the technique was of more importance to forage producers having a limited supply of tame hay and, therefore higher scores were attained by the cattlemen of Isafold and Inwood/Meleb than by forage producers residing in either Arborg/Peguis or Red River/Osborne.

Soil testing was another forage production technique for which intraregional differences were observed among producers falling into the highest quartile. In Arborg/Peguis and Red River/Osborne the percentage of Class 1 forage producers who based the application of chemical fertilizer on soil tests was 83.2 and 70.3, respectively. By contrast, only 32.9 percent

FIGURE 9.2

MEAN SCORES ATTAINED BY CLASS 1 FORAGE PRODUCERS IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



*livestock producers only

of Class 1 producers in Inwood/Meleb and 25.6 percent of those in Isafold soil tested on an annual basis. Given that the top forage producers in Inwood/Meleb and Isafold were progressive in so much that they sowed pedigreed seed, could identify the forage they grew by cultivar type and applied chemical fertilizer to their forage crops, their failure to soil test was more a consequence of the technique being poorly promoted by agricultural extension agents than an unwillingness to adopt recommended practices. The situation, then, was one where those producers requiring a high level of support from government and private industry were actually provided with a very low level of support.

Characteristics of both farms and farm operators falling into the Class 1 category are presented in Table 9.1 and Figure 9.3. Intraregional differences are, again, quite pronounced.

On farms in Red River/Osborne, for example, Table 9.1 indicates an intensive system of land management was practised allowing a $\bar{x}$ herd size of 178.9 RCAUs to be supported on farms averaging only 401.1 ha. The primary reason behind this accomplishment was that 86.6 percent of the landbase was improved. In Isafold,on the other hand, just 39.8 percent of farmland was improved and, consequently, Class 1 forage producers in this land resource unit maintained 44.1 percent fewer RCAUs on 63.7 percent more land than did their

TABLE 9.1

SOCIAL, ECONOMIC AND FARM CHARACTERISTICS
OF CLASS 1 FORAGE PRODUCERS IN THE INTERLAKE REGION

Characteristics	Red River/ Osborne	Arborg/ Peguis	Inwood/ Meleb	Isafold	$\bar{x}$
Social					
Age (yrs)	45.0	51.5	39.3	40.3	44.5
Education (yrs)	10.6	10.0	11.0	10.8	10.6
Economic					
% Off-Farm Work	10.0	33.3	16.7	25.0	19.2
% Land Improved	86.6	90.2	68.5	39.8	76.1
RCAUs*	178.9	35.0	172.8	100.0	147.2
Farm					
Farm size (ha)	401.1	417.5	504.6	656.7	468.1
Distance from Wpg (km)	36.2	118.7	143.2	75.0	85.9
# of Farms	10	6	6	4	

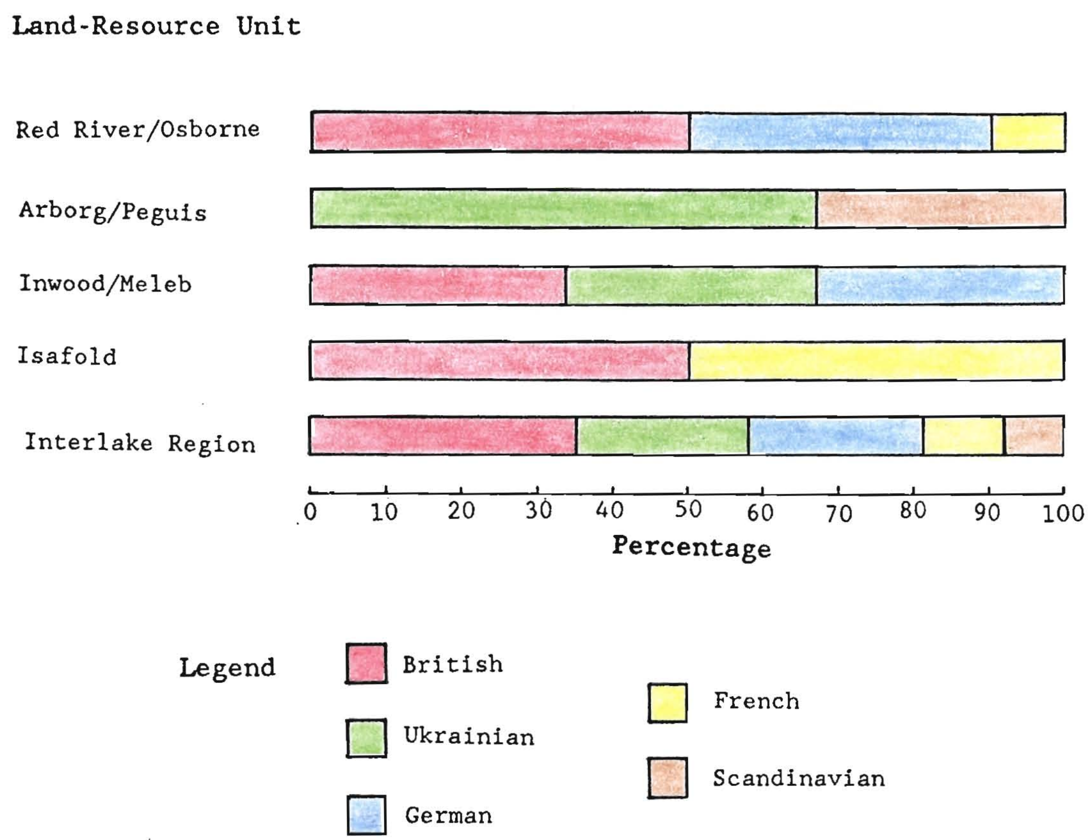
* RCAU = roughage consuming animal unit

counterparts in Red River/Osborne. Farms in Arborg/Peguis were similar to those in Red River/Osborne with respect to farm size and percentage of land improved, but quite different when it came to x herd size. The explanation for this difference in herd size is that in Red River/Osborne most Class 1 forage producers were dairymen and grew the crop as a component of their livestock operations, whereas in Arborg/Peguis the top forage producers concentrated on the production of forage seed as a cash crop.

Personal characteristics of Class 1 forage producers also varied considerably depending on the land-resource unit in which their farms were located. For example, Figure 9.3 illustrates that in Isafold one-half of the top forage producers were British and the other half French, but in Arborg/Peguis neither of these two ethnic groups was present among Class 1 forage producers. Here, top forage producers were predominantly Ukrainian with the remainder being Scandinavian. The ethnicity of Inwood/Meleb forage producers falling into the Class 1 category was equally split among British, Ukrainian and German, while in Red River/Osborne 50 percent of producers were British, 40 percent German and the remaining 10 percent French. These data indicate that the top forage producers in a land resource unit were generally of the same ethnicity as the initial settling group in the area (supra, pp.22-7). It is noteworthy, however, that Class 1

FIGURE 9.3

ETHNICITY OF CLASS 1 FORAGE PRODUCERS
IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



forage producers were drawn from all five of the ethnic groups encountered during the survey and thus emerged as a cosmopolitan group.

Age, off-farm work and years of education are other variables considered in the analysis. While years of education varied little among Class 1 forage producers of the different land-resource units, such was not the case with age and off-farm work (Table 9.1).

Top forage producers in Arborg/Peguis were, with a $\bar{x}$ age of 51.5, over 10 years older than those in Inwood/Meleb and Isafold. Also, one-third of forage producers in Arborg/Peguis worked off the farm while in Isafold and Inwood/Meleb the corresponding percentages were 25.0 and 16.7, respectively. As for the top producers in Red River/Osborne, they averaged 45.0 years in age and only 10.0 percent worked off the farm.

The older age of Class 1 forage producers in Arborg/Peguis indicates that their progressive nature was a function of farming experience and financial security gained as the operators of cash-crop enterprises located on a good land base. Consequently, they had both the intellectual and financial resources with which to establish a Class 1 forage production system. The opportunity that one-third of these operators had to work off the farm resulted from a combination of two factors: first, the labour requirements on cash-crop enterprises are very low during winter months and, second, the towns of Arborg and Fisher Branch were large enough that jobs were readily available.

In Red River/Osborne, Class 1 forage producers also had several years of farming experience and enjoyed a reasonable level of financial security, due largely to the inherent fertility of their land base. As was the case in Arborg/Peguis, experience and financial security were what enabled these Red River/Osborne producers to establish Class 1 forage production systems. The fact that only 10.0 percent of the top producers in Red River/Osborne worked off the farm was a function of the high labour requirements of a dairy operation, the predominant farm type of Class 1 forage producers in this land-resource unit.

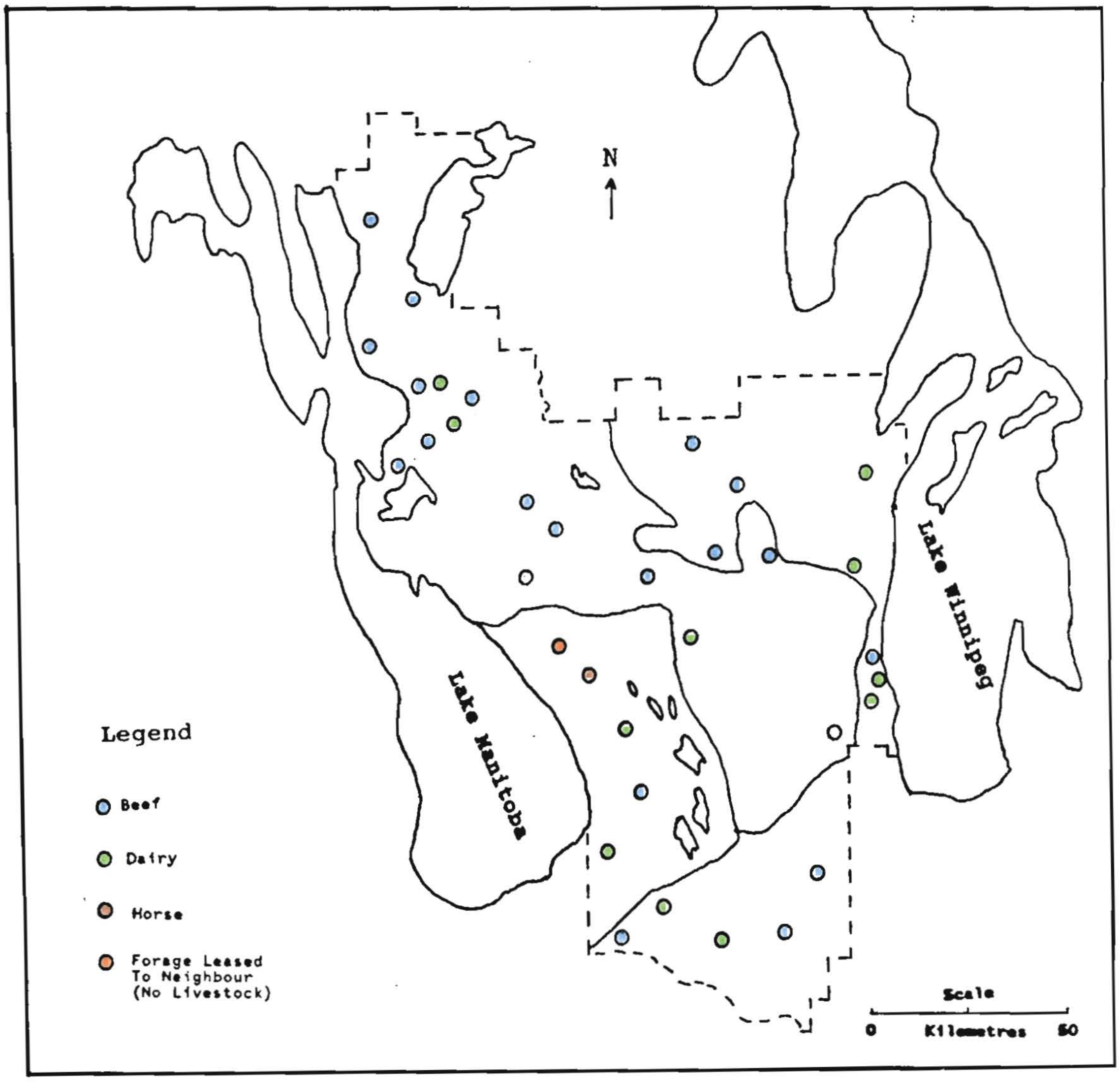
Class 1 forage producers farming in Inwood/Meleb and Isafold were of a younger age and operated farms located on land that was generally poorly drained and/or stony. This indicates that the decision by farmers in these land-resource units to establish Class 1 forage production systems was based more on the desire to improve their operations than it was on either farming experience or financial stability.

Class 2 Forage Producers

The areal distribution of Class 2 forage producers in the Interlake (Figure 9.4) is markedly different than that

FIGURE 9.4

THE LOCATION OF CLASS 2 FORAGE PRODUCERS
IN THE INTERLAKE REGION



observed for Class 1 forage producers. Specifically, 37.2 percent of all Inwood/Meleb forage producers emerged as Class 2 producers whereas only 14.0 percent had attained the Class 1 status. Conversely, in Red River/Osborne 35.7 percent of forage producers had fallen into the highest quadrant, but only 17.9 percent were in the second. In the other two land-resource units, Arborg/Peguis and Isafold, the percentage of Class 2 forage producers showed increases, but of a more modest nature than was the case in Inwood/Meleb.

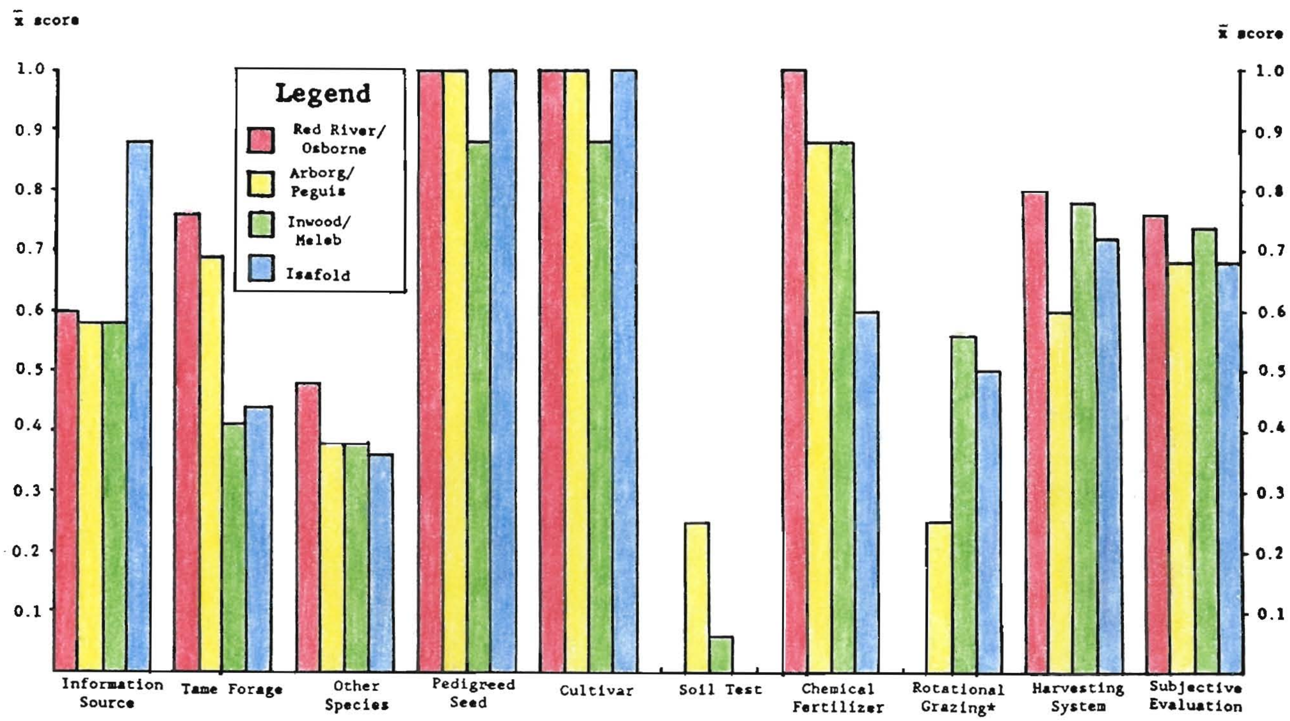
With regard to farm enterprises, Figure 9.4 indicates that 61.8 percent of all Class 2 forage producers were cattlemen, the majority of whom farmed in Inwood/Meleb. Dairy operations accounted for 32.4 percent of Class 2 forage producers, but these farms, rather than being concentrated in Red River/Osborne as was the case with Class 1 forage producers, were dispersed throughout the region. Of interest, is that no Class 2 forage producers operated a farm with both beef and dairy enterprises. The remaining forage producers who fell into the second quadrant included one who operated a horse farm and another who leased his forage fields to a neighbour. Both of these operations were located in Isafold. These data associate Class 2 forage producers primarily with beef operations in the land-resource unit of Inwood/Meleb and, to a lesser extent, dairy operations located outside of Red River/Osborne. Such a high percentage of good forage systems in Inwood/Meleb resulted in part from the land-clearing program of FRED (supra, p.34). This program, along with the Grassland Society, served to convince many cattlemen that the higher the quality of their forage crops the better the quality of the cattle they offered for sale.

In the classification of Interlake forage producers those falling into the second quadrant had an overall $\bar{x}$ score of 6.2 with the range being from 5.7 to 6.7. Figure 9.5 shows that high scores were attained by all forage producers with regard to pedigreed seed and cultivar. A startling discovery, however, was that the vast majority of Class 2 producers did not conduct soil tests before applying chemical fertilizer. In Red River/Osborne the situation was most dramatic with 100 percent of Class 2 forage producers applying chemical fertilizer to forage crops, but none doing so on the bases of soil tests. Given that soil test scores were considerably lower than those attained on other variables, the fault would have to be attributed as much to the promoters of soil testing as to the farmers.

Another anomaly illustrated in Figure 9.5 is the high degree to which Class 2 forage producers in Isafold search out information on the crop. Isafold is a land-resource unit ideally suited for grassland farming, but soil limitations and the extensive nature of farms limits the use of expensive

FIGURE 9.5

MEAN SCORES ATTAINED BY CLASS 2 FORAGE PRODUCERS IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



*livestock producers only

technologies. The situation, therefore, is that Isafold forage producers falling into the second quadrant have achieved that status more as a result of their quest for knowledge than their application of knowledge.

The characteristics of Class 2 forage producers and their farms are provided in Table 9.2 and Figure 9.6.

Over 45 percent of all Class 2 forage producers in the Interlake farmed in Inwood/Meleb. These farms maintained an average of 147.7 RCAUs on a land base of 597.4 ha of which 56.7 percent was improved. On 81.3 percent of these farms beef cattle were raised. This tendency of Class 2 forage producers to raise beef cattle using extensive land-use systems is consistent with the limited agricultural capabilities of Inwood/Meleb. In Isafold Class 2 forage producers practised a similar system of extensive land-use management but, here, the emphasis was not on beef production. In both Arborg/Peguis and Red River/Osborne a more intensive system of land use was evident. In these areas of more productive soils farms were smaller and the percentage of cleared land greater. However, herd sizes were also smaller, thus implying that the holders of these farms were more involved in the cultivation of grain and oilseed crops than they were in forage production.

When comparing Class 2 forage producers with producers in the highest quartile it is apparent that the latter are

TABLE 9.2

SOCIAL, ECONOMIC AND FARM CHARACTERISTICS
OF CLASS 2 FORAGE PRODUCERS IN THE INTERLAKE REGION

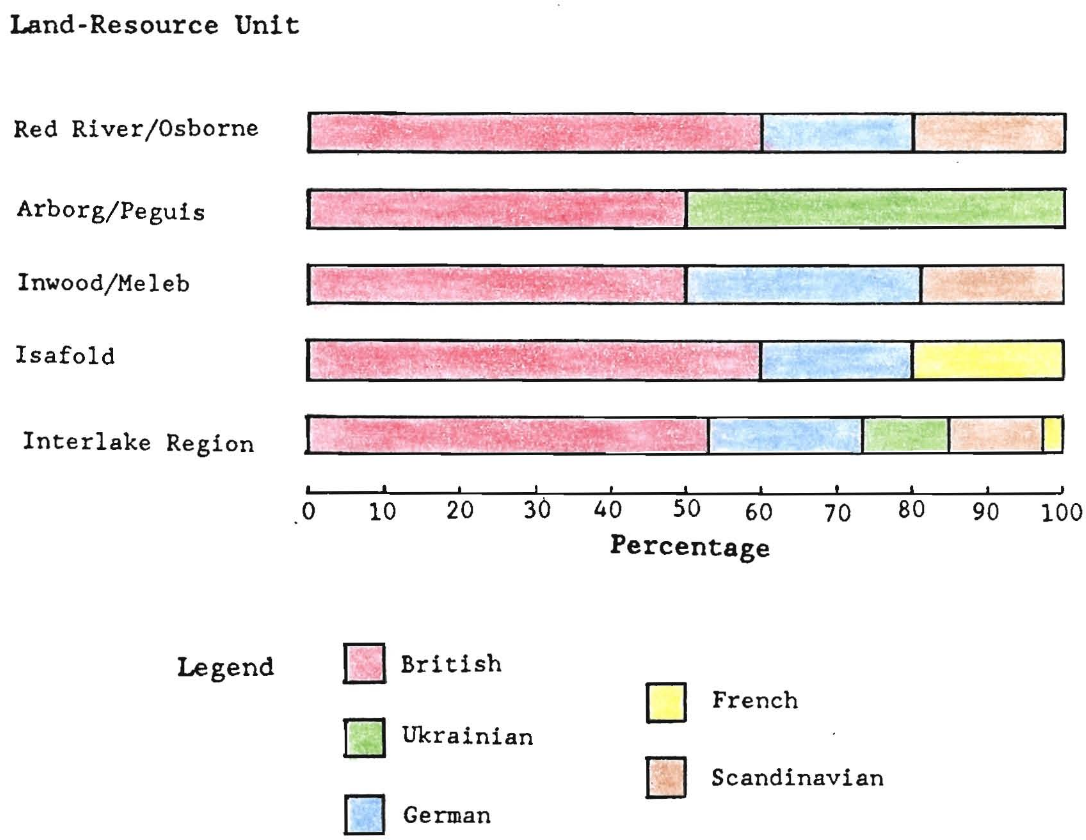
Characteristics	Red River/ Osborne	Arborg/ Peguis	Inwood/ Meleb	Isafold	$\bar{x}$
Social					
Age (yrs)	41.6	41.5	48.9	39.0	45.0
Education (yrs)	11.6	11.0	9.8	12.2	10.7
Economic					
% Off-Farm Work	----	37.5	6.3	40.0	17.6
% Land Improved	90.2	82.5	56.7	66.1	69.1
RCAUs	78.4	50.4	147.7	108.8	107.3
Farm					
Farm size (ha)	273.6	331.3	597.4	591.7	486.5
Distance from Wpg (km)	43.0	105.5	144.5	82.6	111.3
# of Farms	5	8	16	5	

able to maintain a larger number of RCAUs on smaller farms, thus indicating the benefits associated with the adoption of progressive farming techniques. Also, a comparison of distance from Winnipeg indicates that Class 2 forage producers are, in general, located 25.4 km farther from Winnipeg, than Class 1 producers. This supports Von Thünen's concept that as one moves away from an urban market, land use becomes more extensive and, consequently, the degree to which progressive production technologies are adopted, diminishes.

A comparison of the $\bar{x}$ columns of Figure 9.1 and 9.2 shows that regionwide the age and level of education of Class 1 and Class 2 forage producers were almost identical, as was the percentage who performed off-farm work. Ethnicity, however, was a social factor that did help differentiate Class 1 and Class 2 forage producers. Class 2 forage producers were predominantly British. In fact, in each of the farm land resource units 50 percent or more of forage producers falling into the second quadrant were of British extraction. In contrast to the ubiquitous nature of British farmers among forage producers in the Class 2 category, Ukrainian producers of that status were located exclusively in Arborg/Peguis, where they accounted for one-half of all such producers. These data indicate that above-average forage producers of British extraction, be they Class 1 or Class 2, were located throughout the Interlake and involved in a variety of farm

FIGURE 9.6

ETHNICITY OF CLASS 2 FORAGE PRODUCERS
IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



enterprise types. On the other hand, Ukrainians in either Class 1 or Class 2 were largely confined to farms in Arborg/Peguis having a forage-seed component.

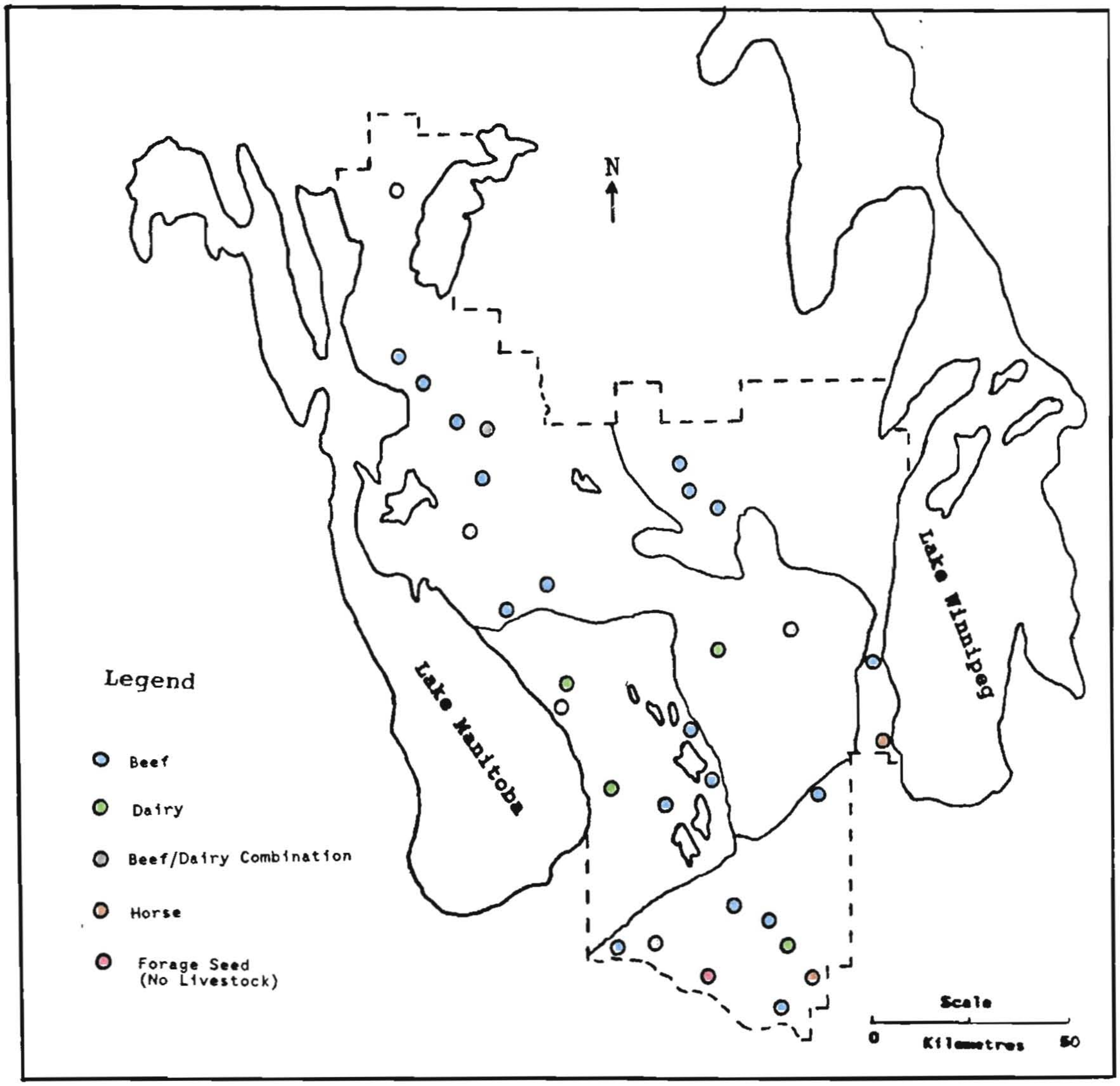
Class 3 Forage Producers

Thirty-one Interlake forage producers fell into the Class 3 category, thus ranking as fair on a qualitative basis. Figure 9.7 indicates that this group of forage producers had the highest density in Red River/Osborne and the lowest in Arborg/Peguis. Specifically, 32.1 percent of all Red River/Osborne forage producers were in the Class 3 category while in Isafold and Inwood/Meleb the percentages were 27.3 and 25.6, respectively. In Arborg/Peguis only 20.0 percent of forage producers were in the third quadrant. The high concentration of Class 3 forage producers in Red River/Osborne is an anomaly given that it also had the highest concentration of Class 1 forage producers.

In addressing the anomaly of Red River/Osborne forage producers having high representation in both the excellent and fair categories it is illustrative that 60.0 percent of Class 1 forage producers from this land-resource unit were dairymen, while in the case of Class 3 producers 55.6 percent were cattlemen. These data indicate that the classification of forage producers farming within a land-resource unit having

FIGURE 9.7

THE LOCATION OF CLASS 3 FORAGE PRODUCERS IN THE INTERLAKE REGION



soils of high agricultural capability was a function of farm enterprise type. This was a quite different situation than that encountered on the lower agricultural capability soils of Inwood/Meleb where there was a high representation of cattlemen in each of the excellent, fair and good categories.

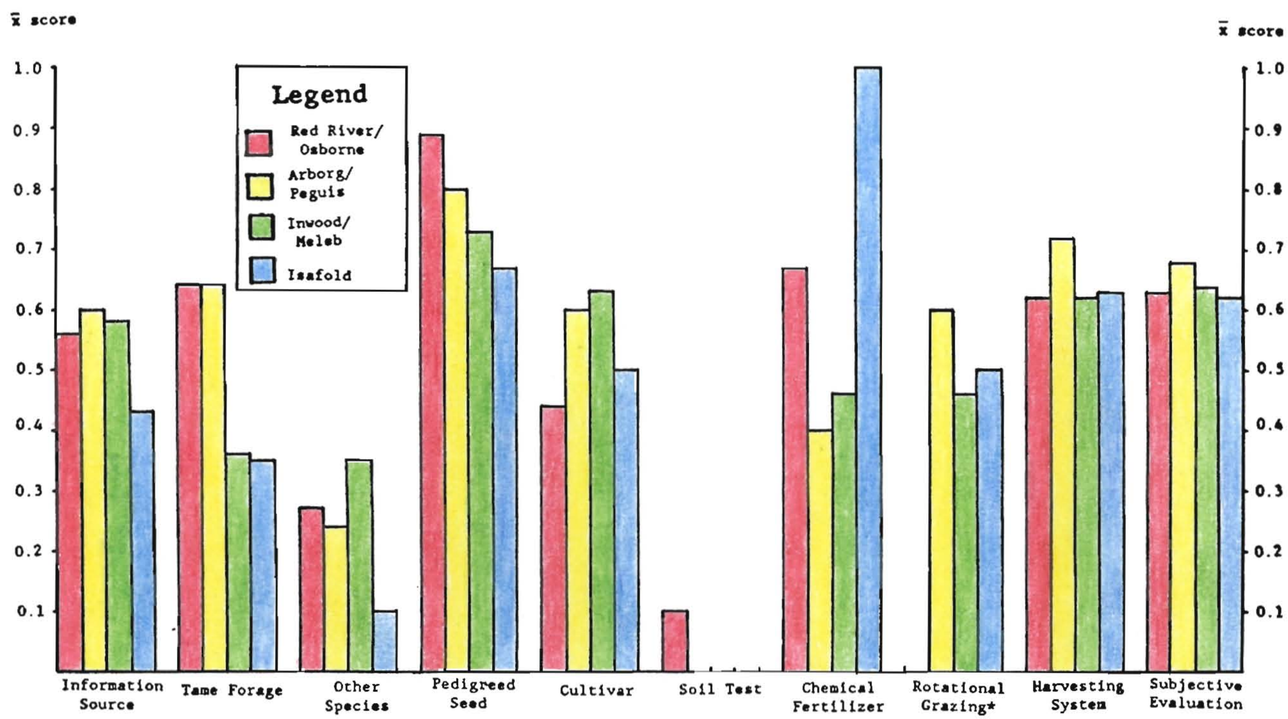
The $\bar{x}$ scores attained on forage production variables by Class 3 producers are shown in Figure 9.8. Overall,the $\bar{x}$ score for this class was 4.9 with a range from 4.2 to 5.6.

Pedigreed seed was the forage variable for which Class 3 had the highest accumulated score. However, the pattern of the histogram describing the variable indicates a steady decline in pedigreed seed use as one moves from the fertile soils of the Red River/Osborne unit north to the soils of Arborg/Peguis, then west to the poorer and heavily treed soils of Inwood/Meleb and, finally, south to the native grasslands of Isafold.

The lowest scoring variable was ,again, soil testing. Only 10 percent of Class 3 forage producers in Red River/Osborne conducted soil tests on forage fields, while in the land-resource units of Arborg/Peguis,Inwood/Meleb and Isafold there was none. Particularly alarming was the tendency for forage producers to apply chemical fertilizer on some basis other than soil tests. In Isafold, for example, 100 percent of Class 3 forage producers applied chemical fertilizer annually, but none used soil tests to determine

FIGURE 9.8

MEAN SCORES ATTAINED BY CLASS 3 FORAGE PRODUCERS IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



*livestock producers only

fertilizer type and application rates. Instead, these were based on general recommendations provided by the MDA or agro-chemical companies. The practice of applying chemical fertilizer on the basis of generalized recommendations is often referred to as 'cookbook' farming and criticised as being potentially hazardous to the environment. The major problem is that phosphorus may be applied in excess of plant needs with the excess then washed from soils into streams and lakes where it contributes to eutrophication.

Data in Table 9.3 indicates that Class 3 forage producers in Red River/Osborne and Arborg/Peguis operate smaller farms with fewer RCAUs than do their counterparts in Inwood/Meleb and Isafold, a situation consistent with that observed for Class 1 and Class 2 forage producers. Overall, age of operator and level of education were also quite consistent among Class 1,2 and 3 forage producers. There is a considerable difference, however, in the percentage of producers performing off-farm work. Among Class 3 forage producers 35.5 percent performed off-farm work regionwide, with the percentages on a land-resource unit basis ranging from 22.2 in Red River/Osborne to 60.0 in Arborg/Peguis. These data indicate that a relatively high number of forage producers falling into the third quadrant were unable to devote adequate time to forage management because of their commitment to off-farm employment.

TABLE 9.3

SOCIAL, ECONOMIC AND FARM CHARACTERISTICS
OF CLASS 3 FORAGE PRODUCERS IN THE INTERLAKE REGION

Characteristics	Red River/ Osborne	Arborg/ Peguis	Inwood/ Meleb	Isafold	$\overline{X}$
Social					
Age (yrs)	40.2	49.2	46.9	37.7	43.5
Education (yrs)	10.7	10.0	9.1	10.7	10.0
Economic					
% Off-Farm Work	22.2	60.0	40.0	33.3	35.5
% Land Improved	75.3	80.1	45.5	63.4	63.2
RCAUs	75.2	79.0	90.7	173.3	103.7
Farm					
Farm size (ha)	357.9	329.8	529.4	479.6	437.8
Distance from Wpg (km)	38.9	109.4	143.0	76.2	94.4
# of Farms	9	5	11	6	

With regard to ethnicity, Figure 9.9 indicates that in Red River/Osborne, the land resource unit having the highest concentration of Class 3 forage producers, 77.5 percent were British. That such a high percentage of British producers farming on the fertile soils of Red River/Osborne would have only fair forage production systems is a function of the time they devoted to the crop. British farmers in this land-resource unit were quite willing to engage in off-farm work thus reducing the amount of time available for the management of forage crops. As for British producers living in Red River/Osborne who had Class 3 forage production systems but did not work off the farm, there was a tendency for them to consider the beef cattle component of their operations, and, consequently, the forage component, as being subordinate to the production of grains and oilseeds.

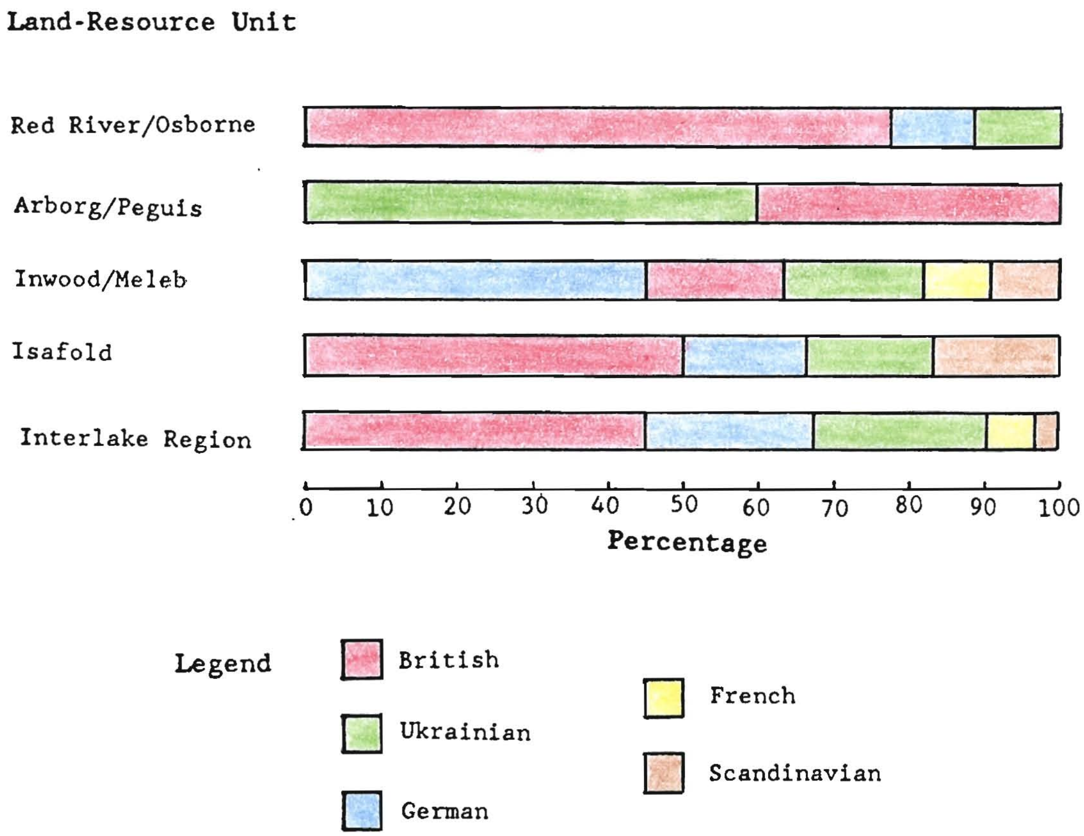
In summary, Class 3 forage producers in the Interlake region were dominated by producers of British extraction having relatively small cattle herds on farms located in Red River/Osborne.

Class 4 Forage Producers

Twenty-seven Interlake forage producers, or 22.9 percent of all those surveyed fell into the lowest quartile. Isafold, home to 31.8 percent of all Class 4 forage producers, had the

FIGURE 9.9

ETHNICITY OF CLASS 3 FORAGE PRODUCERS
IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



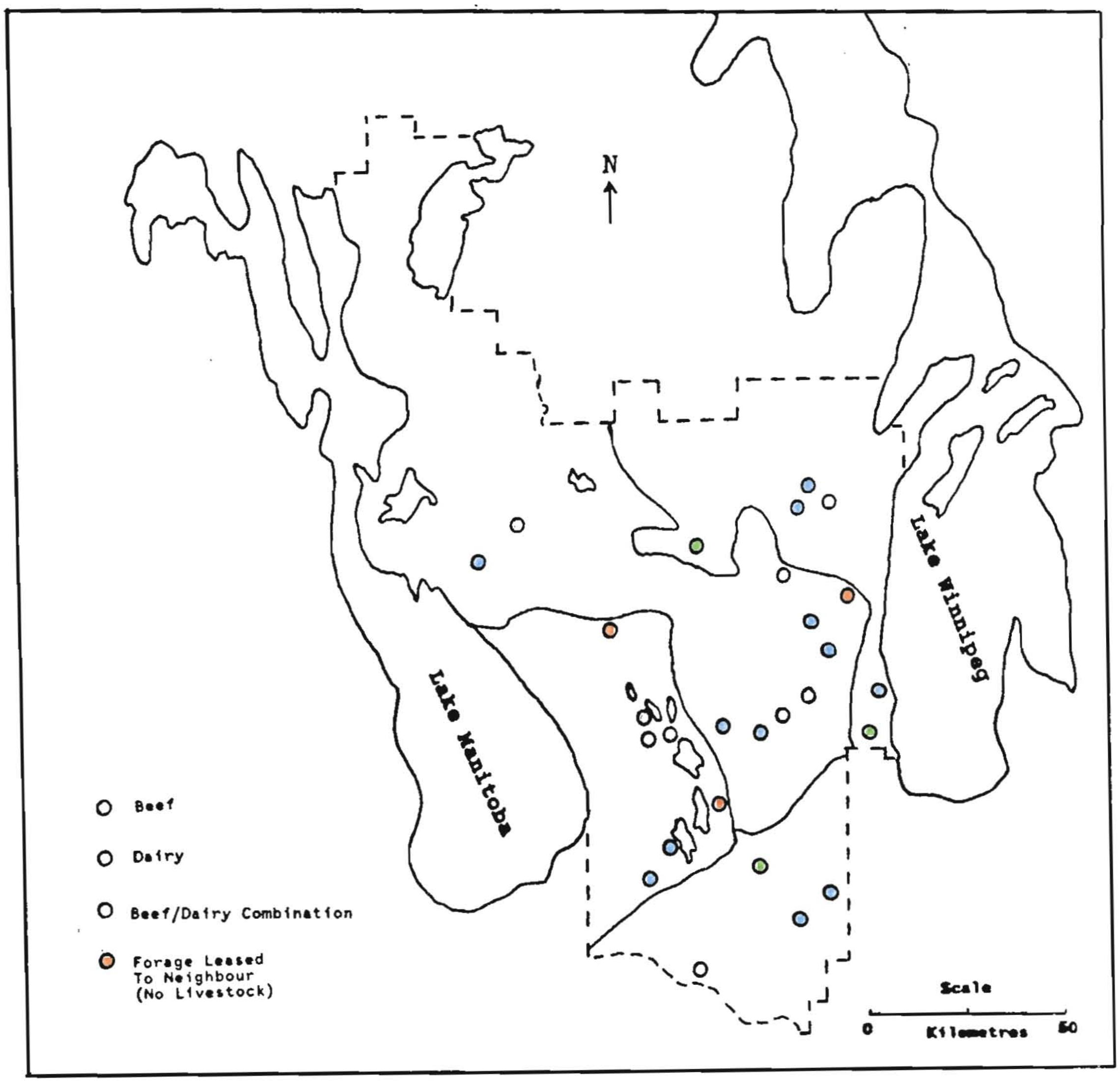
highest concentration of producers with poor forage production systems. By contrast, in Red River/Osborne only 14.3 percent of forage producers were categorized as Class 4. In Arborg/Peguis and Inwood/Meleb the percentage of Class 4 producers was 24.0 and 23.3, respectively. The areal distribution of Class 4 forage producers is shown in Figure 9.10.

It is noteworthy that of the 27 Interlake forage producers categorized as Class 4, 14 were located in the southeastern part of Inwood/Meleb (Inwood/Meleb is aligned northwest to southeast) and the eastern half of Isafold. Under the FRED Land Acquisition Program several thousand hectares of land were purchased in these areas and converted from marginal agricultural use to wildlife habitat (supra, p.34). Given that over 50 percent of Class 4 forage producers were located in these same areas 15 years later the indication is that more land should have been taken out of production than was the case.

With regard to enterprise type, two-thirds of forage producers with combination beef/dairy operations were categorized as either Class 3 or 4. Farmers who diversify their operations are generally viewed as progressive because the strategy is a useful hedge against fluctuating commodity prices. However, these data indicate that forage producers having both beef and dairy cattle were more likely to have a

FIGURE 9.10

THE DISTRIBUTION OF CLASS 4 FORAGE PRODUCERS IN THE INTERLAKE REGION



poor or fair forage system than those who specialized in one livestock class or the other.

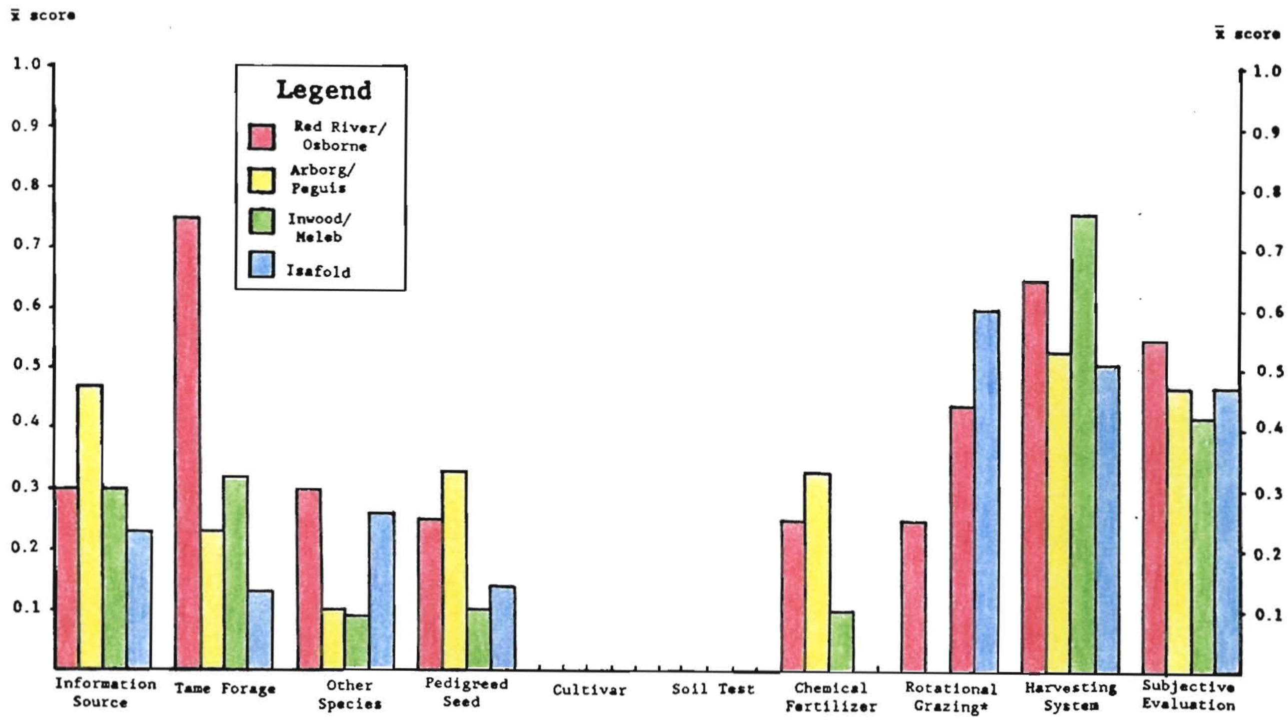
The $\bar{x}$ scores of Class 4 forage producers shown in Figure 9.11 reflects the poor quality of their forage production systems. No Class 4 producers could name a forage cultivar grown on their own fields, none conducted soil tests on their forage fields and few showed an interest in consulting information sources, using species other than alfalfa or brome, sowing pedigreed forage seed, or applying chemical fertilizer to forage crops.

The relatively high scores attained by Class 4 forage producers in all land-resource units for the harvesting system variable was related more to the scoring system than the attitude of producers. Quite simply, the farmers wishing to store a crop for winter feed had to use a mechanical harvesting system and, in so doing, scored a minimum of 0.4 points. Consequently, it was impossible to have scores as low for this variable as other variables used in the classification system.

The high tame forage score in Red River/Osborne, however, were in contrast to tame forage scores achieved by Class 4 producers in other parts of the Interlake region. The explanation is that so little land in Red River/Osborne was left in a native state that anyone wishing to grow a forage crop had no choice but to establish tame forage on cultivable

FIGURE 9.11

MEAN SCORES ATTAINED BY CLASS 4 FORAGE PRODUCERS IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



*livestock producers only

land. Yet, despite the advantages of fertile, easily tilled soils, there were four producers in Red River/Osborne who fell into the lowest quartile.

When data in Table 9.4 are compared with that in Tables 9.1, 9.2 and 9.3 it is apparent that farms occupied by Class 4 forage producers were smaller in terms of areal extent, had a lower percentage of improved land and maintained fewer RCAUs than did the farms operated by Class 1, 2 and 3 producers. The only land-resource unit for which this was not the case was Red River/Osborne, where one of the four Class 4 forage producers operated a farm of over 1 000 ha with 750 beef cattle, thus upwardly skewing the farm size and RCAU data for farms of that category.

The $\bar{x}$ age and average level of education of Class 4 forage producers (Table 9.4) when compared with those of producers in Classes 1,2 and 3 were considerably different. In Classes 1,2 and 3 the $\bar{x}$ age of forage producers was 44.5, 45.0 and 43.5, respectively, whereas in Class 4 it was 54.2. With regard to level of education, forage producers in Class 1 had, on average, 10.6 years, those in Class 2 had 10.7 years and those in Class 3 had 10.0 years, but forage producers with a Class 4 system had only 9.0 years. The failure of older and less-educated farm operators to adopt good farm management practices is well documented in the literature (Ilbery 1978:456) and borne out by these data.

TABLE 9.4

SOCIAL, ECONOMIC AND FARM CHARACTERISTICS
OF CLASS 4 FORAGE PRODUCERS IN THE INTERLAKE REGION

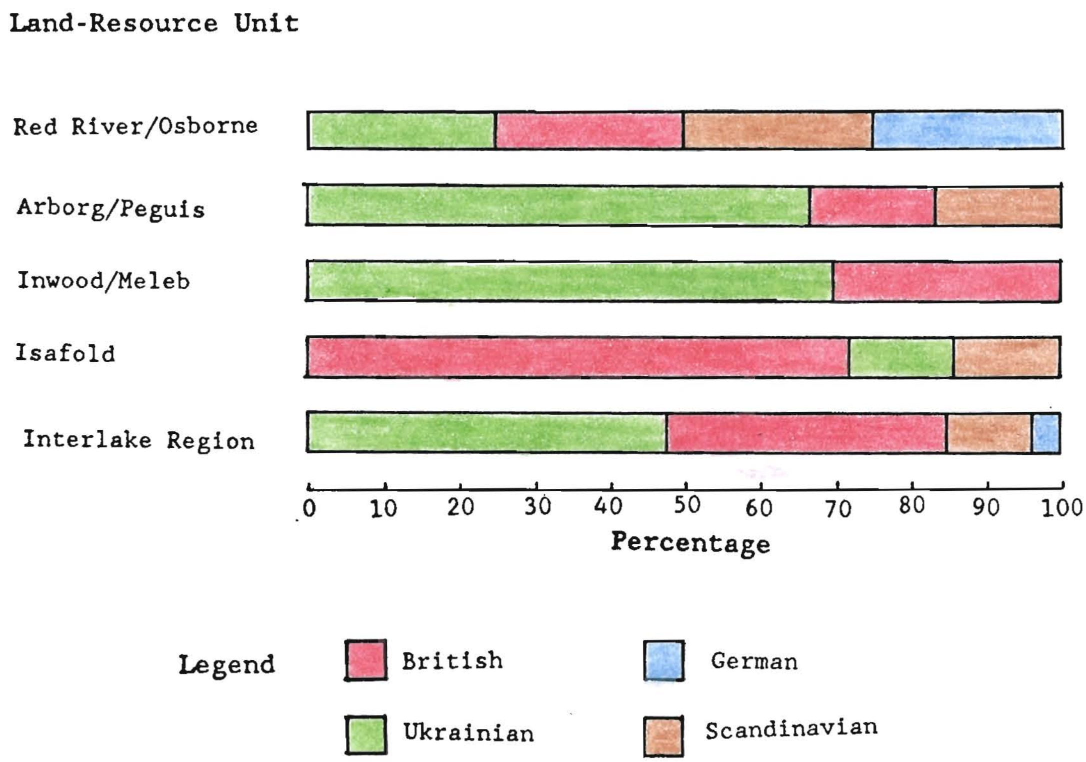
Characteristics	Red River/ Osborne	Arborg/ Peguis	Inwood/ Meleb	Isafold	$\bar{x}$
Social					
Age (yrs)	49.8	42.7	57.0	62.7	54.2
Education (yrs)	8.0	8.3	8.9	9.9	9.0
Economic					
% Off-Farm Work	----	33.3	20.0	28.6	22.2
% Land Improved	79.7	74.3	45.2	37.3	50.6
RCAUs	265.0	27.8	79.5	68.0	98.4
Farm					
Farm size (ha)	563.1	118.7	327.0	306.4	310.4
Distance from Wpg (km)	73.5	102.8	96.3	74.7	83.4
# of Farms	4	6	10	7	

Figure 9.12 illustrates that Class 4 forage producers were largely confined to two ethnic groups: British and Ukrainian. British producers dominated in Isafold, the land-resource unit having the highest concentration of Class 4 forage producers, while in Inwood/Meleb the majority of producers in the lowest quartile were Ukrainian.

In summary, Class 4 forage producers were associated with older farmers having low levels of formal education who operated farm units in either Isafold or Inwood/Meleb that were insufficient in areal extent and magnitude to be economically viable. Operators in Isafold were of British descent while those in Inwood/Meleb were Ukrainian.

FIGURE 9.12

ETHNICITY OF CLASS 4 PRODUCERS
IN THE LAND-RESOURCE UNITS OF THE INTERLAKE REGION



CHAPTER 10

CONCLUSIONS AND RECOMMENDATIONS

The primary research tool used in this study was a questionnaire developed to gather farm-level data on farm operations in general, forage production systems in particular and such demographic information as age, level of education and ethnicity of the operator. Data on forage production systems served as the basis for the Forage Classification System, while general farm and demographic data were used to explain the differences among forage producers in each Class.

Although the classification system involved quite simple calculations it was a reliable method by which to rank forage producers, largely because of its complexity. By considering nine production techniques relating to the establishment of a crop, the nurturing of a growing crop and the harvesting of a crop, the classification system allowed for producers with vastly different forage production systems to attain similar overall scores and, thus, fall into the same category. Also, producers who adopted one or two progressive techniques but scored low in all other areas or, conversely, producers with high scores on all but a few variables would fall into a category that reflected their overall score.

The analysis indicated that farm location, farm enterprise type and ethnicity were factors that could be used to describe and differentiate between the 4 classes of forage producers. For example, Class 1 forage producers were confined mainly to the land-resource units of Arborg/Peguis and Red River/Osborne. Those in Arborg/Peguis were generally of Ukrainian descent and concentrated on the production of forage seed, while those in Red River/Osborne were dairymen of either British or German extraction. Class 4 forage producers, on the other hand, were generally cattlemen farming in either Isafold or Inwood/Meleb, with those in the former land-resource unit being predominantly British and those in the latter, Ukrainian.

These findings could provide the basis for a subsequent study measuring the extent to which agricultural extension agents from both government and industry focus their attention on farmers displaying characteristics of Class 1 producers, while ignoring those exhibiting traits of Class 4 producers.

Another topic related to forage production and worthy of further study was the widespread adoption of round-bale technology by forage producers in the Interlake region. It is quite remarkable that a technology that had only been available for 10 years had been adopted by 64.4 percent of all forage producers in the region, including 55.6 percent of those in the lowest quartile. A study to determine why forage producers were so receptive to this technique, particularly when it required a relatively large capital expenditure would be useful. If aspects of the marketing strategy used in promoting round balers could be applied with the same degree of success to the marketing of such forage production techniques as the use of pedigreed seed and soil testing, the productivity of forage producers would be considerably enhanced.

The widespread adoption of round-bale technology among Interlake forage producers was in direct contrast to that of soil testing, a technique practised by only 19 of the 118 forage producers surveyed, with 79.0 percent of them being Class 1 forage producers located in either Red River/Osborne or Inwood/Meleb. This study demonstrated a reluctance on the part of Class 2, 3 and 4 Interlake forage producers - regardless of location, enterprise type or ethnicity - to base the application of chemical fertilizer to forage crops on soil tests. The need to target fertilizer rates to the specific nutrient requirements of a crop is important from both an economic and environmental perspective. Increasingly, farmers are being advised to tailor the application rates of fertilizer to individual fields and, in some cases to vary the rates within a field. That being the case, it is inappropriate to follow generally recommended fertilizer rates that have been generated using regional data. A program whereby the government underwrites the cost of soil tests on land producing a forage crop is one method by which forage producers could be introduced to this management technique. Presumably, once the benefits associated with soil testing were realized, producers would be willing to bear the cost of annual soil testing.

Finally, there is a need for a comprehensive study of the forage-seed industry in the Interlake region. There has been interest, worldwide, in reducing agricultural inputs such as pesticides and fertilizers through the use of crop rotations that incorporate forages. This is a component of a sustainable agriculture strategy to combat environmental degradation. If the concepts of sustainable agriculture are adopted throughout the world, the market for forage seed would expand astronomically. Farmers of the Interlake region, a region having large areas ideally suited for the production of forage-seed crops, should be poised to take full advantage of the potential offered by sustainable agriculture.

It is not uncommon for an agricultural area to adopt a local crop of some importance as an adjective descriptor. For example, the midwestern United States are referred to as the Corn Belt, the southeastern United States as the Cotton Belt and the Niagara Peninsula of southern Ontario as the Fruit Belt. If agricultural extension workers and all others with an interest in the promotion of forage crops are successful in this endeavour, the day may come when Interlake residents consider themselves to be a part of the Forage Belt.

APPENDIX A

PERENNIAL FORAGE CROPS OF MANITOBA

FORAGE LEGUMES

Leguminous species have an esteemed position among the various forage crops. A number of reasons can be advanced in support of the high status given to legumes. For example, legumes can be made into hay of higher feeding value than forage grasses primarily because of the higher leaf to stem ratio of the former. Young, tender leaves of all plants used for hay are of about equal feeding value for herbivorous animals, but legumes provide more leaves per kilogram than do grasses. Another important characteristic of legumes is their ability to utilize (when properly inoculated) air nitrogen that is unavailable to non-leguminous species. Farmers capitalize on this by incorporating legume species into their crop-rotation systems, thus reducing fertilizer costs. Finally, the strong root system associated with a legume improves the tilth of a soil.

The agronomic characteristics of the various legumes recommended for Manitoba by the MDA are outlined below. The information was drawn from sources published by the MDA (MDA

1984: 1-6; MDA 1988, 105), Agriculture Canada (Goplen and Gross 1977: 5-14; Smoliac and Wilson 1983: 37) and a major seed company (Northrup King 1986: 34-46).

Alfalfa

Uses in Manitoba*:

- hay, pasture, seed

Positive Aspects:

- long-lived perennial (6 years plus)
- easily established on most soils with good drainage
- high yields of good quality forage
- rapid regrowth after grazing or clipping

Negative Aspects:

- bloat hazard
- good drainage required
- poor persistence when grazed or clipped frequently

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* Uses in Manitoba are listed in order of declining importance.

Sweet Clover

Uses in Manitoba:

- green manure, hay, silage, seed, pasture

Positive Aspects:

- grows under a wide range of soil and climatic conditions
- excellent for soil and drainage improvement

Negative Aspects:

- low palatability unless harvested early
- coumarin content of some varieties can cause feeding problems
- seedling stands susceptible to sweet clover weevils
- biennial

Birdsfoot Trefoil

Uses in Manitoba:

- seed, pasture

Positive Aspects:

- long-lived perennial (10 years plus)
- grows on a wide range of soil conditions
- reseeds itself when conditions are favourable
- feed value similar to alfalfa
- no bloat hazard

Negative Aspects:

- poor seedling vigour

- poor competitor in weedy stands
- slow to come into full production
- lodges easily
- slow recovery after grazing or clipping

<u>Red Clover</u>

Uses in Manitoba:

- seed, hay

Positive Aspects:

- easy to establish
- tolerates soils wetter and more acidic than does alfalfa

Negative Aspects:

- bloat hazard
- short life span (1 to 3 years) due to a number of crown and root diseases

<u>Alsike Clover</u>

Uses in Manitoba:

- hay, seed

Positive Aspect:

- o tolerant to poor drainage and acidic soils

Negative Aspects:

- o bloat hazard
- o short life span (2 to 4 years)
- o low aftermath yield

FORAGE GRASSES

The perennial grasses cultivated as forage crops are generally not as high in feed value as legumes. Nevertheless, there are other characteristics of grasses that make them a valuable component of a farmer's forage system. For example, they play an important role in grass-legume mixtures. In these mixtures it is the grass specie that resists encroachment of weeks into the stand, and reduces the incidence of lodging in the legume. When grasses are established in pure stands, they are usually more persistent than legumes and better at controlling erosion because of their fibrous root system.

The agronomic characteristics of the grass species recommended by the MDA are outlined below. The information was drawn from an MDA publication (MDA 1988: 103-4); Agriculture Canada publications (Lawrence and Heinrichs 1966:

4-6; Agriculture Canada 1973) and a Northrup King seed catalogue (Northrup King 1986: 47-61).

Smooth Bromegrass

Uses in Manitoba*:

- hay, pasture, seed

Positive Aspects:

- grows on diversity of soil types
- drought and heat tolerant
- winter-hardy
- palatable even at mature growth stages

Negative Aspects:

- seed difficult to sow
- slow to establish
- becomes sod bound in absence of nitrogen
- weakened by heavy grazing
- susceptible to sinter crown and root rot

---

* Uses in Manitoba are listed in order of declining importance.

Timothy

Uses in Manitoba:

- seed, hay, pasture

Positive Aspects:

- seed plentiful and low priced
- stand establishment is rapid
- offers little competition to legume in mixtures

Negative Aspects:

- susceptible to heat and low moisture conditions
- low palatability and feed value at maturity
- weakened by heavy grazing or frequent cutting

Orchard Grass

Uses in Manitoba:

- pasture, hay

Positive Aspects:

- rapid establishment
- rapid regrowth following harvest
- shade tolerant
- compatible with alfalfa

Negative Aspects:

- only moderately sinter-hardy
- requires high nitrogen inputs for high production
- course and unpalatable at maturity

Reed Canarygrass

Uses in Manitoba:

- hay, pasture, seed

Positive Aspects:

- grows well in wet areas and can withstand considerable flooding
- remains productive throughout season
- excellent grass for waterways and areas subject to water erosion

Negative Aspects:

- seed difficult to sow
- slow to establish a sod
- palatability declines rapidly with advance in maturity
- alkaloids in forage associated with decrease in animal performance

Russian Wild Ryegrass

Uses in Manitoba:

- pasture, seed

Positive Aspects:

- well adapted to prairie provinces
- very tolerant of grazing
- palatable and nutritious in mature stage
- good salinity tolerance

Negative Aspects:

- o poor seedling vigour
- o poor competitor in establishment year

<u>Crested Wheatgrass</u>

Uses in Manitoba:

- o pasture, hay, seed

Positive Aspects:

- o easily established on wide range of soils
- o withstands close grazing and trampling
- o palatable in early spring

Negative Aspects:

- o does not tolerate cool, wet soils
- o hay quality deteriorates rapidly after heading
- o slow regrowth after harvest

<u>Slender Wheatgrass</u>

Uses in Manitoba:

- o hay, seed

Positive Aspects:

- o good seedling vigour
- o easily established
- o shade tolerant
- o forage cures well on stem
- o high salinity tolerance

Negative Aspects:

- o less competitive and persistent than other wheatgrass
- o not resistant to close or heavy grazing

<u>Intermediate Wheatgrass</u>

Uses in Manitoba:

- o hay, pasture, seed

Positive Aspects:

- o begins growth early in spring
- o outyields crested wheatgrass and brome in dry areas
- o works well in association with alfalfa

Negative Aspects:

- less drought tolerant and winter-hardy than crested wheatgrass
- does not tolerate salinity
- does not persist in areas with poor drainage

Tall Wheatgrass

Uses in Manitoba:

- hay, seed

Positive Aspects:

- very tolerant of saline soils
- high protein and energy rating when harvested early

Negative Aspects:

- slow to establish
- not as palatable as other wheatgrasses

Creeping Red Fescue

Uses in Manitoba:

- pasture, seed

Positive Aspects:

- o vigorous seedling
- o tolerates low fertility and close grazing
- o tolerates areas too dry for timothy
- o starts growth fairly early in spring
- o grows vigorously late to freeze-up

Negative Aspects:

- o fair palatability
- o vulnerable to crown and root rots and to snow mould

Meadow Fescue

Uses in Manitoba:

- o seed, pasture

Positive Aspects:

- o established rapidly on wide range of soils
- o productive throughout entire growing season

Negative Aspects:

- o does not persist under continuous heavy grazing
- o susceptible to leaf rusts
- o less palatable than most grasses

APPENDIX B

ANNUAL FORAGE CROPS OF MANITOBA

In Manitoba millet, oats, oat-barley, mixtures and corn are the crops most often utilized as annual forages, with millet and the small grains generally harvested as green feed or pasture wile corn is cut and stored as whole-plant silage for winter feeding (Smoliac and Wilson 1983: 37).

The rationale for including an annual crops in a pasture programs is that they are characterized by rapid growth of nutritious foliage in late spring and summer whereas perennial cool-season* forages become semi-dormant at this time and perennial warm-season** forages produce a lower-quality feedstuff (Fribourg, 1973, 344).

While annual forages do provide an excellent quality pasture and increased stock-carrying capacity the costs associated with their seeding can be prohibitive (MDA n.d.). It may be for this reason that only 67 000 ha or 1.5 percent

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* Cool-season grasses begin growth early in spring and make maximum development by June. They reach maturity in early summer and then become semi-dormant until autumn when they resume vegetative growth.

** Warm-season grasses begin growing late in the spring (late May) but grow continuously until early fall, producing much of their foliage in midsummer. They have no fall regrowth (Clark 1985: 23).

of all Manitoba cropland was sown to an annual forage in 1981 (Census of Canada 1981).

There are two major advantages to including silage corn in a forage grogram. First, corn as a feedstuff is high in energy and low in protein which makes it an excellent supplement for low-energy, high-protein forage legumes such as alfalfa and trefoil. Second, it is generally considered to be easier to make high-quality silage from corn than it is from forage legumes, primarily because of the nonstructural carbohydrates constructed by the grain portion of the corn plant (Smith 1981: 217). Smoliac and Wilson (1983: 37) state that the use of corn for silage is increasing in the prairie provinces as earlier hybrids are developed. This observation is borne out by the 1984 Manitoba Agriculture Yearbook (73) where the hectares of silage corn grown in 1950 is listed as 6 880 compared to 18 200 ha grown in 1984. However, despite this dramatic increase of 165 percent in the hectarage devoted to silage corn production it remains that corn for whole-plant silage occupied less than 1 percent of Manitoba cropland in 1984. One possible explanation for the reluctance of Manitoba producers to grow corn is offered in a Manitoba Agriculture publication outlining field crop production recommendations. This source indicates that in the culture of most cereal crops average management leads to average yields, but with corn improper management of any one aspect of production (seeding, fertilizing, spraying, harvesting, or storage) may lead to poor results (Manitoba Agriculture 1986: 61).

APPENDIX C

FORAGE PRODUCTION SURVEY
MANITOBA INTERLAKE REGION, 1984

FARM INFORMATION

1. What percentage of your total farm area was producing a forage crop last summer? ☐☐

2. a) Did you grow a forage crop 5 years ago?

   Yes....1 No....0 ☐

   If yes, what percentage of your total acreage was then in forage? ☐☐

   b) If there has been a change over the past 5 years then is this related to your livestock enterprise?

   Yes....1 No....0 ☐

   Please explain. ____________

   ____

3. How many animals did you feed (summer and winter) in 1984 and 1980?

	Win. 1984	Sum. 1984	Win. 1980	Sum. 1980
Beef				
Dairy				
Sheep				
Hogs				
Other				

4. How would you presently classify your type of farm?

   Dairy......................1
   Cattle.....................2
   Hogs.......................3
   Wheat......................4 ☐
   Small Grain (ex. wheat).....5
   Mixed: Livestock Comb.......6
   Field Crop Comb......7
   Other......................8

5. What problems have you had with forage production in the past 5 years?

	Year(s)
Low Yields	
poor germination	______
poor innoculant	______
winter kill	______
lodging	______
insects	______
disease	______
weeds	______
other	______
Poor Quality	
low protein content	______
poor palatability	______
other	______
Other problems	______

6. Do you use forage crops in a rotation?

   Yes....1 No....0 ☐

   If yes, what rotations do you use?

   ____

   ____

7. When making management decisions concerning forage crops, how do you rate the following sources:

	P	F	G	Ex
Ag. Reports on Radio and T.V.				
Farm Magazines				
Ag. Associations				
Private Ag. Industry				
Univ. Fac. of Ag.				
Prov. Ag. Rep.				
Other				

8. What crops other than forages did you grow in 1984 and 1980?

	1984	1980
	acreage	
Wheat		
Barley		
Oats		
Other		

FORAGE PRODUCTION - SUMMER 1984

	Total Acres	Land Tenure	Spp. (Ac.)	C.V. (Ac.)	Seed Gr.	Seed Meth.	Comp. Crop (Type)	Year & Season Seeded	Chem.Fert. (Type& Appl.Rate)	Manure (Type& Appl. Rate)	Soil Test	Spray (Type Appl. Rate)	Graz. Syst. (Type)	Bale Syst. (Type &Amt)	Silo Type	Ylds. per Acre	Feed or Plant Analysis	Forage Sold 1984-5	Forage Purch. 1984-5	Harvest Period
Seed																				
Silage																				
Perm. Past.																				
Hay& Past.																				

CODES

Species: Grass - Bl Bluegrass, Br Bromegrass, CRF Creeping Red Fescue, MF Meadow Fescue, OG Orchard Grass, Reed Canary Grass, T Timothy, CW Crested Wheatgrass, IW Intermediate Wheatgrass, SW Slender Wheatgrass

Legume - A Alfalfa, AC Alsike Clover, BT Birdsfoot Trefoil, RC Red Clover, SC Sweet Clover

Cereal - Cn Corn, Ba Barley, Ot Oats

C.V.: 1 Algonquin, 2 Anchor, 3 Angus, 4 Apollo, 5 Banner, 6 Baylor, 7 Beacon, 8 Beaver, 9 Blair, 10 Carlton, 11 Champ, 12 Chief, 13 Chimo, 14 Climax, 15 Cree, 16 Empire, 17 Ensign, 18 Frode, 19 Hunter, 20 Kay, 21 Leo, 22 Magna, 23 Nordan, 24 Norgold, 25 Parkway, 26 Pickstar, 27 Polara, 28 Rambler, 29 Rangelander, 30 Revenue, 31 Spredor II, 32 Thor, 33 Trader, 34 Vernal, 35 Vista, 36 Yukon

Seed Grade: B Breeder, S Select, F Foundation, R Registered, Ce Certified, Co Common

Seeding Method: BC Broadcast, SD Seed Drill, SS Sod Seed; Grazing System: C Continuous, D Deferred, R Rotational, S Strip

Haying System: CB Conventional Bale, R8 800 lb. Round Bale, R12 1200 lb. Round Bale, St Stack, x Covered, o Uncovered

Silo: P Pit, St Stack, H Horizontal, V Vertical, SV Sealed Vertical

PERSONAL

1. Were you raised on a farm?

   Yes....1 No....0

   If yes, how many miles is it from this farm? ____ . __

   If no, in what town were you raised? ____________

2. a) Did you operate a farm before this one?

   Yes....1 No....0

   If yes, where was the farm located? ____________

   b) For how many years did you operate it?

   c) Did you move because this farm offers:

   more total acreage.......1
   more cultivable acreage..2
   better soil type.........3
   better soil drainage.....4
   better buildings.........5
   nearness to market.......6
   other....................7

3. For how many years have you operated this farm?

4. a) Since purchasing this farm have you increased the cultivated acreage

   Yes....1 No....0

   If yes, was it added by:

   Purchasing cultivated land
   Acres ____________
   Years ____________

   Purchasing land requiring clearing or draining
   Acres ____________
   Year Purchased ____________
   Year cleared ____________
   Subsidy: Yes....1 No....0

   Clearing owned land
   Acres ____________
   years ____________
   Subsidy: Yes....1 No....0

   Draining owned land
   Acres ____________
   Years ____________
   Subsidy: Yes....1 No....0

   b) On what percentage of the cleared or drained land have you produced forage?

5. a) What was the total acreage operated in 1984?

   b) Would you indicate the acreage which is owned and that which is leased?

   Owned
   Leased
   Other

6. a) Do you have an occupation other than farming?

   Yes....1 No....0

   If yes, specify ____________

   b) Did you work off the farm in 1984?

   Yes....1 No....0

   If yes, was work:

   Part-time....1
   Full-time....2

   What type of work? ____________

7. a) What was the highest level of schooling achieved?

   Elementary............0
   Some High School......1
   High School Diploma...2
   Some College..........3
   College Diploma.......4
   Some University.......5
   University Degree.....6
   Other.................7

   b) What was your field of specialty (if applicable)?

   ____

8. Would you mind telling me your approximate age?

9. Do you or a member of your family speak any of the following languages?

   Ukrainian.....1 Icelandic.....4
   German/Dutch..2 Scandinavian..5
   French........3 Polish........6
   Other.........................7

10. Has an illness or injury ever interfered with your operating the farm (particularly forage production)?

    Yes....1 No....0

    If yes, explain. ____________

11. Finally, would you indicate any changes you have made in the forage production system on this farm since purchasing it, and any changes you anticipate making in the future?

____
____
____
____
____
____
____

APPENDIX D

PREAMBLE TO QUESTIONNAIRE

Hello. My name is David Armitage and I am studying in the Department of Geography at the University of Manitoba. I am interested in learning about forage production in the Interlake region and would be very grateful if you supply me with some answers to questions I have on the subject.

In particular, I am concerned with the types of forage produced, how they are managed and any problems farmers are experiencing with production. The information you provide me with will be pooled along with that from over 100 other farmers. At no time will your name or farm operation be identifiable. May I stress that I am a university student, not working for the government or any other organization. The information I collect is strictly confidential.

My objective in this project is to describe the various forage production systems observed and indicate ways in which the systems might be improved.

APPENDIX E

TOPOGRAPHIC SHEETS USED IN THE SELECTION OF INTERLAKE SAMPLE FARMS

SHEET NUMBER	SHEET NAME	YEAR PUBLISHED	AERIAL PHOTO UPDATE	YEAR OF CULTURE CHECK
62 H 14	Winnipeg	1981	1977-78	1978
62 I 3	Stonewall	1980	1977-78	1977
62 I 4	Warren	1973	1968	1970
62 I 5	St. Laurent	1980	1977-78	1978
62 I 6	Teulon	1980	1977-78	1977
62 I 11	Fraserwood	1980	1977-78	1978
62 I 12	Narcisse	1980	1977-78	1978
62 I 13	Poplarfield	1980	1977-78	1978
62 I 14	Arborg	1980	1977-78	1978
62 J 9	Lundar	1975	1970	1973
62 J 16	Eriksdale	1975	1970	1973
62 O 1	Ashern	1976	1970	1974
62 O 2	Ebb & Flow Lake	1976	1970	1974
62 O 7	Steep Rock	1976	1970	1974
62 O 8	Moosehorn	1976	1970	1974
62 O 10	Fairford	1976	1970	1974
62 P 3	Shorncliffe	1984	1976-78	1982
62 P 4	Hodgson	1984	1976-78	1982

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