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INTRODUCTION

In recent years *Prairie Forum* special issues, using guest editors, have been published on themes that the editorial board has considered to be of particular interest to its readers. Nineteen eighty-six is the centennial of the formation of the Experimental Farms Service of Agriculture Canada, and this seemed an appropriate opportunity to produce a special issue of *Prairie Forum* having the central theme of "One Hundred Years of Agriculture."

Special issues are intended for a more general readership than are typical issues. The contributing authors, who have been drawn from a variety of fields, have been given individual latitude in their method of presentation and referencing, commensurate with their discipline.

In this issue, celebrating a century of agriculture, one article discusses Indian agriculture prior to the influx of immigrants during the middle of the nineteenth century; two deal with the formation of the five original Experimental Farms of the then Canadian Department of Agriculture, and describe some of the agricultural achievements of the Prairie Experimental Farms, as well as outlining current research being conducted today. Another article deals with the history of the Winnipeg Grain Research Laboratory from its inception in 1913 until 1979. The fifth article details the early ranching industry in western Canada during the latter part of the nineteenth and early twentieth centuries. A history of prairie tree plantings and an article on mechanical farm equipment conclude this special issue.

Finally, the guest editor thanks the patrons of this issue for their encouragement and financial assistance.

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Indian Agriculture in the Fur Trade Northwest

D. Wayne Moodie and Barry Kaye

ABSTRACT. Indian agriculture first appeared in the fur trade lands lying to the north and west of Lake Superior more than a century after the earliest European explorations in the region. Introduced by immigrant Ottawa Indians into the Red River valley at the beginning of the nineteenth century, it subsequently spread rapidly among the Ojibwa Indians of the Manitoba parklands and the mixed forest country of northwestern Ontario and northern Minnesota. It became a small but significant part of the economy of many of the Indians in these areas and, until the end of the fur trade period, was conducted for commercial as well as subsistence purposes. One of the most significant aspects of this agriculture was that it was based on the traditional Indian maize-beans-squash complex and, despite the presence of European traders and missionaries, was conducted on Indian terms. It was also a pioneer agriculture that led to the most northerly development of Indian agriculture on the North American continent, extending the limits of native cultivation over three hundred miles to the north of the prehistoric Indian agricultural frontier in central North America.

RESUME. L'agriculture indienne fit sa première apparition, dans la région du commerce des fourrures qui s'étendait au nord et à l'ouest du lac Supérieur, plus d'un siècle après les toutes premières explorations européennes dans cette région même. Introduite par les indiens Ottawa qui avaient immigré dans la vallée de la Rivière Rouge au début du dix-neuvième siècle, cette façon de vivre se développa rapidement auprès des indiens Ojibwa des forêts parc du Manitoba et des forêts mélangées du nord-ouest de l'Ontario et du nord du Minnesota. L'agriculture prit une petite mais importante place dans l'économie de la plupart des sociétés indiennes de ces régions et fut conservées, pour des raisons aussi bien commerciales que de subsistance, jusqu'à la fin de l'époque du commerce de la pelleterie. Les récoltes de bases de ces sociétés indiennes furent le maïs, les haricots et les courges. Néanmoins un des aspects marquants de cet échange agricole fut qu'il soit fait à la manière indienne malgré la présence de commerçants européens et de missionnaires. Ce fut aussi l'agriculture des colons qui permit de voir se créer le développement agricole indien le plus septentrional du continent nord-américain. Les limites des cultures des peuples natifs purent ainsi reculer à plus de trois cent milles au nord de la première frontière de l'agriculture préhistorique indienne du centre de l'Amérique du Nord.

At the time of European contact, the Indian inhabitants of the lands lying to the north and west of Lake Superior did not practice agriculture, and subsisted wholly by hunting, fishing and gathering. Not until the beginning of the nineteenth century did any of the native peoples of the Northwest begin to cultivate. Within this vast region, however, only the Indians of the Manitoba parklands and of the mixed forests of adjacent northwestern Ontario and northern Minnesota took to cultivating the soil. Although attempts were also made by Indians to extend cultivation into the purely grassland environments to the west, agriculture failed to take root in this region. However, it persisted in the more humid environments to the east and was most strongly developed by the native peoples living in northwestern Ontario and adjacent Minnesota. Even in this area none of the Indians became dominantly agricultural, and their small garden plots served mainly to supplement a subsistence economy that remained based upon hunting and gathering. Despite its limited nature, the introduction of cultivation into these areas represented a significant extension of Indian agriculture beyond its traditional northern limits in native North America.[1] It also contributed to the livelihood of the Indians who adopted it during a period of rapidly depleting fur and game resources and, in so doing, became a significant component of cultural change toward the end of the fur trade era.[2]

The purpose of this article is to elucidate the nature of this expansion of Indian agriculture that took place more than a century after the first Europeans had penetrated into the Canadian Northwest. Although this

development was stimulated to some extent by the European fur trade, it was essentially Indian in both initiative and character. It was also the most northerly development of Indian agriculture on the North American continent, extending its limits some three hundred miles to the north of the prehistorical agricultural frontier in central North America. This article documents the development of agriculture in the southern Manitoba lowlands and its subsequent spread into adjacent areas. It also endeavours to explain the diffusion of Indian agriculture into these areas and to describe some of its salient characteristics.

At the time of European contact, the northern limit of Indian agriculture in the western interior of North America was probably at the Knife River villages of the Hidatsa Indians, located near the confluence of the Knife and Missouri Rivers at about 47° 30' north latitude.[3] The agricultural Indians of the Upper Missouri region were the Mandan, Hidatsa and Arikara, all of whom cultivated Indian corn, beans, squashes, pumpkins, sunflowers and tobacco. The first European to describe the agricultural activities of these village Indians was the French explorer La Vérendrye, who, in 1738, accompanied a party of Assiniboine Indians on a trading expedition to their settlements.

There is little reason to believe that native cultivation extended beyond the Knife River at the time of La Vérendrye's explorations in the 1730s. However, it is becoming increasingly apparent that the northern limit of Indian agriculture observed by the French at this time represented a southward retreat from an earlier, more poleward limit. The first to recognize this possibility was the archaeologist, Waldo R. Wedel, who wrote that "it would perhaps have been feasible to grow corn in favoured spots throughout portions of the Dakota-Manitoba mound area in prehistoric times."[4] It is apparent that the Indians were cultivating to the east of the Missouri villagers in the Sheyenne and James River valleys of North Dakota in protohistorical time,[5] while more recent archaeological research has suggested that Indian agriculture occurred prehistorically in the Red River valley as far north as present Lockport, Manitoba.[6] It might also be pointed out that tobacco, which was the most widespread of Indian cultigens in aboriginal North America, was grown in the plains well to the north of the Knife River prior to European contact. The earliest historical evidence for this occurs in the accounts of the Hudson's Bay Company trader, Matthew Cocking, who, in the course of his explorations in western Saskatchewan in 1772, described an Indian "Tobacco plantation. A small plot of ground about an hundred yards long and five wide. . . ."[7] Although some tobacco cultivation continued among the Indians of the Canadian Plains until the reserve period, it was largely discontinued when better quality tobacco became available through the fur trade.

The earliest historical centre of native agriculture in the Canadian Northwest was the Indian village of Netley Creek. Also known as Rivière

aux Morts, Dead River, or Ne-bo-wese-be, it was established by Ottawa Indians at the turn of the nineteenth century near the junction of Netley Creek and the Red River (Figure 1). The Ottawa first began to plant at this site in 1805 and, from there, agriculture subsequently spread among neighbouring bands of Ojibwa Indians. Neither the Ottawa nor the Ojibwa were living in the Red River valley at the time of European contact but, beginning in the 1780s, they began to replace the Cree and Assiniboine Indians to whom this territory had formerly belonged. The Ojibwa who migrated to the Red River valley were part of a general westward expansion of Ojibwa peoples into the prairie-parkland from the forests to the east. The Ottawa, in contrast, were more recent arrivals, who had come to the west from their home area in the Upper Great Lakes. According to Alexander Henry the Younger, they arrived in the Northwest about 1792, "when the prospects of great beaver hunts led them from their country."[8] Initially, the Ottawa scattered themselves widely but, by 1805, many of them hunted in the lower Red River valley and congregated each summer at the Netley Creek encampment.

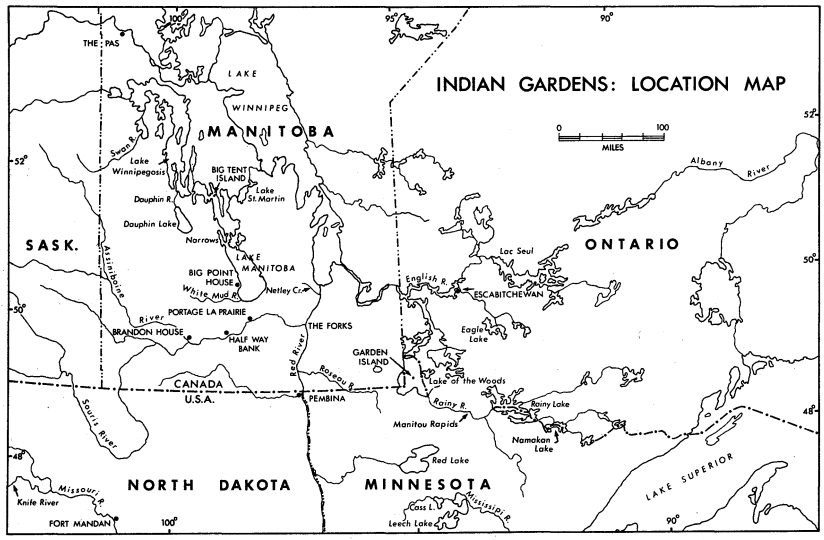

Figure 1

It was the Red River Ottawa who first began to cultivate north of the Knife River and who played the crucial role in disseminating agriculture among the more populous, neighbouring Ojibwa. According to Lord Selkirk:

> The Indians who inhabit the country from Lake Superior to Red River are mostly of the Chippeway [Ojibwa] Nation, who have never been in the habit [of] cultivating the ground. The Ottawas, who speak the same language & reside near Lakes Huron & Michigan have long been accustomed to plant Indian Corn, & some other vegetables tho' on a small scale. A band of these Indians, prompted by the growing scarcity of game in their own country, determined to migrate to Red River where they continued the practice of cultivating the ground.[9]

Although some agriculture had been part of the Ottawa economy in the Upper Lakes homeland, it was only when Alexander Henry gave them seed in 1805 that they first began to plant in Western Canada. As Henry noted in 1808:

> The first corn and potatoes they planted here was a small quantity which I gave them in the spring of 1805, since which period they have extended their fields, and hope in a few years to make corn a regular article of traffic with us.[10]

In the same year the fur trader Peter Fidler observed that four or five Indian families had built wooden houses at Netley Creek, and that several acres of land were planted with Indian corn, potatoes and "other garden stuff."[11]

Between 1805 and the founding of the Selkirk Settlement in 1812, the Netley Creek village increased in size, and corn and potatoes raised there were sold there as provisions to passing European traders.[12] The agricultural activities of the Indians at Netley Creek soon became well known and achieved a prominence such that Lord Selkirk viewed the village as an important source of seed for the first of his Red River colonists. In his instructions of 1811 to Miles Macdonell, the first governor of the colony, Selkirk wrote that:

> The Cos. [Hudson's Bay Company] establishments at Brandon House, etc., will . . . supply you with seed potatoes and perhaps some seed grain ... Perhaps, however, a greater supply at least of Indian corn may be obtained from the Ottawa & Bungee [Ojibwa] Indians at Dead River near the mouth of Red River.[13]

Selkirk's letter is the first evidence to indicate that the small band of Ottawa at Netley Creek had been joined by neighbouring Ojibwa. It also suggests that some of the Red River Ojibwa had taken to cultivating alongside the Ottawa sometime prior to 1811. According to John Tanner, a whiteman who had been adopted by the Ottawa and who was living with them during this period, it was Sha-gwaw-koo-sink, an Ottawa chief at Netley Creek, who first taught the Red River Ojibwa to plant corn. In Tanner's words:

> We then went down to Dead River, planted corn, and spent the summer there. Sha-gwaw-koo-sink, an Ottawwaw, a friend of mine and an old man, first introduced the cultivation of corn among the Ojibbeways of the Red River country.[14]

The adoption of agriculture by the Ojibwa at Netley Creek permitted these nomadic peoples to live a more sedentary way of life than their purely hunting and gathering economy had previously allowed. The Netley Creek village also emerged as a gathering point for Ojibwa from the surrounding country. This enabled them to strengthen ties with one another and the village soon became something of a regional centre. Large numbers could assemble at this site and the Midewiwin or Grand Medicine Lodge ceremony was elaborated at seasonal meetings there. Writing retrospectively of these developments, the Reverend John West noted in 1823 that:

> There was a time when the Indians themselves had begun to collect into a kind of village towards the mouth of the Red River, had cultivated spots of ground, and had even erected something of a lodge for the purpose of performing some of their unmeaning ceremonies of ignorance and heathenism, and to which the Indians of all the surrounding country were accustomed at certain seasons to repair.[15]

On the eve of the founding of the Selkirk Settlement in 1812, events in the fur trade overtook the Indians at Netley Creek and the village fell into demise. The Ottawa abandoned the site and it would seem that several years elapsed before the Ojibwa resumed cultivating there. Tanner related that the Ottawa moved from Netley Creek to an island in Lake of the Woods, where they were observed cultivating in 1813. According to Tanner:

> After this, we started to come to an island called Me-nau-zhe-taw-naun [Garden or Plantation Island], in the Lake of the Woods, where we had concluded to plant corn, instead of our old fields at Dead River. . . . we came to the Lake of the Woods, where I hunted for about a month, then went back into the country I had left, all the Indians remaining behind to clear the ground where they intended planting corn at Me-nau-zhe-tau-naung.[16]

The circumstances that led to the break-up of the Ottawa-Ojibwa village at Netley Creek are not entirely clear. Selkirk wrote that the Ottawa abandoned the site "because their corn being frequently pillaged by other Indians they thought it advisable to retire to an island in the Lake of the Woods."[17] More to the point, Selkirk indicated that the pilfering was encouraged by the North West Company which, in his opinion, was loathe to see agriculture develop in the valley. The Reverend John West, however, remarked that the Hudson's Bay Company traders as well as the Nor'Westers had opposed this development as prejudicial to their interests in the fur trade, observing that "fears were entertained that the natives would be diverted from hunting furs to idle ceremonies, and an effectual stop was put to all further improvement, by the spirit of opposition that then existed in the country between the two rival Fur Companies."[18]

Following 1812, agriculture diffused widely among the Ojibwa. To the west of the Red River, a small Indian garden village, known as Grant's Village, was established in 1815 on the Assiniboine River at a place called the Half Way Bank, located midway between Brandon House and Portage la Prairie (Figure 1).[19] Lower down the Assiniboine six tents of Ojibwa were observed fishing and making gardens in 1819.[20] In the following year, Indian gardens were reported along the Whitemud River near Big Point House at the southern end of Lake Manitoba.[21] The Reverend John West, in traversing the area between Lakes Manitoba and Winnipeg in 1822, noted that a band of Indians was raising potatoes and pumpkins on the shores of Lake Manitoba.[22] By the late 1820s there is evidence that Indian cultivation had penetrated as far north as the Swan River valley, where an Indian called the Otter had gardens said to be productive of potatoes and turnips.[23]

For the most part, the agriculture that diffused into the Lake Manitoba region and northward was based upon the potato. The nature of this potato culture, and the role it played in the subsistence cycle of the Lake Manitoba Ojibwa, was graphically summarized by the Hudson's Bay Company trader, William Brown, in 1819. His account is also revealing of the quasi-sedentary living and the ceremonial gatherings that took place at the more important of these agricultural sites.

> A considerable number of the Indians particularly those of Fort Dauphin, and the Manitoba, have ground under cultivation, and raise a great many Potatoes, but that is their only crop . . . Those of the Manitoba . . . [cultivate] on an Island towards the North end of the Lake, they have erected there what they call a Big Tent, where they all assemble in spring, hold Councils and go thro' their Religious Ceremonies — The soil here is excellent and each family has a portion of it under cultivation, which the women and old men remain, and take care of during the summer — while the young men go a hunting — In the fall of the year when they are going to abandon the place, they secure that part of the produce, under ground till spring, which they cannot carry along with them — During favourable years, they generally make a considerable quantity of maple sugar, part of which they also put in Cache — The Big Tent is constructed in the form of an arch, and consists of a slight frame of wood covered on the outside with the bark of the pine tree, and lined in the inside with bulrush mats. It is 60 ft. long — 15 ft. wide — and 10 ft. high.[24]

Although some of the agricultural sites that emerged to the north and west of the Red River were relatively short-lived, agriculture persisted among the Indians of this region until the end of the fur trade period. Thus, in 1843 the Reverend Abraham Cowley recorded an instance of Indian cultivation in the vicinity of the Narrows of Lake Manitoba.[25] The Reverend James Settee observed potato fields in 1855 and 1856 on what he called the Potatoe Island, that is, the present Garden Island at the north end of Lake Manitoba.[26] Members of the Assiniboine and Saskatchewan Exploring Expedition of 1858 noted Indian potato culture on Sugar Island in Lake St. Martin in the same general area. They also observed "several places on the Dauphin River [the present Mossy River] where the Indians grow potatoes, Indian corn and melons."[27] This latter observation is noteworthy, for it appears to have been the northernmost instance of Indian corn cultivation on the continent.

Of greater significance was the expansion of agriculture to the east of Red River, a movement which began with the removal of the Ottawa to Garden Island in the southwestern corner of Lake of the Woods in 1812. Introduced by the Ottawa, it soon spread to the more numerous woodland Ojibwa around the Lake. Daniel Harmon, for example, who passed through Lake of the Woods in 1816, remarked that "the Sauteux [Ojibwa], who remain about the Lake of the Woods, now begin to plant Indian corn and potatoes, which grew well."[28] By this time, agriculture had also penetrated some distance to the north of Lake of the Woods. Thus, several Indian families about Escabitchewan House on Ball Lake were cultivating Indian corn, potatoes and beans at least as early as 1815[29] and by 1823 the Indians of Eagle Lake, south of Lac Seul, had "good gardens" described

as very productive of Indian corn.[30] The expansion northward of agriculture into this region carried corn cultivation to the outer limits of the mixed forest belt, where further diffusion of this Indian cultigen was precluded by the harsh environmental conditions of the boreal forest to the north. Even at these northern margins, however, corn cultivation could play an important role in Indian subsistence, a circumstance that was appreciated by the fur traders of this country. The lack of big game, especially of moose and caribou, had reduced subsistence levels to the point where the traders came to view agriculture among the Indians as a beneficial development. Thus, lamenting the fact that his Lac Seul Indians were not raising corn, John Davis, the trader in this region, wrote:

> could the Indians be brought to dwell more at one place and employ less of their time seeking the deer [caribou] and Moose they might be induced to cultivate the soil and otherwise improve their condition . . . particularly as they have an example shown them by the neighbouring Indians at Eagle Lake.[31]

From Lake of the Woods, Indian agriculture also spread along the line of the Rainy River, but this eastward thrust petered out as the climate deteriorated toward the height of land separating Lake Superior drainage from that flowing into Lake Winnipeg. Indian corn appears to have been grown only as far east as the Manitou Rapids on the Rainy River, where Major Delafield described "a small field of thriving Indian corn" in 1823.[32] Farther east, cultivation was confined to potatoes, a development that appears to have spread as far as Namakan Lake, on whose islands the Indians, according to the Reverend Peter Jacobs, "raised a good quantity of potatoes, which they barter to the traders for goods."[33]

The beginnings of agriculture to the south of the Lake of the Woods cannot be dated precisely, but, in 1821, Father S.J.N. Dumoulin, the Roman Catholic missionary at Pembina, reported that the Indians in his charge were planting at four different localities, of which the main one was on the Roseau River.[34] Although the Pembina mission was south of the 49th parallel, the Roseau site was probably in British territory, but it is likely that one or more of the three unspecified localities lay to the south of the international boundary. If so, this represents the earliest occurrence of Indian agriculture in northern Minnesota. Not until 1828, however, is there conclusive evidence of Indian agriculture in that area. In February 1829, the American Fur Company traders at Rainy Lake purchased corn grown by the Indians at present Red Lake, Minnesota.[35] In 1832 Henry Schoolcraft learned from traders at Cass Lake that the Red Lake Indians were raising considerable quantities of corn. However, travel accounts of the Upper Mississippi region to the southeast of Red Lake make no mention of Indian agriculture before 1832.[36] In that year Schoolcraft visited garden sites on Star Island in Cass Lake and along the shores of Leech Lake.[37] Although he had not observed Indian agriculture in these areas during his explorations of the Upper Mississippi country in 1820, it was well established by 1832, and had spread to the other lakeside sites, including Big Turtle Lake and Lake Winnibigoshish.

Of the different agricultural sites or complexes that emerged among the Ojibwa of the Northwest, the most important and enduring were at Lake of the Woods and Red Lake located some fifty miles to the south. It was in the Lake of the Woods-Red Lake area that Indian agriculture was most prominently developed and played its most important role both within Ojibway society and in their relations with European fur traders. Of the two complexes, that in Lake of the Woods was the earliest and it was following this development that agriculture subsequently spread to most of the groups that cultivated east of the Red River.

The earliest and most important site in Lake of the Woods was Menau-zhe-taw-naun, or Garden Island, occupied by the Ottawa in 1812. Within a few years of its founding a considerable agricultural complex had evolved on this island, which was described as follows by the Hudson's Bay Company factor at Rainy Lake in 1819:

> I visited their tents which were pitched alongside of the piece of ground which they [had] under cultivation which from the regular manner in which it was laid out would have done credit to many . . . farmers, excellent Potatoes, Indian Corn, Pumpkins, Onions and Carrots. The women on whom it is a duty to do all the laborious work, were busily employed gathering . . . .[38]

The corn culture at Garden Island was strongly commercial in character and, from the outset, part of the corn crop was sold to the fur traders of the Rainy Lake-Lake of the Woods area. As early as 1808, the Ottawa had expressed a desire to trade agricultural produce and commercial opportunities at the Lake of the Woods may well have influenced their decision to locate there. The Ottawa had a long tradition as traders and middlemen in the Michilimackinac area and elsewhere, and had raised corn commercially near parts of Lake Michigan and the southern shore of Lake Superior to provision the fur trade.[39] The "chief part" of Shaw-gwaw-koo-sink's first crop at Garden Island was sold to the North West Company traders,[40] and by 1817 it was widely known that corn could be purchased from the Ottawa in the Lake of the Woods.[41]

Commercial corn production by both the Ottawa and Ojibwa in this area was initiated by the demand for provisions by the fur traders. By this time the country between Lake Superior and the Lake of the Woods had been virtually depleted of the larger food animals, and an often meager and precarious subsistence was derived by the fur traders from fish, rabbits, and wild rice (also traded from the Indians). Corn was purchased, not only to assist in feeding the men at the trading posts, but also to supply the transport brigades with essential voyaging provisions. Garden Island was strategically located in this respect, for it lay astride the main canoe route connecting the Lakehead with the Western Plains. The Indian gardens afforded the traders a small, but fairly dependable, supply of corn. The supply of corn was especially valuable when the more capricious wild rice harvests failed.[42] The traders of the North West and Hudson's Bay Companies vied with one another for the corn supply to ensure greater mobili-

ty in the competition for furs and a more assured food supply. Although the amounts traded annually by the Indians to the two companies during the period of competition are not known, the chief factor at Rainy Lake reported in the autumn of 1819 that the Hudson's Bay Company's trade at Garden Island had "been more successful than could have [been] imagined."[43] The post journal indicates that not all of the corn purchased had been transported to the company's headquarters at Rainy Lake; seventy-nine bags of corn and one bag of rice had been cached somewhere between the island and Rainy Lake.[44]

After the union of the two companies in 1821, corn production at Lake of the Woods declined, largely as a result of a drop in price brought on by the cessation of competition. The chief factor at Rainy Lake reported in 1822-23 that during the period of competition the Indians "would never give more than 2 bushels for a three point blanket, which traders, some from competition and some from necessity were obliged to give; as soon as the junction was affected the exorbitant price was reduced to a pint of powder for a bushel. On this the Indians in great parts discontinued their cultivation."[45] However, in 1824 the Hudson's Bay Company "succeeded in trading a tolerable stock of Indian corn" at Garden Island,[46] a total of seventy-six bushels.[47] In 1825 the total traded was 140 bushels[48] and in 1828 the total was one hundred fans (about seventy bushels) of very bad corn.[49]

Although the union of the companies precipitated a falling off in corn production, the decline was both short-lived and limited in effect. The Nor'Westers were quickly supplanted by the Americans, and the old rivalry was replaced by an equally intense Anglo-American rivalry. Corn regained its previous importance in the trade, and the strategic position of Garden Island along the international boundary was fully appreciated by the traders on both sides.

One of the best descriptions of the agriculture on Garden Island is contained in the reports of the Red River Exploring Expedition, which visited the island in 1857.

> Garden Island is about a mile and a half long at its widest part. Its western half is thickly wooded, the greater portion of the eastern half cleared and cultivated. A field containing about 5 acres was planted with Indian corn, then nearly ripe. The corn was cultivated in hills, and kept very free from weeds . . . Near the space devoted to Indian corn, were several small patches of potatoes, pumpkins, and squashes. An air of great neatness prevailed over the whole of the cultivated portion of the Island.[50]

The expedition provided the first reliable indication of Indian cultivation on islands other than Plantation Island, and a map produced by its members shows that cultivation had spread to a number of sites along the lakeshore.[51] The widespread nature of this agriculture, and evidence that it persisted into the treaty period, is corroborated by the reserve surveys which, although only partially conducted, show several agricultural islands at the

north end of the Lake near Rat Portage and in Shoal Lake.[52] The number of Indians who eventually took to cultivating in the Lake of the Woods is not known, but in 1854 it was estimated that about two hundred Indians resided on Garden Island in summer and raised on it "large quantities of potatoes, Indian corn and pumpkins."[53]

Like the Lake of the Woods Ojibwa, their neighbours at nearby Red Lake in Minnesota were exceptionally predisposed towards agriculture and sold their corn to both British and American fur traders. As early as 1829, the Red Lake Indians were trading corn to the American Fur Company traders at Rainy Lake[54] and by 1832 Henry Schoolcraft related that the Red Lake band was supplying corn to "the posts on the Upper Mississippi, and even as far east as Fond du Lac."[55] Of these people it was further noted that "They are enabled to sell 3 or 400 bushels in exchange for goods and reserve to themselves a comfortable supply for the winter."[56]

The Reverend Frederic Ayer, who conducted a reconnaissance of the Upper Mississippi region in 1842-43, wrote a detailed description of the Red Lake people at this time. According to Ayer, they comprised about one hundred hunting men and from five to six hundred women and children. He described them as one of the largest bands of the Ojibwa nation and, "as a body, probably more stationary than any other band of Ojibwas." He further observed that "This band raise more corn and potatoes probably than any band of Ojibwas in this part of the country. In ordinary seasons they put up from 15 to 60 to 80 sacks of corn to a family. Their sacks contain a bushel or more each."[57]

The seasonal activities of the Red Lake Indians, including their far-flung trading trips, were described in detail by Ayer as follows:

> When the rivers open in the Spring, the men generally leave, and descend the Red River to the Colony . . . They are absent about 20 or 25 days. The principal object of this visit to the Colony, is to traffick sugar with the half-breeds and others, for which they receive clothing and goods. Again in the first part of June, a considerable number start out to hunt buffalo in the plains to the West. A few also visit La Pointe and the Sault Ste Marie during the summer. With these exceptions, they spend the spring and summer at Red Lake. The men only go to the Colony and on their hunts in summer. And in their winter hunts, the men do not usually take their families with them. Fewer families than usual remain at Red Lake this winter [i.e. 1842/43], on account of the small crop of corn there last season. The hunters have taken their families with them this winter on account of the scarcity at R. Lake. There are this winter 35 lodges at the Lake. As a general thing the women and children remain here both summer and winter.[58]

The importance of corn cultivation at Red Lake, especially in relation to that of surrounding Ojibwa bands, was further underscored by Ayer's observation that "Indians from other bands in considerable numbers starving at home come here to winter and live upon the hard earned fruits of this peoples industry."[59]

The Indian agriculture that emerged in the fur trade Northwest varied greatly in extent and significance, ranging from isolated individual fami-

ly plots to large village complexes. On the whole, the larger and more enduring agricultural sites were confined to the southern and eastern sections of the region, while the smaller and often ephemeral ones predominated in the extreme north and west. In some instances, agricultural produce was regularly sold to the fur traders, so that cultivation was undertaken with commercial as well as subsistence intentions by different groups or individuals within them.

Geographically, the most striking feature of this agriculture was its northern nature. Throughout most of its distribution, it was essentially confined to lakeside or insular locations, where micro-climatic conditions allowed the cultivation of corn well to the north of its prehistoric limits. Although it developed following European contact, and incorporated European crops, it was nonetheless a native agriculture derived from the maize-beans-squash complex of North American Indians. This complex remained intact at least as far north as Garden Island, located at 49° 10' north. However, corn, the most adaptable of the cultigens in this complex, was cultivated significantly farther north, reaching its outer limit in northwestern Ontario at Eagle Lake and Escabitchewan and achieving its extreme northern limit on the continent in Manitoba along the Mossy River at latitude 53° 31' north. Indian agriculture thus made its farthest poleward thrust at the centre of the continent along the large north-south trending lakes of the Manitoba lowlands. Beyond this it appeared only under the auspices of church missions, and generally at a later date. It was also confined to crops introduced by Europeans.

Despite the increasing inroads of white traders, missionaries and government officials into the Northwest, the agriculture that spread among the Ojibwa remained essentially native in character. If not entirely based on Indian cultigens, it was conducted on Indian terms, a feature that for some bands persisted into the reserve period. Thus, despite dwindling game resources and persistent attempts by missionaries and representatives of government to convert them to farming, many continued to hunt and fish, and to plant the small gardens of corn and potatoes that had been their custom prior to becoming wards of the new Canadian state.

NOTES

The authors wish to acknowledge the Hudson's Bay Company Archives, Provincial Archives of Manitoba, for permission to consult and quote from their records.

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The Formation of the Experimental Farms

T.H. Anstey

ABSTRACT. In March 1884, a select committee of the House of Commons recommended that a central bureau of agriculture and experimental farms be part of the Canada Department of Agriculture. The objectives of the experimental farms were to improve crop varieties and animal breeds; improve their methods of culture; control diseases and insects; and publish information bulletins for the use of Canadian farmers.

The Experimental Farm Station Act was given Royal Assent on 2 June 1886. Two of the first five experimental farms were established in the prairie region at Brandon and Indian Head.

RESUME. Un comité choisi de la chambre des communes recommanda au mois de mars 1884, qu'un bureau central sur l'agriculture et sur les fermes expérimentales fasse parti du ministère canadien de l'agriculture. Les objectifs des fermes expérimentales furent d'améliorer la variété des cultures et l'élevage du bétail; d'améliorer la cultivation; de contrôler les maladies et les insectes et de publier un bulletin d'information pour les fermiers canadiens.

La loi sur les stations agronomiques expérimentales reçut le consentement royal le 2 juin 1886. Deux des cinq premières fermes expérimentales furent établies dans la région des prairies à Brandon et à Indian Head.

For more than two centuries before Confederation in 1867, farming had been practiced in Canada. In Prince Edward Island the primary industry was agriculture. Although Louis Hébert had been farming at Québec City since 1617, agriculture in Lower Canada (now Québec) really started with the arrival of Robert Giffard and one hundred colonists in 1634. About thirty years later, Jean Talon organized the seignorial system of land tenure, which assured the continuation of landlord-tenant agriculture. Agriculture was encouraged and became intensively practiced along the St. Lawrence River so that by the middle of the nineteenth century almost all of the easily accessible arable land in Québec was being farmed. In Upper Canada (now Ontario), nearly all available arable land was in use before Confederation and by 1802 the region was a major exporter of wheat and flour. On the West Coast, agriculture was limited primarily to the lower Fraser Valley and Vancouver Island and served only the needs of the local population. The District of Assiniboia, embracing the Red River Settlement, formally became a part of Canada in 1870 when it was named Manitoba. Although almost self-sufficient in food production, frequent plagues of grasshoppers in the summer and early frosts in the fall severely depleted winter food supplies.

Settlers from eastern Canada started to move west in 1884 using the partially completed Canadian Pacific Railway (CPR) to reach the "free" farmland in Manitoba and the North-West Territories. The latter, which were to become Saskatchewan and Alberta, had been acquired from the Hudson's Bay Company by the Government of Canada in 1868. Instead of the "God's Country" depicted by the novelist James Oliver Curwood, they found a country with a dry hostile climate and land that was unsuited to the crops and farming methods of Eastern Canada and Europe. However, attempts were made by some farmers to improve their operations and MacEwan has described the trials and experiments with different crops and machinery conducted by Archibald Wright at Winnipeg in the early 1880s.

The Need for Experimental Farms

The Department of Agriculture for Canada was organized under the Department of Agriculture Act, passed by Parliament and given Royal Assent on 22 May 1868. In addition to agriculture, the minister and the department had other national responsibilities including immigration, public health, censuses and statistics, patents, copyrights, and trademarks. For the protection and improvement of Canadian agriculture, the minister, the Honourable J.C. Chapais, and his deputy, Dr. J.C. Taché, lost no time in presenting bills, such as the Contagious Diseases of Animals Act (1869), to the House of Commons.

By the early 1880s, it was becoming apparent that Canadian agricultural methods needed improvement. In the West, new crop varieties and agricultural practices more suited to western conditions were sorely needed, while the established methods of farming in the East, which followed traditional European patterns, were becoming outdated. In response, Parliament, on 30 January 1884, established a Select Committee of the House of Commons to determine how the necessary improvements could be made.

Mr. G.A. Gigault, MP, was appointed to chair the Select Committee. The committee's first action was to send a questionnaire to 1,500 Canadians whose names were suggested by committee members; 385 replies were received. The questionnaire contained five specific questions and these, together with the responses, are given in Table 1.

TABLE 1
QUESTIONNAIRE PREPARED BY THE GIGAULT COMMITTEE

Question	Number of respondents		
Are you in favor of —	For	Against	No answer
Establishing an experimental farm?	278	64	43
Appointing an entomologist?	198	117	70
Establishing a central bureau?	256	62	67
Establishing a section devoted to statistics?	211	74	100
Publishing handbooks, reports, and bulletins?	255	48	82

The committee suggested the establishment of an experimental farm, to be set up as a garden, where varieties of grain and trees from northern Europe, Russia, and northern India, and various fertilizers could be tested. It also suggested that samples of seeds and plants be tested and distributed throughout the Dominion by such an experimental farm. In addition to an experimental farm, the committee envisioned a central bureau with the objective of collecting information on all matters relating to agriculture.

On 21 March 1884, the committee reported its findings to Parliament. Its recommendations were that the federal government should establish a central bureau of agriculture, and establish experimental farms that would operate in conjunction with the proposed central bureau. The bureau would be part of the Department of Agriculture and have the following objectives: (1) introduce plants, determine the comparative value of fertilizers, test seeds for purity and vitality, and test the health of plants and animals; (2) investigate methods of controlling insects and diseases of plants and animals; (3) study the qualities of breeds of animals, how to protect them from parasites and diseases, and how best to feed them; (4) gather useful statistical information; and (5) publish informative bulletins on the foregoing subjects.

The idea of having experimental farms for the express purpose of providing current technology to farming communities was relatively new in North America. The first organized agricultural experimental station in the world was sponsored by Sir John Lawes at Harpenden, just north of London, England, in 1843. Called Rothamsted, it is frequently referred to as the "Mother of Experimental Stations." Nine years later in Germany, farmers banded together in order to test plants and animals on one farm in Saxony rather than have individuals conduct tests on their own farms. When the work grew beyond their means, the German farmers requested help from their government, which applauded their initiative and encouraged others toward group experimentation. Within thirty years, that is by 1882, there were eighty experimental stations in Germany. By 1878, France had established forty-three experimental stations, which were said to be as important to the farming community as physicians were to sick people and lawyers were in litigious matters. The first agricultural experiment station in the United States was organized in Michigan in 1857. Five years later the government of the United States passed the Morrill Act which established land grant colleges for the study of agriculture and engineering. Not until 1887, however, was the Hatch Act passed which granted lands for the development of state experiment stations.

Parliament appointed Professor William Saunders of Western University, London, Ontario, to make further and detailed studies into the practicality of establishing experimental farms in Canada. The appointment was dated 2 November 1885. Saunders worked quickly, for on 20 February 1886, he reported to the minister, the Honourable John Carling, his findings on thirty-three states in the United States and on four provinces in Canada. He also gave a summary of the situation in the Dominion Department of Agriculture and referred to the organizations in Europe. Saunders concluded that the benefits derived from agricultural teaching colleges in America under the Morrill Act did not warrant the cost of establishing such institutions in Canada at that time. He did report, however, that agricultural experiment stations were of very great service in supplying information and stimulating progress in agriculture at a comparatively

nominal cost. Because agriculture lay at the foundation of Canadian prosperity, Saunders recommended that any reasonable expenditure in the development of agricultural experiment stations should be incurred without delay, leaving the matter of agricultural education in colleges for future consideration.

The Experimental Farm Station Act

On 22 April 1886, the Honourable (later Sir) John Carling, by now Minister of Agriculture for Canada, moved that the House of Commons "resolve itself into Committee of the Whole . . . to consider the following resolution. . . ." The resolution empowered the government to establish experimental farm stations. The motion for the House to go into Committee was approved, but the matter was delayed until the Minister had resumed his duties following a short illness. On 30 April 1886, the Minister reopened the subject, reviewed the work of the Select Committee chaired by Mr. G.A. Gigault, MP, and reminded the House that Professor Saunders had been appointed to visit different agricultural experimental farm stations in the United States, and to enquire into the workings of similar institutions in England, Germany, Russia, and France to determine the amount of land each experimental farm needed, their annual expenditures, and the results of experimental work. His report also included observations regarding institutions in Belgium, Ireland, Austria, Hungary, Italy, and Japan. The minister then said that it was the intention of the government to establish a principal, or central, experimental farm for Ontario and Québec jointly, in the vicinity of Ottawa, and four other farms in different parts of Canada. According to the proposed act, of these four other farms one was to be located in Prince Edward Island, Nova Scotia, or New Brunswick, one in Manitoba, one in the North-West Territories, and one in British Columbia.

Of the sixteen members of parliament who spoke, none from either side of the House opposed the resolution. One must recall that at the time nearly half the men, and hence voters, in Canada derived their livelihood from the soil. Some members from the opposition suggested that the appropriate provincial governments should establish such farms because they would be more familiar with the types of problems that required solving in their particular areas. They would also be able to supervise the activities of the experimental farms better than the federal government could from Ottawa. One member thought markets were needed, not experiments to learn how to grow more produce. This member stated that "our farmers as a body are intelligent and know precisely what to do in their business . . . our farmers are raising too much [produce] and are not paid enough for what they raise."

The remaining speakers were enthusiastically in support of the resolution. Several said that there was nothing before the House during that ses-

sion as important as the proposal brought by the Minister of Agriculture. Many speakers identified problems that required attention. The most frequently raised one was that of determining the best varieties of crops to grow under each of the climatic conditions selected for the five experimental farms. Such information would make it unnecessary for each farmer to experiment on his own and risk losing some of a year's harvest when part of an experiment was a failure. Another subject of interest was the planting of trees both for shelter and for timber. Those who knew the climatic conditions in the North-West Territories claimed that large stands of trees planted in Manitoba and the Territories would bring substantial benefits to the settlers by providing shelter and timber, and might even soften the severe climate. Others were concerned about fencing and its cost, saying that the experimental farm stations should test various kinds of bushes for their hedge-making capabilities. The matter of manures, chemical fertilizers, pastures, crop rotations, feeding values of different kinds of crops, and harvesting times for grain were all subjects for lively comment in Parliament. Probably the most significant proposal, however, was that Canada should produce a spring wheat that would ripen before the fall frosts in Manitoba and the North-West Territories. In addition, this spring wheat should be of superior baking quality. One member wisely noted that since the experimental farm stations were to replace individual experimentation, the results farmers were given by such stations should be dependable.

The second reading was on 7 May 1886. This time, only eight members of parliament spoke in addition to the Minister of Agriculture. Questions related to details on how the various experimental farm stations would be set up, where they would be located, the cost to establish them and the cost to maintain them. The minister read the conclusions of the Gigault Committee into the Commons Debates. These conclusions, together with Saunders's recommendations, form the basis of Bill 124: The Experimental Farm Station Act. Some members suggested again that provincial governments assume the responsibility for these stations or that individual farmers be supplied with the necessary seed and that one farmer in each constituency, recommended by the local member of parliament, perform experiments as planned by a central staff in Ottawa. None of these suggestions was adopted, however, and the House agreed to the second reading. The final reading and passage of the bill, under Prime Minister, the Right Honourable Sir John A. Macdonald, was on 11 May 1886. The house prorogued on 2 June 1886, and Bill 124, together with many others, was given Royal Assent and became law.

Five Sites Chosen for Experimental Farms

Much care and good judgement led to the selection of a central experimental farm site at Ottawa, Ontario, and branch experimental farms located at Nappan, Nova Scotia; Brandon, Manitoba; Indian Head, North-West Territories; and Agassiz, British Columbia. The sites were chosen

by Dr. William Saunders, director of the new experimental farms. An advanced agricultural industry developed and spread around each establishment as farmers recognized the benefits accruing from the new technology now available to them.

Dr. Saunders was appointed in October 1886. In 1848, when he was twelve years old, he and his family had moved to London, Ontario, from Devon, England. His scientific bent was evident at an early age; he apprenticed as a druggist and opened his own pharmacy in 1855 when he was only nineteen years old. Saunders was also an avid gardener, and, because insects attacked the plants he grew, he became interested in entomology. He helped organize the Entomological Society of Canada in 1863. As a result of his interest in and knowledge of gardening and entomology, he was made a Fellow of the American Society for the Advancement of Science in 1874, and of the Royal Society of Canada in 1881. His remarkable book, *Insects injurious to fruits*, was published in 1883 and remained the primary reference in that field for many years.

Saunders described to the Minister of Agriculture in some detail the property selected for the Central Experimental Farm and its value for agricultural research. The land was located on the south side of the road leading to Merivale, just west of the City of Ottawa in Nepean Township. On 25 June 1908, this portion of Merivale Road was named Carling Avenue (Ottawa By-law 2777).

Residences were built for the director and for several officers and foremen on the Central Experimental Farm. This became common practice not only in Ottawa but on branch farms as well. Because of a lack of suitable commercial accommodation near branch farm locations, a "government room" with linen was provided in each superintendent's residence for the use of the director and other officials when they made their annual tours. Usually the bed was a brass four-poster. The large porcelain washbasins, pitchers, and washstands that were provided in each one of these rooms are today held by some research stations as treasured mementos. The wife of each superintendent brought out her best linen, china, and silver on which to serve specially prepared meals featuring the produce of the experimental farm and the region. Each of the first four experimental farms was near a CPR station. The superintendent usually met the director at the station and drove him to the farm in a democrat or a carriage harnessed to a sleek pair of bay trotters.

During his first year Saunders made three trips to the Maritime provinces and two trips to Manitoba, the North-West Territories, and British Columbia. Indeed, the day following his appointment, Saunders left for the Maritime provinces. He travelled continuously for the next three months, inspecting all the farms that had been offered for sale as experimental farms. Travel was by train, probably in a lower berth. Roomettes were not available until much later and Saunders certainly did not have his private rail car.

Superintendents were appointed for the branch farms in the Maritimes, Manitoba, and the North-West Territories. All three (William M. Blair, S.A. Bedford and Angus Mackay) were brought to Ottawa in 1887 to help with the work of establishing the Central Farm and to give each superintendent the opportunity of becoming familiar with the way in which Saunders wished the work of the experimental farms to proceed.

Mr. William Blair was born at North River, near Truro, Nova Scotia, in 1836. He farmed near his hometown and was the first person to supply milk to Halifax by rail. He was active in both local and national politics, having been elected twice to Parliament. He was Colonel, 78th Highland Regiment, from 1880 to 1888. The Nova Scotia Agricultural College, Truro, was established in large measure through his urging. In the spring of 1888, he moved to the Experimental Farm, Nappan, Nova Scotia, as superintendent.

Mr. S.A. Bedford was twelve years old in 1863 when he came with his family from Sussex, England, to Goderich, Ontario. In 1877, at the age of twenty-six, he homesteaded near Darlingford, Manitoba. He was employed by land companies to examine properties and guide new settlers to prospective homesteads. He himself then farmed in the Moose Mountain District of the North-West Territories and was elected to its first Legislative Assembly. In 1888, he arrived in Brandon, Manitoba, as the first superintendent of that experimental farm.

Mr. Angus Mackay was born in 1840 in Pickering Township, Ontario. In 1882, together with three companions, Mackay moved to Indian Head, North-West Territories. Each one took up a homestead and operated the four properties cooperatively. After his appointment as superintendent for the branch farm in the North-West Territories, Mackay spent part of 1887-88 in Ottawa with Saunders. In the spring of 1888 he returned to Indian Head with the assigned task of selecting suitable land and developing an experimental farm.

It was not until July 1889 that Mr. Thomas A. Sharpe was appointed superintendent of the experimental farm at Agassiz, British Columbia, where he assumed his duties on the following 19 September. Sharpe was born near Kingston, Ontario, in 1847. He moved to southern Manitoba as a young man, where he raised cattle on unsurveyed land. He had one of the first registered herds of Shorthorn in that new province.

Under these four pioneering superintendents, inspired by the drive of their director, William Saunders, the experimental farms developed rapidly and set the course for agriculture in Canada. All four were amateurs in the sense that none was trained in technical agriculture. Each one, however, was keenly interested in advancing agriculture throughout Canada and had a concern for soil, crops, and livestock. Also, each one was brilliant in his own way and took the responsibility to act in the best interests of Canadian farmers.

Close Relations with Canadian Farmers

Correspondence built rapidly. In 1889, only three years after the experimental farms were authorized, the Central Farm received nearly 7,000 enquiries from farmers and responded with 5,400 letters, 41,500 pamphlets, and 3,700 packages of seed. The following year, more than 17,000 letters were received and nearly 20,000 responses mailed. By 1894, 15,000 farmers were being supplied with samples of improved varieties of seed, most of which were cereals. The director visited each experimental farm annually and attended meetings of farmers in each province. He promoted the planting of hardwood trees, such as hickory, ash, elm, oak, beech, walnut, and cherry, noting in particular that these species were absent from the forests of British Columbia.

On 20 August 1890, when Saunders was visiting Indian Head, the temperature dropped to 27°F (-3°C). This caused severe damage to grain that had been sown late in the spring. It confirmed to Saunders the need, previously expressed by members in the House debate on 22 April 1886, for early maturing varieties of cereals, which would permit earlier harvests and lengthen the harvesting period. The Indian Head experience had a far-reaching effect on the development of wheat varieties in Canada. When Saunders visited Lethbridge in the southwestern part of the North-West Territories, he was impressed with the "energy and industry" of the settlers.

In 1895, Saunders reported that Canada had too few experimental farms which were "too widely separated to fully represent all the different climates and other conditions affecting agriculture throughout the Dominion." As a result, he enlisted the cooperation of farmers to test varieties of grain. During the year, he received applications from more than 31,000 farmers for samples of seed but regretted that only 26,000 three-pound (1.5-kg) samples were available for distribution, and for new varieties of cereals, only one-pound (0.5-kg) samples were supplied. Several of the new varieties proved to be better than those then under general cultivation.

In the same year, Saunders acknowledged the donation of a large number of trees and shrubs from Russia, England, Jamaica, Japan, California, and Minnesota. In addition, the Geological Survey of Canada collected and forwarded to the Central Experimental Farm seed from remote areas of Canada. Professor John Macoun, who had resurveyed the Palliser Triangle in the 1870s and had demonstrated the importance of summer rainfall to the growth of plants on the Great Plains, was the botanist for the survey.

The year of 1896 was the tenth anniversary of the establishment of experimental farms and Saunders reviewed their accomplishments. Although there had been rivalry among districts across Canada to obtain experimental farms, Saunders said there had been no "adverse criticism worthy of attention" and he therefore concluded that the sites chosen were supported by the Canadian farming population.

Among the practical results obtained from experimental farms during the first decade, Saunders emphasized that the recommendations for maintaining soil fertility and renewing cropping capabilities of land were of prime importance. Particular attention was paid to the fifty thousand people who had settled in the north-west. Extremes of climate required many experiments on the culture of hardy plants. Low precipitation brought about new methods of cultivating soil to maximize moisture retention. Saunders said that the experimental farms were "due the credit" for introducing awnless brome grass, *Bromus inermis* (Leysser) to the Canadian Northwest and demonstrating its resistance to drought, its tolerance of low temperatures, and its usefulness as both a pasture and a hay crop. It is still the only species of brome grass sown today, and many varieties have been developed and licensed since 1896.

W.T. Macoun, chief of the horticulture division, gave thought to the health and happiness of Canadians by encouraging farmers to cultivate fruits, vegetables, and ornamental plants. He ensured that each experimental farm grew a good selection of all imported material. The planting of trees and shrubs for shelter and ornament transformed a sometimes bleak landscape to one of comfort and beauty.

Each year brought an increased response from the public for information. Controls for insects and plant diseases were frequently requested. Noxious weeds received attention. The analysis of feeds and seeds, the relative nutritional value of different manures and various chemical fertilizers, and the determination of the quality of well water were among the services rendered by F.T. Shutt, chief of the chemistry division, who had been one of Saunders's first appointees in 1887.

East or west, Saunders had the well-being of the Canadian farmer uppermost in his mind. He was determined to improve the ability of the primary producer to make a better return on his investment in land and labour and to improve the conditions under which farming families lived. He and his staff established a remarkable agricultural base during the final fifteen years of the nineteenth century.

Post Script

The Experimental Farm Station Act in force today is the same prescient act that was passed in 1886. It was so well conceived that only minor amendments have had to be made to provide for experimental farm stations in new provinces as they were formed, and to make some administrative adjustments. The act has served agriculture and Canada well. It gives ministers the freedom to organize according to changing needs, but it charges their officials and scientists with solving problems as these emerge. Initially, the act met the requirements of an agriculture dependent upon horsepower, then, without change, adjusted to the mechanical evolution, and now provides for the high technology era. Over this period

twelve deputy ministers have assured that spending estimates are prepared each year in support of experimental farms. Twenty-one ministers have justified them in Parliament. Today, after going through several reorganizations, the Experimental Farms System is known as the Research Branch of the Canada Department of Agriculture. The organizations resulting from this act (the names were frequently preceded by "Dominion"), with the dates, are as follows:

1886-99 Experimental Farms or Experimental Farms System
1900-10 Experimental Farms Branch
1911-37 Experimental Farms and Stations
1914-37 Entomological Branch
1937-58 Experimental Farms Service
1937-58 Science Service, and
1959- Research Branch

NOTE

Adapted by the author from his manuscript *One Hundred Harvests*, the history of Research Branch, Agriculture Canada, published in June 1986.

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Agricultural Achievements of the Prairie Experimental Farms, 1886-1986

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ABSTRACT. This report is a review of the contributions made by federal experimental farms to prairie agriculture. It includes only the farms (now called stations) that are located in the three prairie provinces. After a brief outline of the current research and past achievements of today's stations, the impact of their discoveries on prairie farming in the areas of animal production, crop development, soil fertility and crop protection is outlined.

RESUME. Ce rapport est une revue des contributions apportées par les fermes expérimentales du gouvernement fédéral à l'agriculture des prairies. Ne sont prises en considération que les fermes (appelées maintenant stations) situées dans les trois provinces des prairies. Un bref aperçu présente les recherches en cours et les dernières réalisations des stations actuelles. Le rapport accentue enfin l'impact des découvertes de ces stations, en ce qui concerne l'agriculture dans les prairies dans les domaines de la production des animaux, du développement des récoltes, de la fertilité des sols et de la protection des récoltes.

When Parliament declared the Experimental Farm Station Act in 1886, it was an investment for the future. The challenge was a large pioneer country with seemingly unlimited potential but where progress would be inhibited by a harsh climate, by a short growing season, by great unknowns of soil problems and pests, and moreover, uncertain markets. On the prairies it was not at all certain that farming could survive. The Act identified problems with domestic animals, soils and crops that required resolution.

Today, one hundred years later, there is little doubt that agriculture research has paid off handsomely for the West and that farming has survived. While it is not correct to relate all the success in the development of agriculture to research, there is a strong conviction that without the research, change would have been much slower and substantially less advanced.

Five experimental farms were established by the act. Two of them, Brandon and Indian Head, were on the prairies, though others were inaugurated at various times after 1900 as pressure of problems demanded attention. The research conducted at the experimental farms administered by Agriculture Canada has been of major significance to the efficiency and economy of farming on the prairies. To provide coverage in any detail of the specific contributions would require more space than is allowed in this article. Therefore a brief outline will be given of current research being conducted at prairie research stations together with some of their past achievements; this will be followed by a short summary of the impact of these discoveries on prairie farming in the areas of animal production, crop development, soil fertility and crop protection.

Research Review by Stations

Brandon (1888)

The present research programme at Brandon encompasses beef cattle breeding; swine nutrition, physiology, genetics, and management; breeding,

physiology, and management of barley, corn, soybeans, and sorghum; soil fertility, agronomy, plant nutrition, and weed control in cereal, oilseed, and forage crops. Research programmes are designed to solve production problems and to evaluate new opportunities that will enable Canadian farmers, especially those located in the eastern prairie area, to maintain or improve their competitive position in domestic and foreign markets.

The early efforts at the Brandon Experimental Farm were directed toward the introduction and development of crops and livestock adapted to the local environment. Management practices were modified to cope with the short season and harsh climatic conditions encountered by the settlers. The Experimental Farm was involved in many aspects of early agricultural development in the eastern prairies including dairy and beef cattle, horses, poultry, honey bees, vegetable production, ornamental horticulture, cereal crops, forage crops, and pest control.

Shorthorn cattle were used to evaluate the effectiveness of selection based on performance testing and to determine the relative importance of genetic and non-genetic sources of variation in growth rate. Since 1969, Brandon has cooperated in the Foreign Cattle Breed Evaluation Project, publishing information on reproductive performance of hybrid cattle, feed lot response, carcass yield and quality. Achievements in swine include breeding and selection procedures to improve crossbred performance; determining the minimum age for boars for breeding effectiveness; management procedures that have improved reproductive performance, e.g., feeding levels, nutrient supplements, housing, and hormonal treatments; physiological mechanisms that control reproductive functions such as ovulation rate, litter size, embryo survival and estrus cycle; and management procedures for market hog production. Studies in nutrition and management of poultry increased egg production and hatchability.

The barley breeding programme has been an unqualified success. Improvements in yield, quality and disease resistance have been achieved in both feed and malting barley through a series of fifteen varieties that include Parkland, Conquest and Bonanza. About two-thirds of the barley hectarage in Western Canada is seeded with Brandon varieties. By developing the appropriate management techniques and identifying the best hybrids, Brandon has played a major role in the revival of corn production in Manitoba. Early-maturing soybeans from a programme at Ottawa were selected and released. Forage research supported regional grass and legume breeding as well as production techniques. Many vegetables and ornamentals adapted to the eastern prairies came from the station including the unique Monarda ornamentals.

Research in plant nutrition and soil fertility continues to refine fertilizer recommendations as varieties, crop species, production methods and economic circumstances change over time. Recommendations are produced on rates and methods of application, placement relative to seed,

residual effects and analysis procedures for predicting nutrient deficiencies. Recommendations regarding crop rotations, crop sequences and tillage practices ensure a sustainable and productive industry.

Brandon Research Station cooperates with the Expert Committee on Weeds in the evaluation of candidate herbicides for licensing and recommendation. Herbicides are assessed alone and in combination with other herbicides, adjuvants, and insecticides to broaden the spectrum of pest control in new and established crops. Physiological studies cover the mode of action of herbicides. Field research at Brandon has supported the registration of many herbicides in common use.

Morden (1916)

The programmes of the Morden Research Station are currently directed toward the development of new cultivars and the improvement of management for buckwheat, field corn, field peas, pulses, new crops, flax, sunflowers, potatoes, and herbaceous and woody ornamentals. Recently, a new programme on vegetable crops was implemented, and there has been an increased emphasis on food technology. Morden, with an atypical prairie climate, is a desired site for the testing of ornamentals and new crops. Cereal rusts develop early and cereal trials are carried out cooperatively. Physiologists and pathologists refine management practices and search for new methods of disease control. Information is generated on new herbicides which may lead to registration of these products and more effective weed control.

While the prime motivation for the station was to improve horticulture crops, in the early years at Morden Experimental Farm, poultry, horses, Ayrshire dairy cattle and bees were kept and techniques demonstrated for their use in the area. Grain cleaning services were maintained. But it was for fruits, vegetables and ornamentals that Morden gained national and international fame. Varieties and how best to grow them in the prairies was their forté. In time Morden served rural and urban enquiries from all regions of Western Canada and many parts of the United States to the south and west. Cooperative programmes in apple breeding, corn, sunflower, and tomato breeding and more recently potato breeding were key activities of the early plant scientists. Since 1960 special crops have been added to the responsibilities and programmes with flax, buckwheat, field peas, and new crops are now coordinated from Morden.

The development and release of horticultural and special crops selected for their adaptability to a harsh climate have been station highlights. Thirty-four varieties of vegetables including cabbage, cucumbers, garden peas, sweet corn, early tomatoes such as Manitoba Redstaker, potatoes, and Jerusalem artichoke have been licensed.

Over one hundred varieties of ornamentals have been released that include shade trees such as Fallgold black ash, Jacan Japanese elm, and Tower poplar; decorative shrubs such as flowering almonds, flowering plums, lilacs, mock oranges and rosybloom crabapples; and herbaceous ornamentals such as Morden pink lythrum; twenty-two chrysanthemums, including the Fathers of Confederation series; and twelve roses, including the Parkland series.

Forty-seven tree and bush fruits have been developed, including apples such as the Manitoba Spy, Breakey, Goodland, Carroll, Northland, Parkland and Westland; apricots, cherries, plums and Boyne rasperry.

Thirty-seven field or special crop varieties were released, including Mancan and Manor buckwheat; Dufferin, McGregor, NorLin and Nor-Man flax; Trapper, Triumph, Tara and Lenca field peas; fourteen corn hybrids and eleven sunflower varieties and hybrids.

The establishment of a processing laboratory to extract sugar from sorghum during the last war has meant that quality of fruits, vegetables and potatoes has been of concern to scientists at the station. Thus the vegetable canning industry and potato chip plants in Manitoba were serviced by the food technologists, and now studies into the chemistry of crop products is an important addition to the services of the station.

Recommendations for control of weeds and plant diseases of a wide range of horticulture and special crops are now coming from the station.

Winnipeg (1925)

Research programmes at the Winnipeg Research Station emphasize three broad responsibilities: development of improved varieties of cereals adapted to regions of the Canadian prairies, research on the protection of stored grain and grain products, and research on the integrated control of insect pests of field crops. Improvement of cereal varieties, historically the first mandate of the Research Station, requires close cooperation between plant breeders, geneticists, cytologists, plant pathologists, and cereal chemists. Pathologists and chemists also serve other prairie cereal breeding programmes. Research on the storage and protection of grains, oilseeds, and their products is national in scope and involves close cooperation with the grain industry. Particular emphasis is being placed on ecology of storage, insecticidal control, and the detection, prevention, and dynamics of mycotoxins in stored grains and oilseeds. Research on the control of field crop insects, particularly those that attack canola, includes the evaluation of new insecticides, assessment of economic damage, biological control, and the development of management systems.

Since its origin in 1925, the development and release of improved varieties of hard red spring wheat resistant to the smuts and to the ever-changing races of stem and leaf rust has provided stability to production in the eastern prairies.

Since 1937, thirteen varieties of hard red spring wheat have been released from Winnipeg. Seven of these currently occupy 80 percent of the area sown to hard red spring wheat across the prairies — some eleven million hectares. The timely release of Selkirk in 1953 checked the devastation being caused by the sudden appearance and explosive spread of race 15-B, a new and highly virulent form of stem rust. As a result of the subsequent release of even more sophisticated rust-resistant types, there have been no serious losses from stem rust of wheat since 1954.

Neepawa (1969) has been the most popular variety and still occupies over 50 percent of the area sown to hard red spring wheat. Columbus (1980) was the first to provide good resistance to postharvest sprouting. Cereal chemists provide quality screening for all wheat and barley programmes, raising the general quality for all licensed varieties across the West.

Since 1936, fifteen oat varieties resistant to smuts and to crown and stem rust have been released. Fidler and Dumont currently occupy 80 percent of the oat seedings in Manitoba and eastern Saskatchewan. Four varieties of high-quality durums having smut and rust resistance have been released. Coulter and Medora, two recent releases, are popular in Manitoba and Hercules maintains its place as the high quality standard. Norbert and Ellice, two-rowed malting barleys having adequate disease resistance for Manitoba were recently released.

Winnipeg plant pathologists are an integral part of the breeding teams at the station, their services in monitoring changes in virulence for screening and breeding lines are well recognized. Moreover, their research, following in the footsteps of the early scientists, has made them world leaders in basic knowledge of biochemical and host-parasite interactions.

The integrated pest control section has established guidelines for control by insecticides of bertha armyworm and pea aphids; used sex attractant traps to provide a warning for bertha armyworm; identified potentially effective parasites for biocontrol of flea beetles and bertha armyworms in canola; and made recommendations for control of strawberry cutworm and red turnip beetle, a pest of canola. The stored products section has developed effective control recommendations for the safe storage of cereals, oilseeds, and their products; established guidelines for the cooling of grain bulks; identified critical moisture levels in different kinds of grain above which mycotoxin-producing fungi can become a threat; determined the incidence and distribution of grain-infesting insects and mites throughout the prairie provinces; and developed other information of both a practical and basic information for safely storing grain and canola seed.

Melfort (1935)

The Melfort Research Station serves a large productive and diversified agricultural area in northeastern Saskatchewan. At the station,

specialists in forage, engineering, pastures, soils, ruminant nutrition and cattle management work as a team. They are involved in devising energy-efficient forage production, harvesting, storage and utilization systems that are assessed by laboratory analyses and by feeding the product to beef cattle and sheep. The station conducts a comprehensive beef cow-calf management project, in cooperation with the provincial government, which includes summer pasture and winter feeding of hay. Five scientists (a cereal crop specialist, three agronomists, and a soils specialist) evaluate new varieties of cereals, oilseeds and forage crops, develop methods for weed control, and determine the effective use of fertilizers.

Since its beginning in 1935, Melfort has played a key role in the assessment of forage, cereal and oilseed crops; the management practices that optimize their growth; and developed more efficient rations based on local crops for a major productive area of Saskatchewan. The need for the station has been amply justified by the practical results obtained and disseminated to farmers.

As stated, the team approach to beef production has meant many disciplines working together to achieve practical pasture management systems for beef cattle; the adaptation and development of a European hay drying system to Western Canada; feeding systems using pasture supplemented with silage or barley; the renovation of rough pasture and determination of fertilizer required for optimum daily gain of beef cattle on such pasturage. A remote sensing system was developed by the technology transferred to Saskatchewan Lands Branch and PFRA for pasture management in Saskatchewan. This system, consisting of a combination of photographs and Landsat satellite data, provides information for pasture management in all prairie provinces and can be applied from year to year.

In crops, Melrose sainfoin, a new, non-bloating legume and Dormie, a Kentucky bluegrass variety have been licensed. Reducing summerfallow and including grasses and legumes in the rotations increased crop productivity and economic gains. Studies showed that canola, barley and wheat could be windrowed up to ten days earlier than normal, thus reducing losses from frost and shattering. Chemical summerfallowing increased yields by 10 percent over normally tilled fallow and provided excellent conditions for direct stubble seeding of winter wheat.

Results from fertilizer trials are used to develop provincial recommendations for nitrogen, phosphorous, potassium, and sulphur. Recent work showed that boron is needed for canola. Melfort pioneered the nitrate-nitrogen test for the black and grey soils of the area. The weed control recommendations and support for registration of new herbicides have been further accomplishments of the station.

Regina (1931)

The Regina Research Station is a major centre for the study of the biology and control of weeds in cultivated crops and pastures. The extensive use of herbicides in crop production creates a demand for increasingly sophisticated information on efficacy, crop tolerance, environmental persistence, and health hazards. New technology developed for biological control with insects and plant pathogens and cultural means is providing important information on alternatives to control with herbicides. In addition to the weed research programme, the station has responsibility for increase of new crop varieties developed by Agriculture Canada and for a winter plant breeding nursery in California. Cereals, oilseeds, forages, and pulse crops are evaluated for adaptability to southeastern Saskatchewan at both Regina and Indian Head. Long term agronomic experiments at Indian Head develop information for soil and crop management.

Indian Head Experimental Farm (1886), one of the original farms, has been a satellite of Regina since 1973. Early efforts of this station, established in the unsettled North-West Territories, were similar to the other pioneering stations — introduction of crop varieties and management trials for growing them; encouragement for raising high quality animal and poultry breeds; considerable foresight for beautifying the prairie farmstead; and long term study of soils and protection problems.

Cereal varieties credited to Regina include the durums, Wakooma and Wascana and Sinton hard red spring wheat. Echo rapeseed developed at Indian Head was the first named variety of Polish rapeseed to be grown in Western Canada. The seed section at Regina has increased basic seed stocks of most new varieties of cereals and forage crops produced by federal plant breeders. It operates a winter nursery in California which has expanded from using two hectares for four breeders (1946) to ten hectares and twenty-six breeders. This service, of considerable value to all plant breeders, including universities, is an essential part of the crop breeding programme for the West.

Testing of herbicides, begun in 1945, included the then recently discovered Weedone — 2,4-D. The chemical was particuarly effective against wild mustard and stinkweed and did not damage cereals. This herbicide has had a significant impact on prairie farming and revolutionized agriculture in western Canada. Spray equipment and the placement of herbicides in soils have been studied and techniques developed that have been the backbone of herbicide research in the West. From weed surveys data have been gathered which have provided accurate, reliable and timely information of weed species and populations in crops. Measures for weed control in pastures have been developed.

For the past twenty years, Regina has been the main research station in the West for the study of the behaviour, and fate, of herbicides in the

environment after their application. Thus, crop-residue studies have led to the registration of such existing herbicides as triallate for weed control in new crops that were not originally included in the initial registration. By determining the carry-over of herbicides in prairie field soils, farmers have been given information that allows them to plan courses of treatments that will minimize crop damage. The measurement of airborne herbicides, both as vapour and droplets, has led to the phasing out of the volatile butyl esters of 2,4-D and their replacement with less volatile derivatives, as well as to recommendations for more efficient spraying techniques with reduced drift potential. Long-term studies at the Indian Head Experimental Farm with repeated annual applications of 2,4-D, started in 1947, and still in effect today, have shown that crop yields and soil fertility have not been impaired after nearly forty years of continuous applications.

Biological control of weeds has been achieved with the use of insects on several weeds. Introduction of a weevil in 1968 in Saskatchewan gradually reduced nodding thistle to a minor species. Promising results have been obtained against diffuse and spotted knapweed that infests dry grasslands in British Columbia, by the release of seed gall flies and other insect species.

Saskatoon (1917)

At the Saskatoon Research Station and the Scott Experimental Farm, four research programmes are conducted. The oilseed, forage crops, and cereal programmes include research on breeding, agronomy, and control of diseases, weeds, and insects. They have the major responsibility in the Research Branch for research on rapeseed/canola and mustard. The station, along with the Lethbridge and Kamloops stations, is an integral part of the Branch's research programme on development of bloat-safe alfalfa. A major responsibility is the development of forage grasses for the northern prairies. The cereal programme is mainly concerned with reducing losses from root rot in wheat and barley, and with the breeding of utility wheats. The integrated pest management programme deals with the development of control systems for problem insects (i.e. grasshoppers, wireworms, black flies) that are not specifically restricted to any one commodity. A major objective in the programme is the minimization of our dependence on insecticides for the control of these pests.

The Dominion Entomology Laboratory, founded in 1917, provided vital information on life cycles and biology of black flies, grasshoppers and wireworms. In 1919 a Dominion Plant Pathology laboratory started working on wheat stem rust at the University of Saskatchewan. Subsequently the work was transferred to Winnipeg, when the laboratory was formed there in 1925, and common root rot was emphasized at Saskatoon. Then, in 1931, forage research was started and trials with brome and crested wheat grass pioneered the use of these species that were to become so important in the Dirty Thirties. These three units were united

with oilseeds research in 1957 to form the present Saskatoon programme. The Scott Experimental Farm, opened in 1934, carried a large testing and developmental programme for cereals, forages, and horticultural crops, especially potatoes. Now administered by Saskatoon, its programme is closely integrated with that station.

Saskatoon has produced some very notable crop varieties and has been the federal leader for the rapeseed/canola programme. Both rapeseed species were genetically modified to provide a canola seed quality with a more desirable oil for human consumption and better quality meal for livestock. In this process, stretching over a short thirty years, rapeseed has become the West's second most valuable crop. Rapeseed varieties include Golden, Oro, Zephyr, Span, Midas and Torch. Canola varieties are Candle, Tobin and Westar — the latter two covered 80 percent of canola-seeded land in 1984. Three mustards and a sunflower were also released. Eight successful varieties of forage grasses and much useful germ plasm have been released. Among these are Summit and Parkway crested wheatgrass, Carlton and Magna brome, Polara and Norgold — two of the three coumarin-free sweet clovers, Beaver alfalfa, Melrose sainfoin and Cree birdsfoot trefoil. The causes of bloat in cattle have been identified and a programme to breed a bloat-safe alfalfa is well advanced.

Building on the strength of early successes, the protection group now has control recommendations and much needed biological information on the destructive insects such as grasshoppers, wireworms, blackflies, wheat midge, bertha armyworm, and flea beetles. The biology of the mosquito species transmitting equine encephalitis was determined and a control monitoring system developed. Plant pathologists have spent several decades on common root rot of wheat and are the foremost scientists in the world in the knowledge and release of germ plasm for its control.

Swift Current (1920)

The Swift Current Research Station conducts research with a broad area of interest, serving dryland agriculture in the Palliser Triangle of the Prairies. Improvements in cereal and forage varieties and technology to increase production, utilization and economic efficiency are accomplished through a multidisciplinary approach involving breeding of cereals and forage crops, plant physiology, cereal and forage agronomy, soil microbiology, water management, salinity control, plant, cattle and turkey nutrition, agrometeorology, agricultural engineering, energy use and economics.

Swift Current's early achievements and those for which it is still recognized can be summarized under the key words: dryland grasses and legumes; soil fertility; wind erosion control; and long-term conservation of soils. More recently, cereal breeding has become paramount. In the early years, many native species of grass and legumes were evaluated.

Serious soil erosion in the 1930s spurred on the evaluation of species introduced from other countries. One of these, crested wheatgrass, proved effective in stabilizing the soil and improving the economics of range production.

More recently, beef-pasture management systems have been developed that have extended the grazing season in spring and fall, increased forage production, established the optimum use of forage in relation to nutritive value, and supplemented feeding systems to increase the efficient utilization of forages.

Swift Current research with poultry included one of the first feeding trials of an experimental low glucosinolate variety of rapeseed, Bronowski, and provided the first published evidence that rapeseed gums from the refining process could be safely blended with the meal by crushers. Recent trials have shown canola meal to be equal to other protein sources in nutritional value for young turkeys and broiler chickens.

Durum varieties released from Swift Current occupy 80 percent of the durum hectarage in Western Canada. Kyle, released in 1984, outyields current varieties by 8 percent. Solid-stemmed hard red spring wheats, such as Leader, that are resistant to attack from the wheat stem sawfly occupy over 89 percent of the area affected by this pest. Rescue, the first resistant variety, was produced by Swift Current and Lethbridge. HY320, a high-yielding semi-dwarf wheat suitable for making noodles and steamed bread, has been supported for licensing. The only winter rye breeding programme in Canada is located at Swift Current. Three varieties including Muskateer have been released with two of them occupying 30 percent of the cultivated hectarage.

The alfalfa breeding programme has successfully fulfilled the needs of the livestock producers of the Palliser Triangle for winter-hardy, drought-tolerant alfalfa. Rambler (1955), the first creeping-rooted variety, remains popular, with Roamer and Heinrichs introduced later. Varieties selected from native or introduced dryland grasses have given higher grass (and thus beef) yields per hectare, are hardier, extend the grazing season, are highly productive as hay and tolerant to saline soils. Sawki, Mayak and Swift are varieties of Russian wild rye, Orbit and Clarke are wheat grasses. Prairieland is the first variety of Altai wild ryegrass in the world.

Since the 1930s, soil scientists have worked with the factors influencing wind and water erosion. They devised new techniques for assessing changes in soils and recommended stubble mulch and tillage methods to control soil erosion. Soil physicists were among the first to establish and emphasize the low efficiency with which summerfallow stores water, compared to stubble. Optimum seeding rates were established for Brown soils and scientists showed that a fall chemical summerfallow with 2,4-D improved weed control and conserved moisture.

Research into soil fertility has led to improved fertilizer practices; demonstrated the usefulness of alternative fertilizer applications, such as residual fertilization; shown the serious consequences to soil fertility of erosion and leaching resulting from summerfallow; and proven the negative effects on soil fertility of burning cereal stubble. The eighteen-year-old crop rotation study is conducted using practical farm machinery, seed, fertilizers, etc. It has shown that producers can profitably adopt a more intensive crop production system. A three-year wheat, wheat fallow rotation, though slightly more risky, provided 24 percent more net income than the traditional wheat, fallow system.

Achievements of engineers serving at the Swift Current station are many: research carried out in 1933 fostered the use of rubber tires on farm tractors; the widely-adopted practice of windrowing wheat at 35 percent moisture without loss of quality; the forage plot harvester that is used by scientists all over the world is in its third decade of use; the self-propelled plot seeder combining the advantages of the V-belt and cone; the dryland ridger-seeder, designed in cooperation with an Indian engineer that has helped crop production in India; and the zero-till field drill now used as a standard in research units in the West.

Beaverlodge Research Station (1919)

The Northern Research Group, comprising the Research Station at Beaverlodge and the associated Experimental Farm at Fort Vermilion, Alberta, has the responsibility for research on agricultural problems of northwestern Canada. This area is broad and boundless, encompassing a wide range of soil and climate types. Agriculture varies from virginal, unsettled tracts of pasture land to the well-developed farms of the Peace River block. The station conducts its own breeding programme with cereals, forages and oilseeds and is the anchor station for the full range of cooperative testing trials for other prairie breeding programmes with these crops. The special agronomy problems associated with northern climates also receive attention, especially at Fort Vermilion. Soils research with acid soils and nitrogen-fixing bacteria are emphasized. Of special significance is the bee research programme for management and selection of hardy bee strains. Horticulture crops are an added programme at Beaverlodge.

Since its beginning in 1919, this station has promoted and served an agriculture in a constant state of development and expansion in an area with a complex, and sometimes a harsh environment. Given northern responsibility, Beaverlodge has at times administered the stations at Mile 1019, Yukon; Fort Simpson, Northwest Territories; Prince George, British Columbia; and still is the leader of Fort Vermilion, Alberta. Experiments and trials have ranged from northern Alberta to the mouth of the Mackenzie River at Inuvik. Forage crops, cereals, fruits and vegetables, ornamen-

tals and the soils and climates they grow in have been their charge. Historically, with experiments conducted on rented land beginning in 1908 and then on the current site since 1935, the Fort Vermilion Experimental Farm has played a vital role in introducing quality seeds, livestock and poultry breeds into a developing and isolated community.

Cereal and oilseed breeding programmes contributed to the licensing of Olli barley, Saunders and Park wheat, and Noralta flax. Pasture research with sheep on grey-wooded soils, reclaimed burned-over lands, and herbage from forage seed fields, were firsts. Forage breeding produced six varieties, e.g., Aurora alsike clover, Boreal creeping red fescue, and established a major national and international seed industry based on these varieties and those of foreign origin assessed at the station. Hardy crab apples, apples, the strawberry variety Protem, saskatoons, tomato varieties and ornamentals add to the list.

Research to date on acidic soils with low pH and organic matter holds a commanding priority. Acidic soils can now be farmed productively. Problems with nitrogen fixation by rhizobium have been clearly identified and corrective measures have been developed. Two efficient strains of inoculum were released in 1980. Climatology is a natural interest for this northern group.

Weed control research gave the procedures used in western Canada for cultural control of couch grass and a basic understanding of herbicides for weed control in forage seed fields.

Apiculture research has been a long term programme with emphasis in the last two decades producing new strains more suitable for cool conditions and better management practices for overwintering bees.

Lacombe (1907)

The Lacombe Research Station and the Substation at Vegreville (1955) are responsible for soil reclamation and development of cropping practices for solonetzic soils of east-central Alberta; breeding feed barley and oat varieties; developing soil fertility, soil management, weed control, cropping and management systems for cereals, oilseeds and forages grown on grey-wooded and black soils in the parklands of western Canada. The Lacombe programme also includes research responsibility for regional and national programmes in swine and beef cattle breeding; the technical research aspects of record of performance (ROP) beef cattle and swine testing programmes; major carcass evaluation research related to departmental beef and swine carcass grading programmes and assessing physical, biochemical, microbiological and sensory factors affecting beef and pork quality.

The Lacombe Station was one of the earliest of the new stations opened by the government in the expansion of the West. Like similar research

farms, the distribution of seed or animal stocks, plus knowledge on how to use these resources, were early accomplishments at Lacombe. The problems inherent in solonetzic soils led to the opening of the substation at Vegreville.

The animal programme at Lacombe has had a major impact on animal production. The station has made important technical contributions to the organization and procedures used in the National Swine and Beef Cattle Record of Performance programmes; developed and released in 1959 the "Lacombe" breed of pigs (still Canada's fastest growing breed — by number of hogs bred, or individual weight gain) for use in hybrid pork production systems; demonstrated to breeders the superiority of swine selection systems based on gain and low backfat; and showed that selection based on ROP records could improve yearling weights of beef cattle by four kg per year (in collaboration with Brandon Research Station). In cooperation with Lethbridge and Brandon, Lacombe evaluated ten hybrid cattle types (Charolais, Simmental, Limousin crossed to Hereford, Angus and Shorthorn) and identified one or more that were substantially superior under farm and short grass range conditions, to current industry standard (Hereford X Angus) for weaning weight, rate of gain, cow productivity and carcass yield.

The meats section provided the basic technical data and developed the index system for grading hog carcasses which was implemented in 1968 and provided the technical data on leanness and meat quality on beef carcasses used to establish the new beef grading standards in 1972. Both systems have been used as models around the world. It developed national colour standards and colour/structure charts to assist hog and beef graders to improve consistency and accuracy of grading for colour and quality of carcasses; extended shelf life of meat products in retail store display coolers by two to seven days by defining proper cooler and storage conditions; and defined conditions and quality standards for retailers and consumers for freezing and storage of fresh pork.

Achievements in crops include the selection of three early-maturing tomato varieties, and an apple variety. Scientists initiated and perfected the single-seed descent method of cereal breeding. From it they licensed seven oat varieties, including Random and Cascade, two varieties of barley and Park wheat. Norlac red clover was released in 1973.

The soils team established and demonstrated amelioration and improved productivity of solonetzic soils through deep plowing and use of chemical fertilizers and established the existence of soil deficiencies of sulphur, selenium, and potassium and developed recommendations for Parkland and grey-wooded soils.

Crop loss models for predicting losses from wild oats, Canada thistle and tartary buckwheat in cereals and canola were prepared by weed scien-

tists. New control measures for Canada thistle were developed. The station is a key unit for the evaluation of herbicides and results have formed the basis for the information on many product labels.

Lethbridge (1906)

The Lethbridge Research Station is the largest of the forty-four research establishments operated by Agriculture Canada. Its scientists conduct fundamental and applied research on crops, soils, and animals. Crop production and improvement deals with the breeding and genetics of twelve different species, the study of the biology and control of a wide range of plant diseases and insect pests, and the development of improved agronomic practices. Research in soil fertility, tillage, and irrigation includes studies on the physical, chemical, microbiological, and hydrological aspects of soil, and provides guidance for the maintenance or improvement of soil and water resources. In animal science, the emphasis is on efficient production of beef cattle, dairy cattle and sheep. Major research efforts involve breeding, nutrition, rumen microbiology, physiology, and reproduction in animals.

From the early decades of the century, research concentrated on improving farm productivity, helping farmers to resolve problems in soil drifting, irrigation, animal production, rangeland management, and control of wheat stem sawflies, cutworms and grasshoppers. Scientists developed higher yielding varieties and improved management of soils under irrigation and dryland farming.

The animal science section studied and evaluated the native buffalo, Brahman, and various European breeds crossed with British breeds for range production; crossbred dairy cattle for lower culling levels and fewer diseases; crossbred sheep to produce a new breed, the Romnelet; identified the causes of urinary calculi and proposed preventative measures; and identified important fertility traits that are now being used to select breeding bulls.

Notable achievements of the crop section include the release of eighteen new crop varieties, including Winalta and Norstar winter wheat, Galt and Fairfield barley, Beaver and Kane alfalfa, Chinook orchard grass, and Oxley Cicer milkvetch. This section also developed regrassing and grazing-management techniques for intensive pastures, determined carrying capacities of native rangelands and improved weed control in an irrigation water delivery system.

The soil science section developed computer-based irrigation technology for long-term soil and water management; evaluated the formulations and uses of fertilizers; defined methods for maintaining crop residues on the soil surface to prevent erosion; determined the value of sewage effluent for irrigation and fertilization of field crops; established

methods for nitrogen fixation in non-legume crops; and studied the reclamation of saline soils of Alberta.

The plant pathologists developed improved biological and chemical controls for diseases such as streak mosiac, root rot and bunt of wheat, stem nematode, bacterial and verticillium wilt of alfalfa, seedling rot and root rot of peas, ring rot of potatoes, snow mold in turfgrass, and sclerotinia diseases in oilseed and pulse crops.

In the animal parasitology section, products and methods, such as systemic insecticides and release of sterile male flies for cattle grubs, were developed for control of livestock parasites. Effective pest management practices, developed for biting flies, lice, ticks, and sheep keds, have increased the efficiency of production for cattle and sheep. Economic models have been established from new definitions of host-parasite relations in the ecology, behaviour, pathology, and immunology of animals. Research with livestock vaccines showed that livestock can be protected against animal parasites.

Research Review

The importation, distribution and encouragement for farmers to raise purebred stock of various animal breeds was an early role for the experimental farms. That action has left a heritage that is reflected in the excellent reputation of Canadian stock in international markets. While today fewer than half of the western research stations have livestock programmes, others once conducted research that is now amalgamated and concentrated at key stations.

In the past, the problems for cow-calf production on range land challenged researchers but good advice is now available for efficient management. One of the difficulties faced by western ranchers is stability of their operation. The short grass prairie provides adequate pasture under normal (optimum) rainfall. In drought cycles, feed gets scarce. The programme of regrassing areas of rangeland with introduced species such as crested wheatgrass or rye grasses, along with many years of management trials on stocking rates, has done much to stabilize cattle production on the western ranges.

The Foreign Cattle Breed Evaluation Project, started fifteen years ago, has yielded much useful information for producers who wish to cross continental European breeds with the standard British breeds. Meat research and standards for grading were a natural fall-out from the evaluation programme.

The pioneer programmes in poultry dealt with improved breeds and the distribution of stock. Nutrition and flock management were necessary areas of research. While not all the research can be credited to western stations, substantial gains in efficiency have been achieved.

The development of crop varieties has been a major objective of the Experimental Farm System since its very beginning. As soon as Dr. William Saunders, the first director, could collect seeds, he did so and sent them for trial at the newly formed stations, including Brandon and Indian Head. He knew that Red Fife wheat had good quality but it matured a week too late for use in the West. Ladoga, a Russian variety, matured earlier but failed the quality test.

In 1892, Saunders sent his sons west to make crosses between varieties growing at Indian Head and Brandon. One such cross resulted in the variety Marquis. Credit for this variety goes to Sir Charles Saunders, the son, because he made the final selection at Ottawa. But it was the performance of Marquis at the Indian Head and Brandon Experimental Farms that convinced everyone that this variety was a world beater.

Forages, vegetables and other crops were tested at the two original experimental farms and at new farms when they were formed (Lethbridge, Lacombe, etc.). Because of their importance, cereal varieties received the lion's share of testing but the cooperative trial system was followed for all crops, albeit on a different scale. The same system is in force today and includes cooperative testing for licensing as well as variety recommendations for the provinces. Disease resistance, maturity, yield and quality characteristics are noted. Plant science staff of three prairie universities cooperate in common programmes.

The canola (rapeseed) story is another contribution to Western farming. Using modern techniques and equipment for analyses, breeders have changed this crop from one that produced lubricating oil into one producing a vegetable oil suitable for salad oil and margarine. In 1950, there were less than 170 hectares grown; by 1978 there were 2.8 million hectares. Saskatoon station is the key unit for breeding canola.

In earlier sections of this article, the names of a few crop varieties developed by the research stations are given. To list and describe them all would require a small book. While not all the varieties that are licensed become universally accepted, the contribution from the research stations is impressive. In 1981, of seventy-three varieties of cereal and oilseed crops grown on twenty-one million hectares in the West, forty-five were developed by research stations, with the research station varieties being grown on 79 percent of the farmed land. Of ten million hectares of hard red spring wheat, 94 percent were research station varieties (coming from Winnipeg, Swift Current, Regina and Lethbridge); while station-developed varieties occupied 95 percent of the durum hectarage, 84 percent of the oat and 60 percent of the barley seedings.

One should not forget that ornamentals have made an important contribution to our Canadian way of life. They are particularly important for prairie homeowners because the climate limits the variety of planting that

can be used. All experimental farms had a horticulturist and although expenditures in person years in ornamental research have not been great, the beauty and attractiveness of the grounds at farms made them showplaces and encouraged homeowners to beautify their own surroundings. There has been a direct contribution to the varieties of hardy plants, lilacs, rosybloom crabapples, chrysanthemums, and many trees and shrubs as well as turf grasses. Morden maintains an excellent arboretum, known throughout North America for the variety of trees and ornamental shrubs which it has introduced and developed.

The total land area of Canada is nearly one billion hectares, but only 5 percent, about forty-four million hectares, is improved farmland. The three prairie provinces have some thirty million hectares with an additional five million in rough or marginal land.

Many mistakes were made when early settlers took up homesteads in the West. Abandoned farms are testimony to these errors. Soil surveys and careful classification have provided much-needed information for proper land use, for irrigation or drainage and for choice of crop.

When the farm service began in 1886, very little was known about the nutrient requirement of crops or the effect of fertilizers. Reports from Rothamsted, England, were just beginning to clarify the use of chemicals and the nitrogen cycle. The soil scientists worked with local soils and crops to determine and demonstrate the proper rates and dates of fertilizers for optimum crop growth.

Soil conservation is a very strong and important aspect of the research at all stations. There have been many serious drought cycles but the Dirty Thirties was by far the most devastating. Wind erosion and drought forced the abandonment of many farms and seriously impaired the productivity of the prairie area. The development of such practices as strip farming, cover crops, timely cultivation and the incorporation of straw and organic matter into crop land has reduced, but not eliminated, the wind erosion problem.

Soil agronomists started rotations, some of which are still ongoing such as those at Indian Head. Rotations are providing information for long-term stabilization and the impact of farming on organic matter, and on soil salinity. This latter condition is another constant threat to productivity on the dry plains.

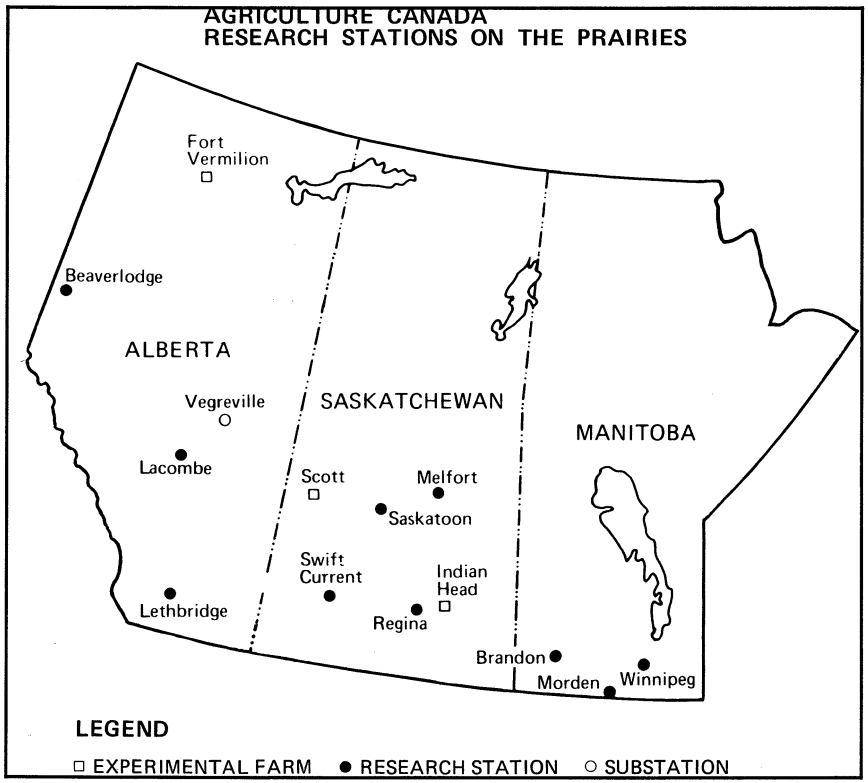
In the West, as everywhere in Canada, a great deal of effort has been placed on crop protection research, since losses from weeds, diseases and insects have been estimated to be as high as 30 percent. The pests are numerous: grasshoppers, aphids, cutworms, sawflies, army worms and other insects; rust, smut, wilts, root rots, snow mold and leaf diseases; mustard, wild oats, couchgrass, thistles of all kinds, stinkweed, and pig weed. Mosquitoes and black flies are notorious blood suckers of man and

beast. As well, there are many other ticks, worms and parasites of animals that require constant surveillance and new methods of control while maintaining a pollution-free environment.

Losses in stored products, be they grains or horticultural crops, occur regularly from insects and molds and the Winnipeg Station has been highly successful in clarifying the problem, showing causes and developing remedial treatment.

Working under the Expert Committee system of the Canadian Agricultural Services Coordinating Committee, scientists from all three disciplines of weed research, entomology, and pathology are working closely with provincial and university colleagues to reduce the potential for loss. These cooperating groups originated from the 1920s when pathologists and breeders got together to discuss mutual problems in rust research.

One of the most significant contributions made by the research stations in the past has been in contributing to the stability of crop and animal production. When crises occurred, the research stations were there to help with the finding of solutions.



Another advantage of the federal research units is the flexibility that arises because experiments can be conducted and evaluated without fear of personal loss. Individual farmers cannot command the resources necessary to breed a new crop variety, to introduce a new crop, try out a new pesticide, import new strains of livestock for breeding purposes. But local research stations can, and have done these things for the overall benefit of the farming community.

NOTE

Research station reports and newsletters are available from the specific stations.

A History of the Winnipeg Grain Research Laboratory of the Canadian Grain Commission, 1913 to 1979

J. Blanchard

ABSTRACT. In 1912 the Board of Grain Commissioners was set up under the new Canada Grain Act to regulate the grain trade in Canada. In their first annual report the commissioners recommended the opening of a laboratory to support the quality control function of their duties. The Dominion Grain Research Laboratory opened in Winnipeg during 1913 and commenced evaluating western grains for milling and baking quality as well as determining acceptable moisture levels for stored grain.

Starting from a two-man operation, the laboratory has grown to become a leading Canadian centre for the study of quality in cereal grains. Today the laboratory continues to evaluate milling and baking quality, but over the years has performed other functions that reflect the development of the Canadian grain trade.

RESUME. La Commission des grains fut créée en 1912 sous la nouvelle loi sur les grains du Canada pour contrôler le commerce du grain. Dans leur premier rapport annuel, les commissaires recommandèrent la construction d'un laboratoire afin que ce dernier les aide dans les fonctions de leurs tâches: le contrôle de la qualité. Le laboratoire de recherche du Dominion (Dominion Grain Research Laboratory) ouvrit ses portes à Winnipeg durant l'année 1913 et commença à évaluer la qualité meunière et boulangère des grains de l'ouest ainsi qu' à déterminer le niveau d'humidité acceptable pour le stockage des grains.

L'exploitation débuta avec deux hommes; cependant le laboratoire se développa et devint le principal centre canadien pour l'étude de la qualité des céréales. De nos jours, le laboratoire continue toujours d'évaluer la qualité meunière et boulangère des grains, mais à travers les années il effectua d'autres fonctions qui reflètent le développement du commerce du grain.

History of the Grain Research Laboratory, 1913-79

The Grain Research Laboratory of the Canadian Grain Commission will soon enter its seventy-fifth year of operation in Winnipeg. The scientific research done by laboratory personnel has always been shaped by the practical requirements of agriculture and the grain trade in the environment of Canada. Some of the greatest accomplishments of laboratory staff have been in the area of moisture measurement and grain drying — major concerns in a climate that often results in wet harvests. Grain Research Laboratory scientists have also made a contribution in the development of varieties of grains suited to prairie growing conditions. The changing weather conditions present grain inspectors with tremendous variations in grain quality, so that they have had constantly to call upon laboratory staff for help in assessing each new crop. Since 1927 the laboratory has been making yearly assessments of the quality of each crop and publishing the results. This information has been a valuable aid to marketing. This article will trace the history of the laboratory with a narrative of the main events followed by examinations of several of the laboratory's more important functions.

The main sources of information about the laboratory are its own annual reports[1] and those of the Board of Grain Commissioners, which became the Canadian Grain Commission in 1970.[2] The reports of the meetings of the Associate Committee on Grain Research and the committees which have succeeded it are also valuable sources because of the involvement of the laboratory in the work of these committees.[3] T.R. Aitken wrote a history of the laboratory to 1939[4] and Dr. G.N. Irvine's study of grain

grading contains a wealth of information about the history of the laboratory.[5] Dr. A.A. Anderson was kind enough to allow me to read the chapter of his unpublished memoirs which deals with his years at the Grain Research Laboratory.

The Grain Commission and the Grain Research Laboratory had their origin in the turbulent first decade of this century. They were part of the response to pressure from organized farmers to solve specific problems which came to a head at that time. In order to understand the work of the laboratory, therefore, it is necessary to understand a little bit about the conditions in the West at the turn of the century.

The Canadian prairies were almost the last of the great wheat producing/exporting areas of the world to be brought under the plough. Immigrants flooded into the West in vast numbers. Over five hundred thousand settlers arrived between the census years of 1901 and 1911. They broke millions of acres and planted wheat, quickly making it a major export crop. By 1912, the year the Board of Grain Commissioners came into being, wheat exports earned $62 million, making wheat the single most important item in foreign trade that year.[6]

This immense and rapid growth put a heavy burden on the grain handling system. There was a good deal of friction between the producers and the trade — the buyers, forwarders and exporters of grain. The producers, through their organizations, registered their grievances concerning a wide range of problems. The Liberal government of Wilfrid Laurier was inclined to listen to this rapidly growing constituency and responded to complaints by setting up a number of Royal Commissions and inquiries. The findings of these investigations resulted in a large amount of regulatory legislation which found its final form in the Canada Grain Act of 1912. This act consolidated the previous laws and established the Board of Grain Commissioners to arbitrate in case of problems and to provide an inspection service.

One aspect of the industry that led to controversy among the producers and the trade was the grading system. The Canadian industry, unlike most others in the world, developed as a bulk shipping industry. Grain was and is shipped in bulk instead of in bags and is classified into grades which are defined in terms of various physical characteristics of the grain. These definitions have developed over the years since the early nineteenth century. Weight per bushel was the first factor to be used in legislation as a means of differentiating grades. Later on other criteria were added, such as colour and plumpness and the presence of varieties of proven quality. In the 1920s moisture content, and in the 1970s protein content, came to be used as elements in grading.

The Canadian system, administered by grain inspectors, allows individual lots of grain of one grade belonging to many shippers to be bulked

together in a single lot for export. This provides Canada with the most economical means of moving grain quickly over long distances from the producing areas to the customers abroad.

The main disadvantage of the system, as it existed in the early 1900s, was the possibility that grades would not always precisely correspond to the commercial value of the grain. Factors like protein and moisture content could not be accurately assessed by visual grading alone and there were as yet no practical ways to measure them. Both factors can, however, greatly alter the end use quality of the grain. On the other hand, some visual blemishes may not greatly lower the value. For example, bleached grain was assigned a lower grade even though bleaching did not always lower the end use quality.

There was widespread dissatisfaction over this weakness in the grading system and laboratory testing of grain was seen as a means of obtaining a more complete picture of grain quality. One of the questions that the 1906 Royal Commission on the Grain Trade set out to answer was whether wheat that had been degraded because of bleaching was really less valuable for producing bread. This was an important issue for farmers who received a lower price for wheat which was degraded because of bleaching. A sample of bleached wheat was tested for milling and baking quality in a laboratory and found to produce acceptable flour and bread. These results were used as the basis for an attack upon the grading system.

At the 1908 conference held to discuss the Royal Commission's report, farm leader E.A. Partridge commented:

> The Royal Commission demonstrated that No. 1 Hard wheat and No. 2 Northern wheat may be produced from the same field, the difference in value and grading being occasioned by bleaching as the result of a rainstorm, and in the instance to which I have reference, the difference in value as brought out, was equal to 4 cents a bushel, although No. 2 Northern was, on test, found to be a better wheat than the No. 1 Hard. A grading system which contains these anomolies is most imperfect and rudimentary.[7]

There was clearly a place in the Canadian grain industry for a laboratory to support the inspection service. Laboratory tests were recognized as a way of securing a more accurate assessment of quality. What developed in the years after 1912 was a system in which the research laboratory worked side by side with the Inspection Division, giving the inspectors laboratory support when it was required.

The Grain Research Laboratory from 1913 to 1979

In his first annual report, for 1912, Robert Magill, the Chief Commissioner of the Board of Grain Commissioners, asked that a grain research laboratory be established. A year later, in December 1913, Dr. F.J. Birchard, a Canadian who was then employed by the United States Department of Agriculture in Washington, was appointed Chief Chemist of the proposed laboratory.

While it had first been proposed to locate the laboratory on the Campus of the Manitoba Agricultural College in Fort Garry, the facility was installed, in June 1914, on the second floor of Postal Station B on the corner of Magnus Avenue and Main Street. The facilities consisted of an office for the chemist, a secretary's office, a balance room, a large general and analytical laboratory, a bake room and a stack room for journals. In the basement was a mill room, a store room for supplies and a sample room.[8]

In his 1913 annual report, Commissioner Magill had laid out the programme he wished the laboratory to follow. This blueprint was divided into three main areas — moisture testing, the oil content of admixtures found in flax, and the milling and baking quality of "all grades of Canadian wheat." Magill continued that he might appear to be ignoring

> the profounder scientific problems about the constitution of the grains, which an expert chemist might be expected to investigate....
>
> In reply to this, one can only say that the data supplied by the series of experiments referred to would be valuable for purposes of administration of the Grain Act, and not only that, but that the experience and results deriving from such experiments are absolutely necessary to the chemist before proceeding to the more profound research work....[9]

In December 1919, Birchard issued a seventy-four page report on his endeavours over the past six years. At the end he listed twenty-three special reports that had been submitted to the minister, the chief inspector and others during that time. The subjects covered a wide spectrum from routine tests on the quality of the various wheat and flax crops, to special studies on moisture content.[10]

In 1918, their studies on moisture took Birchard and his assistant A.W. Alcock outside Canada — the first of many foreign trips for laboratory employees. The Panama Canal had been opened in 1914 and this provided farmers in the western prairies with an alternative to the Thunder Bay route in shipping their grain. It was felt, however, that the steamy climate of the Panama would damage grain shipped from Vancouver via the Canal to Europe. The Minister of Trade and Commerce decided, therefore, to have the "laboratory make as thorough an investigation as possible as to the feasability of this route."

A.W. Alcock left Vancouver, therefore, on 3 December 1917, aboard the freighter *War Viceroy* and arrived in England in early 1918. He was met there by Dr. Birchard.

The results of Alcock's monitoring during the voyage and examination of the cargo upon unloading indicated no more damage than would have occurred during an Atlantic crossing. The laboratory's report was an important step toward opening up the port of Vancouver and the Panama route to the Canadian grain trade.[11]

On the question of quality of the various grades of wheat, Birchard had, by 1919, made good progress. He stated the problem very clearly in 1920:

> The question has often been discussed as to whether the present system of grading is justified and also if the prices which prevail for the different grades bear a direct relation to the actual value of the grain.[12]

Dr. Birchard the scientist was attempting to answer these questions, but by speculating about the grading system, which was the basis of the grain trade, he inadvertently became involved in what were later called "violent disputes on the relationship of grades, quality and value between the trade and the chief chemist."[13] The organized farmers and the Progressive party members of the House of Commons were embroiled in a number of disputes with the grain trade at this time. Birchard became a minor figure in this conflict, taken up by some farm representatives as "scientific" proof that the system was unfair to them.

In 1923 the controversy became so heated that the Minister of Trade and Commerce, the Honourable T.A. Low, closed the laboratory. The staff of four was obliged to resign. Birchard, however, was employed in the so-called "inside civil service" and could therefore not be dismissed except for very serious offences.

T.R. Aitken, who worked for Birchard at this time, wrote:

> It was the minister's hope that this controversy would bring about the chief chemist's resignation and that a successor would be appointed who would be willing to work in closer harmony with the milling industry and the grain trade: the laboratory would then be re-opened with a new head.[14]

In the event, Birchard did not resign but stayed on, continuing his work in his empty laboratory, helped only by T.R. Aitken who worked for a time without salary. Dr. Birchard was not, however, forgotten. Questions were asked in the House by some Progressive members and they were told by the minister that a final decision on the case would have to wait until the Royal Commission on the Grain Trade had issued its report.[15] When the Commission's report came out, it contained a recommendation for the re-establishment of the laboratory with a "well-trained staff." The work of such a laboratory was held to be essential if Canada was to maintain its "position as a grain growing and grain exporting country."[16]

This recommendation resulted in a new section in the 1925 amendment of the Grain Act, describing the role of the laboratory. Section 79 gave legal sanction to the work of the laboratory for the first time and acknowledged the growing significance of cereal chemistry to the functioning of the board. The Minister turned to the newly created National Research Council for guidance as to what exactly the chief chemist and his staff would do. The council responded by establishing a special committee which grew into the Associate Committee on Grain Research. This committee, which came to be the coordinating body for grain research

at the prairie universities, the Department of Agriculture, the National Research Council and the Grain Research Laboratory has accomplished an immense amount over the years. After 1970 the committee was transferred to the Department of Agriculture under which it now functions. At its first two meetings the programme of the Grain Research Laboratory was discussed.

The laboratory was moved from the Magnus Avenue location to new quarters in the Grain Exchange Building in May of 1927. It was thus in the same building as the rest of the board's Winnipeg offices. The laboratory occupied rooms on the eighth floor and there were a mill room and sample room on the ground floor. It was to remain in these quarters, expanded several times, until 1973, when it moved to the new building at 303 Main Street.

Dr. Birchard's last important contribution was made in 1932, the year before his retirement, when he and Aitken went to the International Bread Conference and exhibition held in the spring in Bologna. They set up a display which demonstrated the quality control work of the laboratory and promoted the idea of using Canadian wheats in blends with European wheat. Birchard presented a paper on this subject at a congress in Rome at the same time. He also visited bakeries in Italy and some countries in northern Europe to demonstrate the benefits of using Canadian wheat in blending.

In July 1933, after twenty years on the job, F.J. Birchard retired. Between July and October T.R. Aitken was the acting Chief Chemist and in the latter month Dr. W.F. Geddes was appointed to the job. Geddes had been head of the Department of Agricultural Chemistry at the University of Manitoba and was already familiar with the work of the laboratory through having served as a member of the associate committee.

The Grain Research Laboratory's connections with other institutions were greatly strengthened by Dr. Geddes, who was involved in many aspects of cereal chemistry. He was the secretary of the Associate Committee on Grain Research, secretary of the subcommittee on methods and chairman of the subcommittee on flax studies. He was given a clerical assistant by the associate committee and he wrote in 1934 that the laboratory was "now closely associated with the work of the Associate committee."[17]

In 1934 a long tradition of educational work began when two graduate students — Harald Johannson and Lois Sellars — began to carry out their thesis research at the Grain Research Laboratory. The increased emphasis on research is demonstrated also by the publication that year of thirteen scientific papers.

The transfer of the Durum Research Laboratory from the University of Manitoba to the laboratory was another important consequence of Dr. Geddes's arrival. This section, with durum milling and macaroni testing equipment and a spectrophotometer for studying pasta colour, had been

funded by the associate committee and this continued for some time after the move.

To support the regular work of the laboratory, Geddes installed a dark room and a machine shop, making the organization more self-contained. Over the years the machine shop was to play a major role in repairing equipment and especially in developing new equipment.

In November of 1938 Dr. Geddes resigned after a relatively short stay of five years. He went to the University of Minnesota to become Professor of Agricultural Biochemistry. Although his stay was short it was Geddes who moved the laboratory away from the problems of the past and brought it into a close working relationship with national and international colleagues. He also laid the foundation for the programme of applied research upon which his successors have so ably built. Dr. Geddes stayed in the United States and became a citizen. He was very active in the American Association of Cereal Chemists (AACC) as President and as editor of its journal, *Cereal Chemistry*. He was the recipient of the AACC's prestigious Osborne Medal.

T.R. Aitken was again acting Chief Chemist from the time of Geddes's departure in November of 1938 to the appointment of Dr. J.A. Anderson in June of 1939. Dr. Anderson had been in charge of the National Research Council's Barley Research Laboratory in Ottawa before coming to Winnipeg and so, like Geddes, he was no stranger to the work of the laboratory when he arrived.

The outbreak of the war marked the beginning of a period of hiatus in the development of the laboratory. The essential programmes were maintained — the protein surveys, the quality testing of each crop and of new varieties and the moisture measurement programme — but research all but stopped. With many staff or potential staff in the armed forces or engaged in war work, the laboratory was functioning with a reduced staff. The percentage of women staff members rose to about 50 percent during the war as women stepped in to do jobs traditionally done by men.

On the national scene the National Research Council ceased to do grain research in Ottawa, transferring staff to war work. The Council's Malting Laboratory, started at the University of Manitoba and funded by the Council since 1937, was moved to the Grain Research Laboratory in 1942. The Council continued to pay the staff of this laboratory until 1946 when the board took them over. With the malting laboratory came Dr. W.O.S. Meredith who filled in in a great many capacities in the laboratory during the war years, working on statistics and the protein survey as well as his barley research work.

During the war large crops and a lack of customers led to vast carryovers of grain. Immense storage annexes were built at the lakehead and at country points to house the excess grain. This presented the laboratory

with a unique opportunity to study the effects of long-term storage of grain in bulk. An entomologist, Dr. B.N. Smallman, was also added to the laboratory's staff to study the control of the various insect pests that became a problem during prolonged storage. Since then the board has always had an entomologist on staff.

Dr. Anderson has been described as a developer of people, equipment and ideas. With the end of the war he was able to embark upon a programme of development and expansion. In 1945 he presented a long-term plan which was approved by the board. This was to eventually involve a number of enlargements of the laboratory's physical space and the upgrading of equipment which had been given a low priority during the war. Perhaps most important, Anderson wanted to hire new people and see that they received the training they needed.

By 1948 he had brought the staff back up to full strength. Their training was done either in the laboratory or at universities where they went on leave of absence. G.N. Irvine, who was to succeed Anderson as chief chemist, was hired after the war and then given time to go to McGill to complete his doctoral studies. Many others, including Dr. W.O.S. Meredith, Dr. W. Bushuk, Dr. E. Bass and Dr. J. Dempster earned their doctorates while on leave from the laboratory during the postwar years. The subsequent strength of the laboratory's research programme demonstrated the wisdom of Anderson's policy.

Dr. I. Hlynka was one of the most distinguished scientists recruited by Dr. Anderson. During his time at the laboratory Dr. Hlynka was recognized as a world leader in dough rheology research and he was awarded the AACC's Brabender and Osborne medals for his work. He was an extremely prolific writer, producing a large number of scientific articles during his career.

Technical staff were also developed while working at the laboratory. Anderson had the rare ability to recognize skills and then to make it possible for people to put their skills to work. Two men who started as technicians in the laboratory later became secretary of the Board of Grain Commissioners. These were K. Hlynka and V.G. Martens, who was also to be the first director of the Canadian International Grains Institute. Another technician, H.E. Rasmussen, helped to design and build a great deal of the equipment used in the laboratory during the 1950s, including prototypes for the Model 919 grain moisture meter which is now the standard moisture meter used throughout Canada. R.H. Kilborn, who has been awarded the Brabender Medal for his work in cereal chemistry, was also recruited by Dr. Anderson.

Although his predecessors had all done some travelling, Dr. Anderson was the first chief chemist to make yearly visits to foreign countries to promote the purchase of Canadian grains and oilseeds. In addition to

traditional markets like the United Kingdom and Western Europe, Anderson travelled to new market areas like China and Indonesia, as the technical expert in delegations made up of Wheat Board representatives, members of the Board of Grain Commissioners and the board's chief inspector.

In the 1950s and 1960s the National Research Council did four studies of the laboratory at the request of the Board of Grain Commissioners. These studies were Dr. Anderson's idea and they cost the board nothing. They were an opportunity for Anderson and his successor, Dr. Irvine, to report on the work of the laboratory to a group of scientific peers. The review committees usually supported the work that was being done and recommended more support and space where it was needed. Through this vehicle of the review committee a number of additions to space and staff were achieved and new duties were added to those already done by the laboratory.

The 1950s also saw the first of many foreign scientists come to study in the laboratory. In 1955 two Pakistani students spent a year in Winnipeg on a Colombo Plan grant. Subsequently, the first of a long list of postdoctoral fellowships was awarded by the National Research Council to Professor Hiroshi Matsumoto of Osaka Women's University. He worked in the laboratory from mid-1957 to mid-1958. In the years since many distinguished researchers have followed Dr. Matsumoto, making important contributions to their fields and strengthening the bonds of goodwill between Canada and other countries. It is interesting to note that two of the postdoctoral fellows, Dr. K.H. Tipples, the present director, and Dr. P.C. Williams both came to join the staff following completion of their fellowship studies.

In 1961 the laboratory became further involved with the work of the Wheat Board when the board opened its Technical Services and Market Research Department. Dr. Irvine was loaned to the Wheat Board to head the department. The Wheat Board began to hire grain technical officers who were fluent in various languages and whose job it was to sell grain. As a part of their indoctrination they received in-depth training at the Grain Research Laboratory in the areas of quality and its measurements. The department also did studies on the performance of Canadian grains in a wide variety of milling and baking techniques, attempting to reproduce the methods used in customer countries.

In 1962 Dr. Anderson left the laboratory to become director of the Winnipeg Research Station, and, a year later, the Director General of Research for Agriculture Canada. During his years as chief chemist the laboratory had become the Canadian centre for the study of grain quality. The staff increased threefold in size and the level of education rose. He carried on the work of Geddes in firmly cementing the ties which bind the laboratory to the agricultural research community in Canada and the rest of the world. He was, for example, one of the founders of the International Association of Cereal Chemists and its second president. He was

also president, like Geddes, of the American Association of Cereal Chemists and a recipient of the association's prestigious Osborne Medal.

In October of 1962 T.R. Aitken retired. "Tim" Aitken had served as a chemist in the laboratory since 1922, specializing in milling and baking. He came to be responsible for much of the work of evaluating the western wheat crops and new varieties. He has left behind a substantial body of work in his many scientific articles. He lives on, too, in the warm memories that many staff members still have of him.

Early in 1963 Dr. G.N. Irvine, who had begun working in the laboratory in 1945, was appointed director of the laboratory. Under Dr. Irvine the laboratory's contribution to market development was greatly increased. He and members of his staff spent part of each year overseas, providing technical support for Wheat Board sales efforts. In 1965 a technical services section was added to the laboratory. Its purpose was described as being:

> ...primarily for applied research studies on problems encountered in the milling and baking industries in countries that are current or potential markets for Canadian wheat....[18]

In 1965 the National Research Council did a fourth and last review of the work of the laboratory and recommended, among other things, the establishment of a pesticide residue laboratory. This unit was set up to monitor pesticide residues in grain — a problem that was becoming more of a concern to foreign customers with the increased use of chemicals by Canadian farmers.

In 1970 work had begun on the new Grain Commission Building at 303 Main Street and preparations were being made for the transfer of the laboratory. After forty years of being overcrowded the laboratory would occupy four whole floors of the new building.

In 1971 the Oilseeds Quality Control section was opened in the laboratory. It was a response to the rapidly increasing importance of oilseeds like rapeseed in Canadian agriculture. In the early years its main function was to test shipments so that high erucic acid varieties of rapeseed could be segregated from newer varieties with less erucic acid. This substance had been shown to be harmful to animals and this knowledge had caused problems in marketing rapeseed. In 1975 Dr. J.K. Daun became head of this section and a research programme has developed to study quality measurement of oilseeds.

In 1978 Dr. Irvine retired, having devoted his entire working life to the Grain Research Laboratory. It was Irvine who made the laboratory an institution of international stature through his extensive travels to foreign countries. In his early years with the laboratory he pioneered new methods of testing the quality of small amounts of durum wheat. In 1955 he took over as head of applied wheat research and as has already been discussed,

he became, in 1960, the director of the Wheat Board's Technical Services and Market Research Department.

With the appointment of Dr. K.H. Tipples as director in 1979, this account of the laboratory's history comes to an end. It now remains to look at several specific topics and briefly describe the laboratory's role in each case.

Moisture Testing

Some of the laboratory's most important contributions have been in the area of developing methods for measuring moisture in grain. It is natural that the laboratory should work in this area because wet harvests are a frequent event in western Canada and moisture can result in damage to grain which will decrease its end use quality and create problems in its grading.

In his first annual report, for 1912, Dr. Magill wrote much about moisture because the harvest of that year had been wet. In 1913 the board took a forward step and installed moisture testers in some inspection offices. Up to that time the inspectors estimated moisture by "eye, nose and touch" and by chewing the grain. The meter installed was the Brown Duval, which was to be used as standard equipment for the next thirty-five years. Simply having the machines installed in some offices was not sufficient since the inspectors had only the maker's instructions as a guide. Magill wanted Dr. Birchard to take control of the moisture testing, checking the meters, instructing the staff in their use and comparing the results of the meters in the field with results obtained in controlled laboratory conditions. This work is still part of the Grain Research Laboratory's responsibility today.

Magill also wanted to know:

> What percentage [moisture] should the grain carry safely in store, what percentage should grain carry in order to be fairly graded as tough, damp or wet — these are questions about the standards of moisture content about which there has been little investigation anywhere, and none in Canada on a sufficient scale. The time has come when such investigation must be attempted.[19]

Birchard's work over the next few years helped establish standards in these areas which still hold today.

Birchard also began the long search for a replacement for the Brown Duval tester. This involved evaluating a great many electrical meters which were easier to use and more compact. For a time the Tag Hepenstall resistance meter was used to do part of the moisture testing work. In the early 1950s the 919 meter, developed by Harold Rasmussen, a former employee of the laboratory, began to be used in some inspection offices. In 1959 it was chosen to replace the Brown Duval tester as the official meter of the Inspection Division. It was also widely adopted by the grain trade for use in elevators.

The laboratory has continued to be involved with research in grain drying. Wet harvests like those of 1951 and others in more recent years have seen the laboratory involved in monitoring the effect upon quality of farm grain drying.

Protein Segregation

Canadian red spring wheat of the top two grades has, since 1970, been segregated on the basis of protein content at the time from boxcars at the seaport terminals. The protein content, expressed as a percentage figure, is included as part of the grade designation for wheat exports. Customers who are willing to pay the extra price can thus purchase wheat of certain guaranteed levels of protein content.

The idea of using protein as a grading factor is not a new one. It was first discussed in the 1920s when the Agriculture Committee of the House of Commons heard extensive testimony on the subject and the Associate Committee on Grain Research of the National Research Council studied it. After two years of expert testimony and study, it was decided that the plan was not feasible. There were a number of difficulties which could not be overcome in the late 1920s — the cost of doing thousands of protein tests using the complex Kjeldahl method, the impossibility of passing the premiums paid on to the farmers, and the general disruption in the trade many felt would result.[20]

The matter was raised again in 1950 when Dr. Anderson outlined in a number of speeches how the segregation might be done. He was, however, instructed by the board to drop the matter — the time was not yet ripe. Dr. Anderson was heavily involved in the 1960s when the present protein segregation system was being developed. His last contribution was a massive statistical study of protein grading done in 1969 and 1970, several years after he had left the laboratory.

During the 1960s preparation began for a major revision of the Canada Grain Act — something which had not occurred since 1930. It was felt by board staff and others that the time had come to include protein content as part of the grading system. There was increased demand for assured protein content from Canada's customers and the United States was offering wheat of guaranteed protein levels. Protein segregation, as it was implemented in the 1970s, does not conflict with the grading system but acts as a further refinement once the grades of one, two and three Canada Western have been assigned. Using protein segregation Canada can offer 1 C.W. wheat with a protein content of 13.5 percent or a protein content of 14.5 percent.

The laboratory's role in this programme was to explore methods of measuring protein content that would be fast and reliable and simple enough to be used by terminal elevator personnel without scientific training. The

traditional wet chemistry Kjeldahl method did not satisfy these criteria. The laboratory, therefore, began to test various alternative methods and by 1974 the Automated Digital Analyzer made by Neotec Instruments was chosen. Laboratory staff worked with Neotec to modify the instrument for the specific purpose at hand. The Kjeldahl laboratory is still used on a continuing basis to check the accuracy of the new instrument.

Variety Testing

Variety testing is the last programme that will be examined in detail in this article. The development of new varieties of grain by Department of Agriculture plant breeders has been and must continue to be a constant process. Diseases change over time and new varieties, resistant to the new diseases, must be produced. There is also an endless search for varieties with higher yields, shorter growing periods, better end use qualities and for grains and oilseeds suited to the needs of new markets.

The role of the Grain Research Laboratory in this process is to participate in the quality testing of promising new varieties, once the breeders have done the highly skilled work of making the original crosses and eliminating the many strains that do not seem to have desirable traits. In the early years such testing was done on demand for breeders. With the establishment of the Associate Committee on Grain Research in the late 1920s the conditions existed for a more coordinated programme of testing. Such a programme was achieved in the early 1930s and continues to this day.

The need for a cooperative system of variety testing was underlined during the 1920s and early 1930s by the controversy over Garnet wheat. Garnet was a spring wheat variety developed by the Department of Agriculture's Cerealist, L.H. Newman. It had been tested by the Department and declared to be equal in milling and baking quality to the benchmark variety Marquis — that is, it was considered it to be eligible for inclusion in the top grades of wheat. Agronomically it was a good wheat for the northern prairies because it matured early and escaped the frost and it came to be grown over a wide area.

The problems arose when the Inspection Department, on the strength of milling and baking tests done by Dr. Birchard, decided that Garnet was not equal to Marquis and should be excluded from the Number One grade. Canadian millers concurred in this assessment and refused to buy Garnet. There ensued an at times heated controversy between the factions. The matter is dealt with in some detail by Dr. Irvine in his book. He writes that one of the results of this debacle was that everyone involved realized the necessity of coordinating the work of variety testing. Dr. Irvine says:

> There continued to be differences of opinion within the committee from time to time, but these usually were resolved by additional tests or new research programs.[21]

In marked contrast to the Garnet case was the cooperative development of Thatcher, a rust resistant variety that was ready to be marketed in 1938. Geddes contributed to the promotion of this new wheat with a pamphlet "Quality Characteristics of Thatcher Wheat" and by going to Europe with the first shipment to answer questions about quality. The system has continued to work well.

NOTES

1. Canada. Department of Trade and Commerce, *Report of the Dominion Grain Research Laboratory, Winnipeg* (Ottawa: King's Printer, 1920).
2. Canada. Department of Trade and Commerce, *Report of the Board of Grain Commissioners for Canada* (Ottawa: King's Printer, 1913). In 1960 the Board was transferred to the Department of Agriculture and in 1970 its name was changed to the Canadian Grain Commission.
3. Canada. National Research Council, *Proceedings of the Meeting of the Associate Committee on Grain Research*, 1926. The committee is at present under the Department of Agriculture and has been divided into a number of Expert Committees on Grain Breeding, Grain Quality, etc.
4. T.R. Aitken, "The Board of Grain Commissioners for Canada Grain Research Laboratory 1913-1938" (unpublished manuscript in Canadian Grain Commission Library, October, 1962).
5. G.N. Irvine, *The History and Evolution of the Western Canadian Wheat Grading and Handling System* (Winnipeg: Canadian Grain Commission, 1983).
6. *The Canada Year Book 1915* (Ottawa: King's Printer, 1916), 146-69.
7. *Report of the Proceedings of Grain Conference held from 31 March to 3 April 1908* (Ottawa: Government Printing Bureau, 1908),23. This issue was often raised at the time: see *Report of the Elevator Commission of the Province of Saskatchewan 1910* (Regina, Government Printer, 1910), 20. Clarence Piper, a Director of the Empire Elevator Company, made the same complaint and wrote that "A system based solely on milling tests would correct this, but would probably be very difficult in application." See C.B. Piper, *Principles of the Grain Trade in Western Canada* (Winnipeg: Empire Elevator Company, 1913), 34.
8. Aitken, "Board of Grain Commissioners," 8.
9. *Report of the Board of Grain Commissioners,* 1913, 84.
10. *Report of the Dominion Grain Research Laboratory* (Ottawa: King's Printer, 1920).
11. Canada. Department of Trade and Commerce. Dominion Grain Research Laboratory 1931, *Report of a Trial Shipment of Wheat from Vancouver via the Panama Canal to the United Kingdom* (Ottawa: King's Printer, 1931).
12. *Report of the Dominion Grain Research Laboratory,* 1920, 21.
13. *Report of the Grain Research Laboratory,* 1963, 3.
14. Aitken, "Board of Grain Commissioners," 17.
15. Canada. House of Commons. *Debates*, 11 June 1924, 3079.
16. *Report of the Royal Grain Inquiry Commission* (Ottawa: King's Printer, 1925), 60.
17. *Report of the Dominion Grain Research Laboratory,* 1934, 5.
18. *Report of the Grain Research Laboratory,* 1965, 17.
19. *Report of the Board of Grain Commissioners,* 1914, 82.
20. Canada. House of Commons. Select Standing Committee on Agriculture and Colonization, *Minutes and Proceedings of Evidence and Report* (Ottawa: King's Printer, 1928 and 1929).
21. Irvine, *History and Evolution*, 62.

The Ranching Industry of Western Canada: Its Initial Epoch, 1873-1910

Sheilagh S. Jameson

ABSTRACT. The story of the ranching industry of Western Canada is a fascinating and significant segment of our heritage. Many historians have regarded range development on the Canadian side of the border as an expansion of the American "wild west" frontier, but on the contrary it was, according to Western Canadian history specialist, Dr. David Breen, one of the main bulwarks of the British tradition in the southwestern prairie region. This paper deals with the national importance, economically, socially and politically, of the early cattle business in the West, and seeks to reveal something of its unique quality during its initial dramatic period, and of the character of the men who piloted its course. To accomplish this some details, perforce limited, of a selected number of the early ranches and their founders and operators are given. The time frame under discussion, 1873-1910, is short because the fundamental importance of the early era warrants this coverage.

RESUME. L'histoire de l'industrie des fermes d'élevage dans l'ouest canadien est une partie importante et captivante de notre héritage. La plupart des historiens ont considéré le développement de ces étendues comme une expansion de la frontière de "l'ouest sauvage" américain sur le sol canadien. Mais ce fut selon Dr. David Breen, spécialiste en histoire de l'ouest canadien, un des remparts principaux de la tradition anglaise dans les régions du sud ouest des prairies. Cet article traite du début du commerce du bétail dans l'ouest, d'un point de vue national et sur le plan économique, social et politique. Il tente aussi de mettre à jour des faits d'une qualité unique, sur les débuts de cette période dramatique et sur le tempérament des hommes qui ont mené cette entreprise. Quelques détails, nécessairement limités, sont donnés à partir d'un échantillon choisi parmi les toutes premières fermes d'élevage, leurs fondateurs et leurs dirigeants, afin de soutenir cet article. La période discutée, 1873-1910, est courte car l'importance fondamentale du début de cette époque justifie cette étude.

The story of ranching in Western Canada is a truly important segment of our nation's history. It has been dismissed, quite wrongly, by some as a replica of America's wild west; for others it embodies something of the romanticism of bygone years — a nostalgic feeling for the freedom and appeal of the ranching era as expressed in the Calgary Stampede and other rodeos. Certainly the days when the range was open and the cattle barons ruled may truly be regarded as the most romantic era of the West's history, but it is also one of special significance. It had an important economic, political and social impact on Canada as a whole. Only in recent years has the extent of this impact been explored by historians and some recognition given to the importance of the early ranching industry.

The first breeding herd of cattle to be introduced into the West's major ranching region, southern Alberta, paradoxically came from the north. In October 1873, Methodist missionary Rev. John McDougall and his trader brother, David, drove eleven cows and a bull from Fort Edmonton to the Stoney Indian Mission at Morleyville in the Foothills region on the Bow River. During the following year the North-West Mounted Police (NWMP) brought some 235 head of cattle, beef animals and draught oxen, on their trek West. The police created the beginning of a Western market for beef and milk and foremost among those who took advantage of this opportunity was Joseph McFarland who, in 1875, drove a herd from Montana to the vicinity of the Fort Macleod post. That same year a trader named John Shaw came from the Kootenay area with a herd of 456 cattle, bringing them up the Foothills to Morleyville. On finding a police post at Fort Calgary and activity at the Hudson's Bay Company posts on the Bow and

Elbow Rivers, he abandoned his original plan of trailing his herd to the Company's establishment at Fort Edmonton and wintered them at Morley.

Following this beginning various traders, most notably George Emerson and Tom Lynch, brought herds north from the western states, the flow increasing as the 1870s progressed. During these years various obstacles to ranching were removed and prospects for development of a full-scale industry deepened. In 1877 with the signing of Treaty Seven the Indians of the Blackfoot Confederacy, no longer free roaming owners of the land, were assigned reserves. Then by 1879 the buffalo were gone and the grasslands of the West were ready for great herds of cattle. The Mounted Police presence with the establishment of law in advance of settlement was an important positive factor in the country's development at this time. In addition the police, with their increasing demand for beef and for horses for patrol work, provided a good share of the growing local market. Another source was the government's need to purchase beef for the Indians to alleviate the starvation wrought by the extermination of the buffalo. In an attempt to encourage the Indians to adopt a new way of life and at the same time to reduce the cost of purchasing beef, the government in 1879 established two farms or ranches, one near Calgary and the other in the vicinity of Fort Macleod. The enterprise met with limited success and it was still necessary to purchase large quantities of beef for delivery on the reserves.

From the beginning the relationship of the Mounted Police with the ranching industry was of particular significance. At the time of its inception and during its early formative years the police provided the infant stock business with protection and encouragement. A further stamp of approval came as a substantial proportion of members of the force, men in a unique position to assess the potential of the situation, joined the ranching fraternity. From 1877 onward those planning to make this move on the expiration of their three-year term of service purchased cattle from the herds that were driven north. Indicative of their involvement in the stock business during its primary years is the fact that the first three brands registered in the North-West Territories were issued to policemen, namely Inspectors P.R. Neale and S.B. Steele, jointly, on 29 January 1880, Superintendent W. Winder, 19 March 1880 and Inspector C.E. Denny, 22 April 1880.

Superintendent William Winder of the Mounted Police, generally known as Captain Winder, is credited with filling a special promotional role in the development of the Western cattle industry. He was a native of Lennoxville, Québec, and when accorded a period of leave in 1879 he spent it in his home area in the Eastern Townships. Here he discussed with the wealthy professionals, merchants, businessmen and farmers who were his friends and associates, the financial possibilities and the appeal of the rolling acres of free grasslands in the West, pointing out that an

incipient ranching business was already operating in the Alberta Foothills with promising success. He advocated the formation of large cattle companies, a suggestion that was in accordance with reports of the North American stock situation which were emanating from Great Britain and the United States. During the late 1870s a roaring cattle business in the American West, based to a large extent on rocketing export sales to Britain, had sprung into existence. Stories of fabulous fortunes to be made on the Western range lands had resulted by 1879 in a range boom, and huge ranch companies, many of them financed by British investors, were vying for positions on the American plains. The Canadian government and Canadian investors, aware of this burgeoning industry, were anxiously considering such lucrative ventures in Canada's west; however, there was still some uncertainty regarding the threat of marauding Indian bands, adverse weather conditions and the stability of grass resources — certainly, Captain John Palliser's report of his western expedition, 1857-60, with its emphasis on the aridity and barrenness of the Canadian plains, was not encouraging. Therefore the enthusiastic firsthand accounts of Captain Winder and some of his fellow oficers, reinforced as they were by the North-West Mounted Police official reports which detailed ranching potential and progress, sounded a welcome note of encouragement. Surely here was not only a golden opportunity for Canadian investors but the challenge of diverting northward the British capital which was pouring into Wyoming, Texas and Montana.

An initial requirement for a large-scale Western ranching industry was a change in land regulations. The Dominion Lands Act of 1872 had provided for development of a general settlement and although later amended did not permit the establishment of a large cattle industry. Prospective investors and ranchers pressured the government to make appropriate changes. An improved cattle market with the added incentive of a privileged position for Canadian cattle on British markets, created by the imposition in 1879 of an embargo on live cattle from the United States, gave weight to their requests. Many of those anxious to become participants in a Western ranching enterprise had influential status in business and/or political connections, a number being involved directly or indirectly with Sir John A. Macdonald's Conservative government. This fact undoubtedly was an aid in precipitating action. There were, in addition, internal national concerns that helped provide a favourable climate for Western ranch expansion. The importation of cattle from the United States to provide beef for Western Indians created a large ongoing expenditure which could be reduced sharply if a local market were established. Also, a thriving cattle business in the West would give greater credence to the building of the controversial railway across the prairies.

The man who spearheaded negotiations with the government for the creation of conditions appropriate for range development was Senator M.H. Cochrane of Compton, Québec. Noted internationally for the purebred

Shorthorns he raised on his Hillhurst stock farm near Compton, Senator Cochrane had now reached the conclusion that the greatest profits lay in mass production of good beef and that this could be achieved on the extensive ranges of the West. Meetings with government ministers and an exchange of correspondence over approximately a two-year period resulted on 23 December 1881 in the passing by Macdonald's government of an Order-in-Council permitting land leases of up to 100,000 acres on a twenty-one-year, or less, basis at the rate of one cent per acre per year; cattle for stocking such leases were to be allowed duty-free entry during 1881 and 1882. Cochrane, who had been allowed his choice of Western land, had proceeded with the establishment of his ranch. He selected his lease stretching along the Bow River with headquarters at the Big Hill (later the site of the town of Cochrane) approximately twenty-five miles west of Calgary, and in October 1881, the first great herd of Cochrane Ranche cattle, purchased in Montana, arrived on the Bow River range. Also that fall over sixty head of purebred Angus, Hereford and Shorthorn bulls, most of them British imports, were shipped by rail and river boat to Fort Benton, Montana and then trailed north. On 30 November 1881 the Cochrane Ranche cattle numbered some 6,800 head.

Thus the year 1881 marked the commencement of the era of the big ranches. Competition among hopeful prospective ranch owners and speculators for both favourably located leases and available investment became eager. The enthusiasm was further fueled by the wholehearted endorsement of Alberta's ranch country by the Governor-General, the Marquis of Lorne, and his party on their 1881 tour of the West — this gave the concept of Western ranching a certain prestige on both sides of the Atlantic.

From the scramble for lands, four particularly large lease holders emerged. Of these Senator Cochrane, besides being first, became controller of the greatest acreage. Nevertheless his operation underwent some major setbacks. Adverse weather conditions during the first two winters, coupled with mismanagement, the result of stock-handling decisions being made in the East, caused serious cattle losses. Undaunted, the Senator decided to run sheep on the Bow River land and to move his cattle further south; in 1883 he took over several leases in the area between the Waterton and Oldman Rivers and that summer the remnants of the two great Cochrane Ranche cattle drives of 1881 and 1882 travelled south. To satisfy land regulations another company, the British American Ranche Company, functioning under essentially the same controlling interests, was formed to operate the sheep enterprise. These two ranches gave Senator Cochrane rights over a total of 334,500 acres of grazing land. Some 8,200 head of sheep were brought to the Bow River range in 1883, but during the late 1880s this ranch gradually went out of business. Although sheep losses and poor wool prices were factors in its failure, the decisive cause was the increasing pressure exerted by both the government and encroaching

settlers for the release of the lands for settlement. Meanwhile the cattle business in the south also faced some initial reverses. Probably the greatest potential danger that threatened it came in 1885 from the Indians on the nearby Blood Reserve. News of Métis and Indian successes in the Saskatchewan Rebellion fueled a growing unrest and a belligerent attitude towards whites among the Bloods. Some Cochrane Ranche cattle were killed but the police established an outpost at nearby Stand Off and, with increased patrol work, managed to maintain peaceful relations. In succeeding years the Cochrane Ranche prospered and became a profitable enterprise but after Senator Cochrane's death in 1903 the pivotal force of the operation appeared to be gone. W.F. Cochrane, one of the Senator's sons who had managed the business since 1884, shortly returned to Québec. In 1906 the Company ceased to function and the land was sold to the Mormon Church.

Following the establishment of the Cochrane Ranche the other three moguls of the cattle industry quickly came into being. The one of these which became most widely known and proved best able to survive the onslaught of time was the Bar U. Its instigator was Fred Stimson, a successful farmer and stock raiser in the Compton area who, fired by the glowing accounts of Western ranching related by his brother-in-law, Captain William Winder, persuaded Sir Hugh Allan, head of the Allan Steamship Line, and his brother Andrew, to provide the necessary financial backing and in March 1882 the North-West Cattle Company was formed with Fred Stimson as manager. In enthusiastic anticipation he had already registered a brand choosing Bar U (U̅), which was issued in his own name on 20 October 1881 — a brand which shortly came to identify the ranch and which eventually received international recognition. An effective manager, involved in both stockmen's concerns and the social life of the Foothills ranch community, Stimson was also a colourful character and an excellent raconteur who placed the stamp of his own unique personality on Alberta's ranching scene, and through his fund of amusing and sometimes preposterous stories, added a certain flavour to Western lore. The Bar U itself earned a special place in the annals of Western ranch history. Many of Alberta's ranchers and stockmen rode for the Bar U and so became indoctrinated into ranch life. A number of the range land's famed and distinctive characters were associated with this ranch, among whom, besides Stimson, were Herb Millar, who was hired in Chicago in the fall of 1881; John Ware, noted Negro cowboy and rancher; and, perhaps most importantly, George Lane. After serving as foreman from 1884 to 1889 Lane branched out on his own. When in 1902 the possibility of obtaining the Bar U arose he managed to interest the noted Winnipeg-based meat-packing firm, Gordon, Ironsides and Fares, in the deal and a new company, Lane, Gordon, Ironsides and Fares, was formed for the express purpose of purchasing the Bar U. After successfully piloting the ranch through the

numerous ups and downs that beset the industry he bought out the Gordon, Ironsides and Fares firm in 1920, becoming sole owner of the Bar U.

Another ranch started in 1882 was the Oxley. During the flurry of ranch fever in 1881 John Craig, an Ontario farmer and Shorthorn breeder, with the support of several Canadian shareholders, organized the Dominion Livestock Company and obtained a 100,000-acre lease in the Porcupine Hills and up the western reaches of Willow Creek. Requiring more capital he went to England where he attracted the interest of Alexander Stavely Hill, a Conservative member of the British Parliament, and the Earl of Lathom, a prominent cattle breeder. Hill's participation was dependent on certain conditions — English capital only was subscribed and the company, formed on 29 March 1882, was named the Oxley Ranche Company after Hill's country home, Oxley Manor. Hill himself assumed the position of managing director and Craig was named ranch manager. As the original lease included some rough land unsuitable for grazing, another lease of 87,000 acres, excellent range further east and south on Willow Creek, was acquired in Hill's name. In August 1882 a herd of approximately 3,400 head of cattle purchased in Montana arrived and the operation was under way. From the outset the Oxley was plagued by internal problems, becoming a classic example of conflict between absentee owners and ranch managers. After the inevitable severance of Craig's relations with the Oxley, he produced a book, *Ranching with Lords and Commons*, in which he records the peculiar problems involved in managing a ranch for the British aristocracy. In 1886 the ranch was reorganized under the name, the New Oxley (Canada) Ranche Company. Despite further problems it achieved some success and a place of respect among the great ranches of the Alberta Foothills.

The fourth of the quartet of big ranches was the Walrond Ranche Company. Organized in 1883 by Dr. Duncan McEachran, Dominion Veterinary Surgeon, it was financed chiefly by British capital with Sir John Walrond-Walrond being the main shareholder. McEachran, vice-president of the company, acted as manager. The Walrond acquired several leases on the north fork of the Oldman River and the southern stretches of the Porcupine Hills. McEachran, a capable manager, imported good stock and developed a successful cattle export business. The Walrond for more than a decade pursued its profitable way despite the ever-increasing advance of settlement. Then came the disastrous winter of 1906-07 with terrible cattle losses and this, added to the discouraging situation which faced big ranchers, spelled the end. In 1908 the Walrond stock was sold and the lease went to W.R. Hull with Pat Burns later taking control.

During their heyday these four giants of the cattle industry, the Cochrane Ranche Company, the North-West Cattle Company (Bar U), the Oxley Ranche Company and the Walrond Ranche Company, held almost one-third of all land in the south-western part of Alberta, of which

any use was being made by ranchers or settlers. By this time practically all the Foothills region from Cochrane south had been assigned in some way. Other large, and comparatively small, companies held leases and stock ranged west to the mountain threshold and eastward onto the plains. This area was originally chosen partly for the shelter and security of the hills and for the more picturesque ranch headquarter sites they afforded, and to avoid complete dependence on the grass resources of the more arid prairie. Many of these ranches also were significant in the saga of range history. A few might be mentioned: the Quorn, 1886, financed by a Leicestershire, England, syndicate and formed primarily for raising horses for the British hunt club market; the Stewart Ranche, 1881, established by Captain John Stewart of Ottawa and with strong NWMP connections; the Winder Ranche started by Mounted Police Superintendent William Winder; the Alberta Ranche, founded by Sir Francis DeWinton who had been aide-de-camp of Lord Lorne during his 1881 tour; the Bow River Horse Ranche, which took over some of the original Cochrane Ranche range; the Glengarry Ranch, 1885, established by A.B. Macdonald, Ontario merchant and eventually owned by railway contractors William Mackenzie and Donald Mann; the Maunsell Ranch, owned by brothers Edward and George Maunsell, formerly of the NWMP — the list could continue.

The Foothills ranch community, unlike most frontier societies, was law-abiding to a marked degree, a situation reflecting not only the background of most of its components, the majority of whom were middle or upper-class British, Eastern Canadians or French, but also the pervading influence of the Mounted Police. A homogeneous relationship existed between the ranchers and the police, produced in part by similar social and cultural backgrounds and further enhanced by the substantial number of ex-members of the force who became stockmen.

Although the major part of the early development of the Western Canadian ranching industry occurred along the Alberta Foothills and their eastern fringe, some ranches of varying types were established on the prairies to the east and south as early as the 1880s. In 1886 the Powder River Cattle Company of Wyoming, under Moreton Frewen, its British manager and part owner, brought approximately eight thousand head of cattle north and established a ranch east of the Foothills leases on Mosquito Creek. The brand of this spread, the 76, later became a part of the most famed ranch/farm scheme to grace the prairies, the Canadian Agricultural, Coal and Colonization Company (CACC).

The CACC had its roots in a Canadian Pacific Railway (CPR) colonization scheme. The CPR, despite its mutually beneficial association with the ranch industry during the early 1880s, was from its inception strongly committed to settlement, for the filling up of the western lands with settlers would create a much larger volume of freight flowing both east and west — besides there was CPR land available for sale, hopefully

to large numbers of settlers. So as early as 1884 the rail company established ten experimental farms along the line running across the arid prairie west of Swift Current. The plan was to grow field crops and vegetables as a test of the suitability of the country for farming. After good initial results because of an unusual amount of rainfall in 1884 and into 1885, the area reverted to its usual dry state and by 1886 the experiment was recognized as a failure. At this point an English promoter, Sir John Lister-Kaye, became involved. Sir John was already operating a farm of nearly seven thousand acres at Balgonie, near Major Bell's famed farming empire in the Qu'Appelle Valley but he envisaged a much more grandiose venture, large enough to overshadow Major Bell's project. He approached the CPR and the Dominion government with details of his scheme. He wished to establish ten ranch/farms patterned upon English estates located at intervals along the CPR line west of Swift Current, for which he would require ten blocks of land each ten thousand acres in size. The CPR and the government were pleased to encourage such an enterprise and provided land at reasonable rates, so after some financing problems were solved the CACC was formed in 1888 with Lister-Kaye as manager. Sir John's Balgonie farm was purchased by the company and, as planned, ten more ranch/farms were established between Swift Current and Langdon, some twenty miles east of Calgary.

Sir John was a man of action and construction of fine houses, stables and other buildings at each farm commenced immediately; young Englishmen, many of them inexperienced, arrived to man the operation and soon walking ploughs were turning the prairie sod. Stocking the establishments was a priority and true to his propensity for action on a grand scale, Sir John purchased the Powder River Cattle Company's entire Canadian herd, some 5,800 head, along with their 76 brand. This became the main brand of the new outfit and as years passed the CACC became widely known as the 76 Ranch. In addition to fine horses and purebred Polled Angus and Galloway bulls, a large number of Yorkshire swine were brought in, but Sir John's sheep enterprise was his most ambitious; he imported some three hundred pedigreed rams from England and had a flock of over ten thousand head trailed north from Montana. Some of his management schemes were unique in Western Canada. For example, during a killing drought in 1889 he attempted to save the wheat on his one thousand-acre fields by having water hauled in carts. Again he envisioned Swift Current as the dairy capital of the West and built a creamery and cheese factory there, but failed to recognize the fact that the wild 76 range cows were not milk cows; naturally, they and the cowboys who handled them were all vigorously opposed to the idea, so this plan too failed. However, his project of establishing a meat packing business in Calgary met with unqualified success.

By 1890 the company was in a serious financial condition and Sir John Lister-Kaye was forced to resign. That year proved to be a particularly

disastrous one. In April, a fire started by a spark from a CPR locomotive caused the death of over one thousand sheep, the loss being compounded by the fact that the majority were ewes and the lambing season was approaching. That summer a burning July drought was followed by a fierce hailstorm with the result that no grain was harvested in the Swift Current area that fall. In 1895 the CACC sold its holdings to a new London-based organization, the Canadian Land and Ranche Company. D.H. Andrews, an Englishman respected in the stock business who had come to the CACC at the time of the purchase of the 76 herd, became manager. Consolidation policies were adopted and in 1897 the company arranged with the CPR and the government to exchange some twenty-four thousand acres of arid prairie in the Maple Creek area and west of Medicine Hat for more arable land around Swift Current, Gull Lake and Crane Lake. During much of the next decade the 76, despite some serious reverses, conducted a largely successful cattle and sheep business. However, in 1903 the combination of spring snowstorm losses and poor wool prices added to the increasing demand for farm land by settlers who were crowding into the Swift Current district led the company to dispose of its sheep operation and sell its land at Swift Current and Rush Lake. During the next few years pressure from the westward flow of settlement strengthened and the Company sold off more of its holdings, retaining sizeable cattle and horse herds which were ranged mainly at the Crane Lake ranch. The killing winter of 1906-07 dealt a final blow to the 76 and in 1909 the Winnipeg-based firm of Gordon, Ironsides and Fares acquired the remainder of the holdings of the company. This pioneering ranch/farm experiment, despite its failures, achieved some valuable successes. Although it did not fulfill its original objectives as a colonization scheme, many of the company's Scottish and English employees remained in the country, particularly in the Swift Current area, becoming a part of the district's agricultural base. In addition, the company's purebred animals, like those of a number of other ranches conceived on an ambitious scale, were major factors in the production of good stock across the West.

Another ranch/colonization enterprise considerably smaller but in operation earlier than Lister-Kaye's gigantic project, was the Military Colonization Company Ranche, founded in 1883. The instigator was a retired military man, General Thomas Bland Strange, who obtained a lease on the Bow River where he planned to raise horses for the British Army and to provide a type of haven for his British officer shareholders, a scheme that was largely unsuccessful.

On the plains in the southeastern part of the district of Alberta and across Assiniboia, a considerable number of American ranches appeared. The Circle Ranch owned by the Conrad brothers and the I.G. Baker Company of Fort Benton, Montana, were the most noted of the early American spreads coming into the country before 1890. Their cattle were wide-ranging but the main concentration was in the Medicine Hat area. As the

1890s and early 1900s passed, increasing numbers of American cattlemen, seeking to escape the overcrowded southern range and the pressure of advancing settlement, brought their herds northward. Sufficient rain fell during 1898 and the first few years of the new century to produce good grass in the normally arid areas south of Medicine Hat, Maple Creek and Swift Current so ranch prospects appeared promising. The largest American cattle business to come into this area was that of A.J. "Uncle Tony" Day, a Texas rancher whose operation had been gradually pushed northward by the rising swell of homesteaders. Leaving his last stop in South Dakota in 1902 he brought his herds of approximately twenty-five thousand head of cattle and six hundred horses north of the border and here on several leases extending from Swift Current westward to Maple Creek, around the Cypress Hills and south of Medicine Hat, he established the Turkey Track Ranch, named from the distinctive brand his animals carried. Tony Day was an expert cattleman but the two greatest enemies of the early Western ranchers, encroaching settlement and killing winter weather, proved too much for him. Almost two-thirds of the Turkey Track cattle perished during the winter of 1906-07 and in 1908 the remainder of his herd was sold to Gordon, Ironsides and Fares Company.

Another famed cattle outfit that came north during this period was the Scottish-owned Matador Ranch with headquarters in Colorado. In 1904 a large lease was obtained north of Rush Lake along the South Saskatchewan River and the following spring shipments of stocker cattle commenced arriving. The cow/calf part of the Matador operation remained in the United States and the Canadian ranch was used entirely for fattening young stock for beef shipments to Chicago. For this reason the 1906-07 winter, although causing a loss of almost 50 percent of the Matador cattle in the Saskatchewan region, did not deal the ranch the crippling blow suffered by many other spreads. After prospering for more than a decade the Matador decided to close down its Canadian operation in 1921.

In the wake of the American ranchers, droves of farmers following the same trails from the western states pushed into the southern section of the plains of Alberta and Assiniboia. Not all were Americans, some were Canadians returning northward, others were Europeans, Germans mainly, who had tried the Western American farm lands and now were looking for greener pastures. South of the border, homesteads were gone and land prices high, so the farmers' trek northward was an attempt to grasp a fast-disappearing opportunity to obtain a homestead or to buy cheaply land available from the government or the CPR. True, it was arid country, but some had had experience in farming dry land — real dryland farming techniques came later but initial attempts were under way. Added incentives were good grain prices, and Canada's welcome to the tillers of the soil. So ranchers were squeezed out and settlers won another battle in their war with the cattlemen.

Conflict with settlement had become a part of life for the cattle industry soon after its inception. As early as 1885 a group spearheaded by Calgary's first farmers, Sam Livingston and John Glenn, and called the Alberta Settlers' Rights Association, sent a petition to Sir John A. Macdonald requesting that all townships around Calgary be opened for homestead entry and that settlers already established receive patent for their land. As numbers of settlers increased the feud became bitter but at no time did it erupt into violence and bloodshed. One particularly contentious case of a settler on the Walrond range gained national publicity, becoming an issue in Ottawa where the Conservative government, in the face of strong criticism in opposition ranks and among much of the public, ruled in favour of the ranch. Nevertheless the rumblings produced by this conflict presaged to some ranchmen a coming change in the comfortable, compatible relationship between the Conservative western ranchers and their friends and supporters in government.

A further disruption for the big ranchers occurred in 1892 when the section of the Calgary and Edmonton Railway running south to Fort Macleod was constructed. Not only did this line cut through the ranges of many of the large ranches, thus interfering with grazing patterns, but land required for railway grants was included in their leases. This situation precipitated the passing in 1892 of an order-in-council to terminate closed leases in 1896. The ranchers were given options to buy comparatively large portions of their leased land at reasonable prices. An added concession was an extension of stock-watering reserves, that is the exemption from settlement and maintenance of public access rights to areas on creeks and rivers, which thus prevented homesteaders from cutting off water resources from ranch cattle.

The year 1896 heralded significant changes in the Western cattle industry. First the termination of the original no-settlement leases took effect and although blocks of land could be purchased and new leases with homestead release could be obtained, the days of the open range when the cattlemen controlled the country were over. Another blow to ranchers in 1896 was the defeat of the Conservative government as the incoming Liberals posed a further threat to the stockmen's cause. Their ranks included both Clifford Sifton, Minister of the Interior, soon famed for his immigration policy designed to fill the West with settlers, and Edmonton-based Frank Oliver, Member of Parliament for the District of Alberta, who was an ardent champion of settlers' rights and a vigorous opponent of the ranchers and their interests. Deprived of their influential connections with Ottawa, the cattlemen, seeking strength in unity, formed the Western Stock Growers' Association in 1896, an organization designed to act as the voice of the industry.

The early 1900s brought difficult years for the cattle industry. The immigration policies of the government and the CPR bore fruit; the stream

of incoming settlers, small until 1896, then rose rapidly becoming a mighty flood through the first years of the new century and continuing at high levels until 1912. A spirit of farming optimism pervaded the West. Grain prices were good and farmers were encouraged by higher than average rainfall, so when the government, despite ranchers' protests that much of the country was too dry for farming, opened the dryland grazing areas of the southeast for settlement, homesteaders poured in and their plows turned under thousands of acres of native prairie wool, that short nutritious blend of grasses which could better withstand dry conditions and which made excellent feed for stock. The severe drought of 1910 forced some of the settlers to abandon their dryland farms but their grain-growing attempts had caused irreparable damage to the prairie ecology as prairie wool once destroyed does not restore itself. For the ranchers meanwhile, settlement advance was taking its toll. Then came the bad winter of 1906-07. In 1907-08 quite a number of ranchers went out of business; the losses they had sustained were a factor but in most cases the decisive reason was the agrarian advance.

So ended the days when the cattlemen ruled the West, the times when their influence was a truly dominant force in government, and when, as during the decade following 1881, the cattle export trade boomed and their industry became the most promising factor in the Canadian economy. Nevertheless the influence of this period persisted with perhaps the social elements of its character being the most enduring. This was particularly true of the Foothills area. The ranchers here with initial strong social connections in Britain and Eastern Canada soon developed a way of life which essentially was maintained until the outbreak of World War I. It featured sports, notably polo, horse-racing, hunting, cricket, tennis, and included such cultural events as balls, musical evenings, and visits to the theatre in Calgary. Indeed the cultural relationship between the city and the ranch community was congenial and, generally speaking, homogeneous; one manifestation of this was the Ranchmen's Club in Calgary.

Thus the life of the early ranch community became a distinctive part of Western heritage. A segment of the cattlemen's story was over but, contrary to some contemporary assessments, the saga itself was not ending. Some felt that the rancher was being pushed out, that the grain farmer and the mixed farmer whose crops were supplemented by the raising of some stock were taking over the West. This, of course, was not so. The days of the open range were certainly gone, but the stock industry survived. The rancher changed with changing times. Obviously ownership of land was necessary for security, so many stockmen purchased as much as possible of their holdings and reduced the size of their herds to more manageable units. Although numerous ranchers operated on a smaller scale, some of the cattlemen still had large holdings and great herds. Foremost among them were Pat Burns, A.E. Cross, George Lane and A.J. Maclean. These, the Big Four as they came to be called, underwrote the first Calgary

Stampede in 1912, an attempt to keep alive memories of early ranch life in the West. They were giants in the cattle business but other ranchers, too, operated comparatively large spreads and held positions of importance in the ranch community during the first years of the new century.

There was a sense of rightness, of destiny, about the Western cattle business during its early days. The prairies and hills had been the home of buffalo and after their demise it seemed ordained that cattle should take over the range. The early ranchers did little to disrupt nature — their homes were few and scattered, the country lay largely unfenced, generally speaking the Canadian range was not over-grazed, the trails that wound across hills and plains were not very different from Indian trails and buffalo paths. There may have been a conscious or unconscious awareness on the ranchers' part of their oneness with nature, with the country — undoubtedly they felt they were the right people at the right time and place using the land as it was meant to be used. Perhaps their strength and influence rose in part from this sense of a God-given right. It was inevitable that the reign of the cattle barons should pass but their impact on the entire Canadian scene was undeniable, they provided the ranching community with a strong foundation and left a legacy of richness and colour. Their story adds to our history's uniqueness, a certain eminence, and a touch of glamour.

NOTE

The apparent discrepancy in the spelling of the word "ranch" should be explained. During the early period it was customary for British and Canadian ranchers to spell "ranch" with a final "e" and in the official names of their cattle companies and in relative correspondence it is so spelled. In the names of American-based spreads and a few others the "e" is omitted. In the interests of accuracy and to give a greater sense of the time period I have followed the practice of spelling the various companies' names as they appeared in documents and writings during the initial ranching period. In general usage throughout the article "ranch" is spelled in the presently accepted manner.

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One Hundred Years of Prairie Forestry

J.A.G. Howe

ABSTRACT. At the turn of the century, trees and shrubs were not a noticeable feature on the grasslands of Western Canada. With the settlement of the prairies, tree plantings became widespread as farmers realized the benefits of shelterbelt plantings. The history of prairie tree plantings is closely tied to programmes sponsored by the federal and provincial governments. The federal tree planting programme has remained much the same for over eighty years — to promote tree plantings for shelter and to aid in soil conservation. There has been an increase in field shelterbelt plantings in the past ten years as farmers become more concerned with soil conservation. In spite of drought, insects and adverse climatic conditions, prairie shelterbelt plantings have been successful and epitomize the faith of prairie farmers.

RESUME. Au début du siècle, les arbres et les arbustes étaient des traits peu perceptibles du paysage des prairies de l'ouest canadien. Avec la colonisation des prairies et au fur et à mesure que les fermiers prenaient conscience des avantages que pouvaient apporter ces arbres, la plantation de brise-vent est devenue de plus en plus conséquente. L'histoire de la plantation d'arbres dans les prairies est étroitement liée aux programmes promulgés par les gouvernements provinciaux et fédéral. L'optique du programme fédéral concernant la plantation d'arbres est restée la même pendant plus de quatre-vingts ans: promouvoir la plantation d'arbres pour créer des abris et pour combattre l'érosion. Pendant les dix dernières années, les fermiers ont de plus en plus réalisé qu'il y avait un problème avec l'érosion et on a vu ainsi une augmentation de brise-vent dans les champs. La plantation de brise-vent a été un succès et elle incarne la foi des fermiers des prairies en dépit des sécheresses, des insectes et des conditions climatiques défavorables.

Introduction

The past one hundred years have seen the settlement of much of the Canadian prairies — an area that covers the southern part of the provinces of Manitoba, Saskatchewan and Alberta. This region is typified by low rainfall, recurring drought and vast expanses of open grassland. The settlement of the prairies has resulted in some remarkable changes in the face of the land — grass and bison have been replaced with farm crops and livestock, and trees have become much more noticeable in the prairie landscape. The appearance of trees on the prairies has taken place for two reasons: the tree planting efforts by farmers and the southward spread of aspen poplar once the damaging influences of fire and bison were removed.

For the purpose of this article, the discussion of the history of prairie forestry will deal with what has taken place in the past one hundred years with regard to tree plantings on the grassland regions of the prairie provinces. This history is intrinsically tied to the history of the Alberta Provincial Tree Nursery and the Federal nurseries at Sutherland and Indian Head in Saskatchewan. All information in this article was obtained from the Annual Reports of the Department of the Interior, Experimental Farm Service, the Alberta Tree Nursery and the Tree Nursery at Indian Head.

The Start of the Tree Planting Programme and Shelterbelt Nurseries

Settlers arriving on the Canadian prairies soon realized that without trees to protect their homes and livestock, life in this new land would be extremely difficult (Figure 1). Some early settlers, especially in Manitoba, transplanted seedlings from river banks, but this sort of planting stock acquisition only benefitted a relatively small number of farmers. The early settlers imported trees and shrubs from Eastern Canada and the United

States but most of these initial plantings were unsuccessful, due to the lack of hardiness of the planting stock and poor preparation of the planting sites. For this reason the federal government became involved in prairie tree plantings.

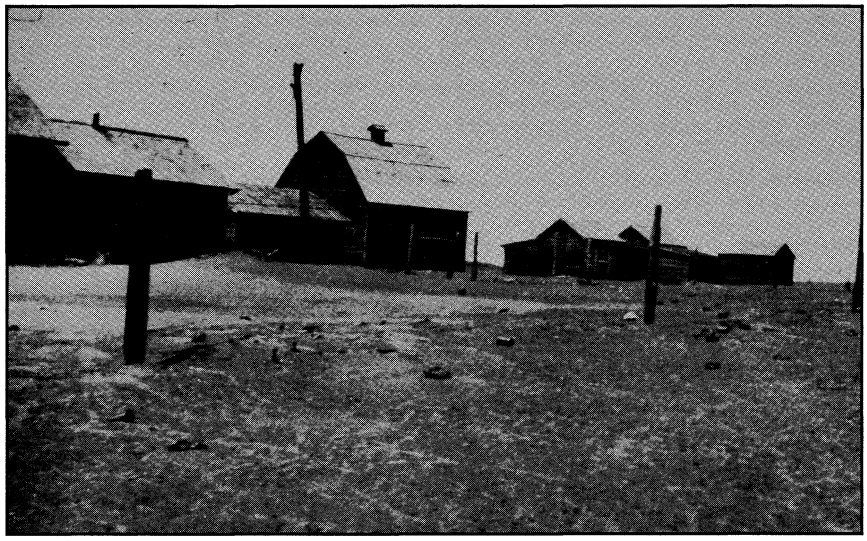

Figure 1. Early Settlers faced great exposure to adverse weather.

Experiments in tree planting were begun at several experimental farms, especially at Brandon, Manitoba, and Indian Head, North-West Territories, as well as at the Central Experimental Station in Ottawa, Ontario. In 1888, the Central Experimental Station sent twenty thousand trees to Indian Head and in 1889, twenty-seven thousand trees and shrubs of 718 varieties were sent to Brandon and Indian Head for evaluation for hardiness. In 1889, for the first time, trees were also sent to experimental gardens set out by the Canadian Pacific Railway at twenty-five sites between Moose Jaw and Calgary. Also, in 1889, seven hundred one-pound bags of tree seed were distributed to settlers for testing.

From 1888 to 1899, some sixty-five thousand trees and shrubs were sent to Brandon and Indian Head from the Central Experimental Farm. As well, approximately 560,000 tree seedlings and cuttings, and nine hundred pounds of tree seed were distributed directly from Ottawa to settlers.

Some of the tree seedlings that were sent to Brandon and Indian Head were utilized for tree plantations, shelterbelts and test plots. Based on the performance of these plantings, recommendations were made to farmers as to spacing, cultivation and planting design for prairie tree plantings.

In 1890, the growing of tree seedlings started at Brandon in earnest. From 1891 to 1898, a total of 513,850 trees and cuttings, as well as 1,526,116 bags of seed were sent to farmers. During this same period,

some 190,000 trees and shrubs and 3,357,116 bags of seed were distributed from Indian Head. By 1901, ten acres of land had been set aside at Brandon and fifteen acres at Indian Head for use by the Forestry Branch of the Department of the Interior to begin propagation of tree seedlings.

In 1901, a cooperative system of tree planting was initiated by the Plains Tree Planting Division of the Forestry Branch, Department of the Interior. Trees were provided without charge to farmers, municipalities and corporate landowners. Each planting site was inspected and approved as properly prepared following application for stock. In 1901, under the cooperative programme, sixty thousand seedlings of Manitoba maple, ash, cottonwood and American elm were distributed.

In 1902, a permanent nursery was established at Indian Head on 160 acres of land to produce shelterbelt stock for farmers. As well as producing trees, the nursery was to be a model farm, demonstrating the potential for growing trees on the prairies. By 1906, all tree distribution by the experimental farms was phased out and tree production was consolidated at the Indian Head nursery under the Department of the Interior.

The first Superintendent of the Tree Nursery was Norman Ross, who initially concentrated on the production of native deciduous species (Figure 2). It was not long, however, before experimental plantings of conifers and introduced tree and shrub species were made. Under Ross's direction the nursery was expanded by a further 160 acres in 1906 and another 160 acres in 1910. The final quarter section of land was not purchased until 1950.

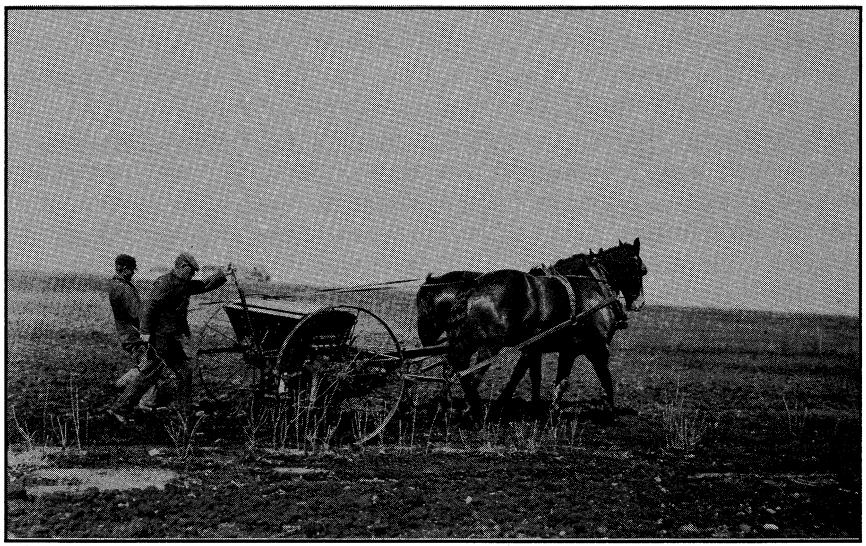

Figure 2. Seeding Green Ash seed at Indian Head in 1906.

In 1912 a supplementary federal nursery was initiated, when 320 acres of land were purchased near Sutherland, Saskatchewan. J. McLean was appointed as the first Superintendent in 1914. This new nursery serviced applicants mainly from the northern parts of Saskatchewan and Alberta. The Sutherland nursery operated until 1966 when it was closed and activities were consolidated at Indian Head.

Due to the great demand for seedling stock and the inability of the Indian Head Nursery to meet demands, the Province of Alberta started its own shelterbelt nursery in 1950 at Oliver, near Edmonton. This nursery provides planting stock only to Alberta applicants and continues operations at this time.

In 1930, the tree nurseries at Indian Head and Sutherland were transferred to the Dominion Experimental Farms Branch and in 1963, the Nurseries were transferred to the Prairie Farm Rehabilitation Adminstration (PFRA) (under Agriculture Canada). The research aspects were changed to support increased nursery production and a small investigations programme was developed to resolve problems affecting tree storage, seed viability and pest and weed control. In 1969, PFRA (and the Indian Head Tree Nursery) was transferred from the Department of Agriculture to the new Department of Regional Economic Expansion.

The Tree Planting Policies

In the annual report of the Superintendent of Forestry in 1901, a review of the tree distribution programme and its reasons for existence were documented. The Superintendent, E. Stewart, stated that, "Ever since the inauguration of the Forestry Branch it has been recognized that the complement to the preservation of forests in these districts where trees grow naturally was the propagation of them — in those parts of the country which were entirely devoid of tree growth, that preservation and propagation were equally worthy of the active attention of the office" and "As to furnishing seeds or other plant material for those who agree to set apart a small portion of their land for the growing of trees, and to plant and to keep the same in a proper state of cultivation, it is surely not asking much that they be supplied with proper material for planting these areas."

The original operational objectives of the tree nursery were as follows, as set out in 1903: (1) not only that trees shall be grown in large quantities for distribution to the settlers throughout the treeless plains, but also the station shall be a model forestry farm where visitors will be able to see the possibilities of growing a variety of trees; (2) to do some experimental work in the growing of certain varieties of introduced species of forest trees from other parts of the world possessing a climate similar to our own; and (3) to gather statistics here of the relative yearly increase in the growth of different varieties under cultivation and other information of great value to the people of the prairie region.

The above-mentioned objectives, of providing stock free to farmers as well as providing site inspections, were continued until 1930. In 1931, due to financial limitations, the site inspections were discontinued. In 1959 the financial assistance for transportation charges was dropped and farmers paid all shipping costs. In 1968, the tree planting programme was modified slightly to include wildlife, soil reclamation and plantings for prairie parks.

Thus, over a period of eighty-two years the policy to encourage prairie tree plantings has remained much the same. The original policy of providing trees and shrubs to farmers free of charge for shelterbelts and woodlots has been expanded to include specialty plantings, plantings by charitable organizations, etc., but the existing policy remains close to what the early organizers of the Tree Planting Program foresaw as needed for the prairies.

The Statistics

Since the inception of the tree planting programme in 1892, it is estimated that over 450 million seedlings have been distributed by the tree nurseries at Indian Head and Sutherland and the experimental farms at Indian Head and Brandon (Figure 3). A further fifty million have been distributed by the Oliver Nursery in Edmonton to Alberta applicants. Of this total, approximately half would have been caragana. Indeed, caragana

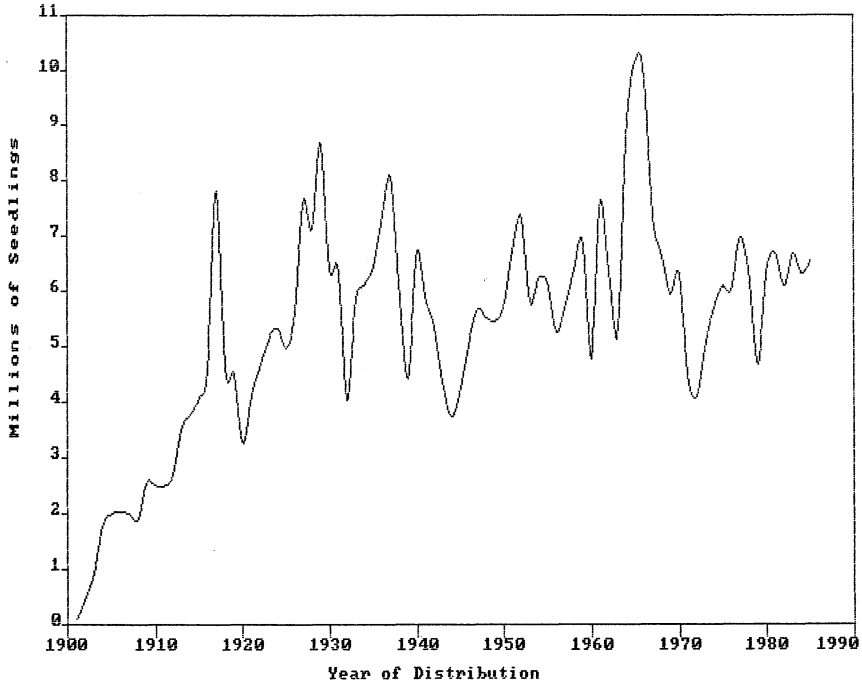

Figure 3. Tree Distribution 1901-1985.

could be considered the symbol of successful tree planting on the Canadian prairies.

The number of trees planted for shelterbelts has varied from year to year, depending in part on weather conditions and the farm economy. During dry periods, distribution may shrink to four million as farmers wait for more suitable planting conditions. For the past ten years, the average tree distribution for the Oliver Tree Nursery has been 2.5 million seedlings a year and from the Indian Head Nursery approximately six million seedlings. The number of farmers planting trees on the prairies has averaged thirteen thousand per year for the past ten years.

Prairie Tree Planting Programmes

For the period 1892 to 1930, nearly all tree plantings in the prairies were connected with farmstead plantings. A few attempts were made to establish woodlots (Figure 4) to provide extra firewood and building materials and some shelterbelt material was utilized for field, roadside and school plantings. Starting in 1931, a change in prairie tree plantings took place, as a result of the drought and soil drifting. From 1935, tree plantings became an integral part of soil conservation as spelled out in the PFRA mandate "to secure the rehabilitation of drought and soil drifting areas in the provinces of Manitoba, Saskatchewan and Alberta and to develop and promote within these areas systems of farm practices, tree culture, water supply, land utilization and land settlement that will afford greater economic security."

Figure 4. Scots Pine Plantation. Planted at Indian Head in 1908 — eight years old.

To assist PFRA in its tree planting programme to combat soil drifting, planting supervisors were employed for site inspections. In 1936, assistance was given to the formation of Field Shelterbelt Associations and District Agricultural Improvement Associations. By 1937, there were some seventy-nine Illustration and Experimental Sub-stations and four Field Shelterbelt Associations, located at Conquest, Aneroid, Lyleton and Porter Lake. Between 1935 and 1964 a total of 2,483 km of field shelterbelts was planted in these projects (Figure 5). Farmers were paid a grant to plant and maintain the trees as a means of increasing interest in the programme. The planting payments were discontinued in 1937, but the maintenance payments were continued until 1960.

Figure 5. Hand planting of field Shelterbelts in the Conquest area in the 1930's.

From 1960 to 1974, the interest in field shelterbelt associations waned, however individual farmers continued to plant field shelterbelts and interest in establishing or expanding existing farmyard plantings remained fairly constant. The overall demand for seedlings would appear to decrease starting in 1950 as indicated in Figure 3, however, certain changes in recommendations and cultural practices accounted for much of this change. Starting in 1950, poplar and willow cuttings were no longer distributed because of poor planting success. They were replaced with rooted cuttings provided by the nursery, in a reduced amount. Also, spacing recommendations changed from a four foot between tree spacing to a six or eight foot spacing, hence fewer seedlings were required for the same planting distance. The wider spacing reduced competition between trees and increased longevity of the plantings.

In 1974 a cooperative programme between Saskatchewan Agriculture and the Indian Head Nursery was initiated to promote field shelterbelt plantings. The site chosen was in the Leader-Prelate area of Saskatchewan, where soil erosion by wind is a serious problem. From the period 1978 to 1983 a total of 177 km of field shelterbelts was planted in this project (Figure 6). In Manitoba, a similar project was initiated in the Melita area in 1979, and by 1982 a total of thirty-five km was planted.

Figure 6. Modern tree planting equipment, 1985.

Starting in 1980, a series of severe dust storms on the prairies stimulated increased interest in field shelterbelt plantings. Farmers realized that the shelterbelts planted in the 1930s were beneficial for protecting soil and conserving moisture by trapping snow (Figure 7). In 1983 another cooperative project between Saskatchewan Agriculture and the tree nursery resulted in fifteen farmers in the Canora district of Saskatchewan planting thirty km of trees in the spring of 1984. With the new initiatives started by PFRA and the Economic and Regional Development Agreement (ERDA) with the provincial governments, an anticipated 450 km of field shelterbelts were to be planted in the spring of 1986 by 180 farmers in various Shelterbelt Associations in Manitoba and Saskatchewan. Although the major reason these farmers are interested in field shelterbelts is for soil erosion control, most are also interested in snow management, changes in microclimate and benefits to special crops. Many of the farmers have seen how field shelterbelts have benefitted their neighbours and now the old shelterbelts, started thirty or more years ago, are stimulating interest in new plantings.

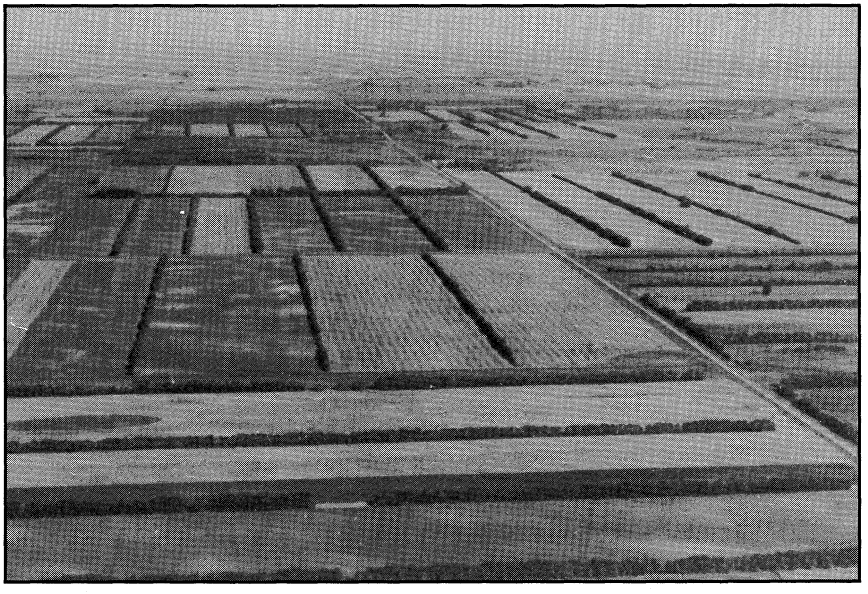

Figure 7. Conquest Shelterbelt Plantings — photographed in 1970.

There is every reason to believe that prairie tree planting will receive greater acceptance by farmers and large areas of the prairies, especially where soils are light in texture, will be planted to field shelterbelts. This planting of trees will continue to benefit prairie farmers and further change the face of the prairie landscape (Figure 8).

Figure 8. Well protected farm yard.

Tractors and Combines in the Second Stage of Agricultural Mechanization on the Canadian Plains

R. Bruce Shepard

ABSTRACT. Modern Canadian Plains agriculture evolved from a lengthy process of mechanization stretching from the turn of the century to the 1950s. There were three incremental steps: up to the end of World War I, the twenties, and during World War II. The first step was the early acceptance of steam and gasoline engines. The second stage, particularly the late 1920s, saw the further acceptance of the tractor, and witnessed the adoption of the combine. This second stage was thus of critical importance because the marriage of the tractor and the combine indicated the future direction of Canadian Plains agriculture.

RESUME. L'agriculture moderne dans les plaines canadiennes s'est développée à partir d'un long procédé de mécanisation qui s'étendit du début du siècle jusqu'aux années cinquante. Il y eut trois étapes successives: la première fut du début du siècle jusqu'à la fin de la première guerre mondiale. La deuxième étape eu lieu dans les années vingt et enfin la troisième durant la seconde guerre mondiale. La première étape fut l'accueil favorable aux engins à vapeur et à essence. La deuxième étape vit particulièrement à la fin des années vingt une implantation plus profonde du tracteur et surtout l'arrivée et l'adoption de la moissonneuse-batteuse. Cette seconde phase fut donc d'une importance cruciale car l'alliance du tracteur et de la moissonneuse-batteuse soulignait la direction futuriste de l'agriculture dans les plaines canadiennes.

The adoption of new technology in agricultural areas is a multi-step process. When a new practice is introduced the initial rate of acceptance is slow, followed by increasingly rapid adoption. Indeed, it is in the last stages of the cycle in which most adoptions occur.[1] Modern Canadian Plains agriculture is an example of this process because it evolved from a lengthy period of mechanization stretching from the turn of the century to the 1950s. There were three incremental steps: up to the end of World War I, the twenties, and during World War II.

The first step had been the early acceptance of mechanical power sources, specifically steam and gasoline engines. Agricultural mechanization was thus well under way by the twenties, and the proliferation of the tractor together with the appearance of the combine indicated the future direction of Plains agriculture. This trend continued until it was cut short by the onslaught of the Great Depression, only to be resurrected and taken to the third and culminating stage during World War II.

The second stage of this process, particularly the late 1920s, was of pivotal importance because that was when the beginnings of modern Canadian Plains agriculture were first evident. While there were other agricultural machines involved, this period witnessed the marriage of the tractor and the combine, which are the two leading elements of mechanized agriculture. Yet it is important to realize that this critical second stage was based upon an earlier experience with agricultural engines. Even if they did not own one of the early engines, farmers had been exposed to their capabilities and this experience had illuminated the potential for further mechanized agriculture.

Previous examinations of the mechanization of Canadian Plains agriculture have underestimated the importance of the early steam and gasoline engines. They have concentrated upon the adoption of the trac-

tor in the twenties, and have missed the multi-step nature of the mechanization process. In addition, they have not included the combine in their assessments of the twenties.[2] The purpose of this paper is to correct this imbalance, and to broaden our view of the mechanization of Canadian Plains agriculture.

Canadian Plains farmers inherited the North American tradition of mechanized agriculture. This tradition began in the 1830s with the introduction of the mechanized reaper. By the 1850s the reaper was popular in southern Ontario, and in the mid-western United States. This lag in acceptance was due to farmers sharing the machines until the price came down. As it did, and as more farmers brought more land under cultivation, more reapers appeared. In the interim, improvements were made, making the basic unit ever more efficient.[3]

As they moved out on to the Great Plains, American farmers took their reapers with them, and began adding new equipment to their operations. Of particular importance was the development of mechanical power sources. By the middle of the 1870s steam power was being increasingly used on American farms and, by the mid-1880s, the self-propelled steam traction engine was being used successfully. Initially steam power made its greatest contributions during the harvest. The success of the reaper had created a demand for more power at harvest time to thresh the crops. Steam engines provided a steady, reliable form of power which replaced the animal power methods employed previously. The advent of the traction engine also allowed the application of mechanical power to field work. Huge gang plows were soon being hitched to these steam behemoths, and millions of acres of the Plains were broken.[4]

While steam engines helped to expand the American frontier, ultimately there were limits to that expansion. The amount of arable land was fixed, and by the 1890s it was clear to many Americans that their era of free homesteading was coming to a close. Irrigation offered some possibilities, yet it was expensive and often limited by terrain. As the turn of the century approached, thousands of American farmers turned northwest to the Canadian Plains — the last large area of arable land on the continent.

The migration of American farmers to the Canadian Plains was paralleled by the expansion of American farm implement companies into the area. Plains farmers in Canada took advantage of this situation, and quickly accepted the new machinery. The early development of the Canadian Plains was therefore unique, because it coincided with the increased mechanization of agriculture. Indeed, the Candian Plains could be called a mechanized agricultural frontier.[5]

This early agricultural mechanization continued through to the 1920s, and was a logical result of the increasing investment in farm implements by Canadian Plains farmers. Unfortunately the kinds of machines farmers

were buying is not known because the federal census did not record such specifics at the time. The census did record farmers' overall investment in machinery, and a general trend is discernible. Between 1901 and 1921 Manitoba farmers tripled their machinery investment. In Saskatchewan and Alberta during the same period farmers increased their agricultural implement investments five times over.[6]

Such large purchases would indicate that Canadian Plains farmers were interested in labour-saving machines. They also bought such large quantities of machinery because it allowed them to quickly bring more land into production. Essentially the Canadian Plains became an agricultural heartland in just a few short decades, an accomplishment which would not have been possible without agricultural machines. Table 1 gives a clear indication of how great the strides were.

TABLE 1
OCCUPIED, IMPROVED, AND FIELD CROP AREAS IN SELECTED YEARS (in acres)[7]

	*Occupied	Improved	Field Crops
MANITOBA			
1901	8,843,347	3,995,305	2,756,106
1911	12,184,304	6,476,169	5,161,858
1916	13,436,670	7,187,737	5,116,661
1921	14,615,844	8,057,823	5,857,635
SASKATCHEWAN			
1901	3,833,434	1,122,602	655,537
1911	28,099,207	11,871,907	9,136,868
1916	36,800,698	19,632,206	13,973,382
1921	44,022,907	25,037,401	17,822,481
ALBERTA			
1901	2,735,630	474,694	188,476
1911	17,359,333	4,351,698	3,378,365
1916	23,062,767	7,510,303	5,505,872
1921	29,293,053	11,768,042	8,523,190

* The federal census from which these figures are taken defined "occupied" as the acreage which had been purchased or homesteaded, "improved" as the acreage which had been cultivated, and "field crops" as the seeded acreage.

These gains were the result of increasing mechanization, and not merely from more farms coming into production. This is clear when one compares the improved acreage to the number of farms between 1901 and 1921 in Saskatchewan, the leading agricultural province. Four years before it became a province, there were 13,445 farms in Saskatchewan. There were over one million improved acres, and the average improved crop acreage per farm was just eighty-four acres. By 1911, the number of farms had increased to over ninety-five thousand. Improved acreage was almost twelve

million acres, and the average improved and field crop acreage per farm had increased to 125 acres. In 1921, there were just under 120,000 farms in the province. Improved acreage was over twenty-five million acres, and the average per farm was now 209 acres.[8] There were more farmers, and they were farming more land, but each farmer was handling more land because of agricultural mechanization.

Agricultural engines played an important role in the evolving mechanization, and the resulting gains. Emil Julius Meilicke, a German immigrant who had farmed in Wisconsin and Minnesota before homesteading south of Saskatoon, used machine power to establish his new farm. As Meilicke recalled,

> When I was still breaking my farm in 1904, I hired two tractors and other machinery to speed up the work. People thought I was crazy to go to all this expense, but I got my farm into cultivation at once, and in 1905 ... we harvested over 46,000 bushels of wheat.... It brought me sixty-four cents a bushel. My extravagance paid.[9]

There were many others who recognized the benefits of machine power. One observer, who travelled through Saskatchewan and Alberta in 1909, estimated that one-half of the breaking in those two provinces that year was done by steam traction engines.[10] These engines, and their successors the gasoline and kerosene tractors, also provided the power to thresh millions of bushels of wheat, oats, and barley. Like their American counterparts, Canadian Plains farmers found that the steady power of an engine was ideal for the demands of threshing.

Canadian Plains agriculturalists recognized that mechanical power sources were the way of the future, and purchased accordingly. Canadian suppliers could not keep up with the demand. In 1907 Canada imported 528 engines for agricultural purposes. By 1911 this figure had climbed to over 2,000 units, with a value of $3.5 million, imported principally from the United States. In 1919 nearly 15,000 tractors were brought in from the United States, and in the next ten years close to 125,000 such units were brought in from south of the border.[11]

This early mechanization of Canadian Plains agriculture had certain interesting side effects. The layout of farm yards was affected by the early mechanization. Saskatchewan farmers, for example, were advised by their provincial Department of Agriculture to plan their farm yards with machinery in mind. Specifically, they were advised that,

> Means of ingress and egress must be provided on either side to give access to the fields. In threshing time it must be remembered that a large traction engine pulling a separator, a caboose and probably a tank, cannot turn a sharp corner and negotiate a narrow gateway without considerable risk of running into a gatepost.[12]

While mechanization had a considerable impact on farming operations, farmers did not replace their horses right away. Horses continued to be used extensively, even exclusively, on many farms. New mowers and reapers might appear, but it was still horses which pulled them. Yet

neither horses, nor animal and human power combined, could account for the great strides in bringing land into production. Whether during breaking or at harvest time, once harnessed the agricultural engine had an important, and increasing role in supplying power on the farm.

Even longtime admirers of the horse recognized the importance of the new power sources. A.F. Mantle, Saskatchewan's Deputy Minister of Agriculture from 1910 to 1916, argued that,

> We do not relish the thought of horseless farms but welcome the advent of the tractor that will relieve our horses of the slavish part of their work, permit us to reduce their numbers, and enable us . . . to plow or summerfallow deeper and better. . . . In threshing operations man was displaced by the horse — and has never regretted it (at least those of us who have ever swung the flail have no regret!); the horse in turn was displaced by the steam traction engine — and neither the horse nor man regret it; now the steam engine is being largely displaced by the gasoline tractor — and no fireman regrets it; perhaps soon the tractor will give place to the electric motor! Why then need there be any sentimental regrets or doubts about displacing the horse as a source of power for breaking sod and plowing summerfallow?[13]

Farmers had several incentives to move from animal to mechanical power, not the least of which were the problems associated with using temperamental animals. During the early years of farming in Alberta farmers claimed to break sod by hand because their horses were too wild. According to one report about such animals,

> Thus his errant ways seldom allowed him to go straight very long and as he meandered the plowing took on much the appearance of being done haphazard or several different ways at once. Then the plowman turned the team loose or tied them up and turned over the wandering sods himself.[14]

The transition from horse to mechanical power was not accomplished without considerable debate, such as arose at the Dry Farming Congress at Lethbridge, Alberta, in 1912. At that gathering a representative of the Rumley Company, the manufacturer of a popular line of engines, made the statement that tractors would soon replace horses for heavy work on the farm. He was immediately challenged by several farmers whose experience with horses had been positive. The Rumley representative countered these arguments with statistics which positively compared the cost of keeping an engine to the upkeep of horses. He also claimed that, since crop production did not keep pace with settlement, sooner or later it would be necessary to convert completely from horses to tractors.[15]

What the Rumley representative meant by this last statement was that horses were themselves an incentive to get power equipment. Horses consumed the production of many acres of land. By converting to tractors, the land normally set aside for pasture and feed could be planted with cash crops.[16]

In spite of the obvious benefits of power equipment, and their desire to have it, farmers did not adopt these new machines for general farm use all at once. Steam and gasoline engines made tremendous contribu-

tions in plowing and threshing, but horses were still used for most other farm tasks. The problem was that much of this power equipment suffered from serious defects in the eyes of farmers. Steam traction engines, for example, were prone to starting fires, and needed a great deal of water to operate, something not always plentiful in some parts of the Canadian Plains. The early gasoline engines were generally hard to start and, like their predecessors, were often huge machines whose weight bogged them down in wet fields, or pushed them through culverts and wooden bridges. The smaller units which followed in the evolution of the farm tractor were often too small for the heavy work done on the Canadian Plains.[17]

Farmers themselves ran risks when operating the early equipment. Scarcely a threshing season went by without reports in the newspapers about boiler explosions or other such accidents which maimed and even killed the operators. Most farmers recognized the dangers, and sought expert advice. The colleges of agriculture of the Canadian Plains universities responded, establishing short courses which taught the fundamentals of steam and gasoline engineering. In his 1912 Report to the President, the Dean of Saskatchewan's College of Agriculture reported that,

> Short courses of four days' duration in gas traction engineering were held at Tantallon, Lemberg, Davidson, Abernethy, Nokomis, Marcelin and Govan under capable instruction and later a short course was held at the College under the supervision of Prof. Greig. All the short courses held were well patronized and the instructors well received. . . . The numbers reached directly through these short courses totaled about 1,530.[18]

In spite of the problems and dangers, farmers still purchased the new machines. The simple fact was that the equipment made their work easier, and increased their chances of planting and harvesting crops. The attraction of the new machinery was so great that some farmers bought too much of it. An acute British observer, travelling on the Canadian Plains prior to World War I, noted that the "machinery man" was often a villain in the "Western drama." According to Elizabeth Mitchell,

> The great firms of Ontario, or American firms with agencies in Canada, send out skilled salesmen into the country districts, and individual farmers are persuaded to buy a great many things beyond the strictly necessary ploughs and binders, and, in the absence of capital, to mortgage their farms to the machinery company. Then the valuable machine is perhaps left exposed to the weather because there is no shed big enough for it; it goes wrong in some detail, and the farmer is no skilled mechanic to understand the trouble; and there is no machinery shop within hundreds of miles. In some such way as this, the farmer often gains very little and is left burdened with debt.[19]

The implement dealers held a different view of the matter. Responding to a Saskatchewan government initiative to regulate farm equipment selling, F.H. Crane, manager of the Saskatoon branch of Canadian Fairbanks-Morse Company, argued that,

> It must be admitted, however, that many times a farmer in his enthusiasm will purchase of his own free will and accord, that is, without being pressed to do so by the wholesaler or the dealer, and to obtain credit he makes a false statement as to

> his financial standing.... When you consider that less than one half of the farmers' notes which fell due last fall, have been met, you can realize the vast amount of money which is outstanding on our books at the present time....[20]

Steam engines and tractors were to play an additional role in the early settlement period, that of quickly breaking huge tracts of ranch and grazing land for wheat production. All that was lacking for this to take place was an incentive, and the high wheat prices of World War I provided that essential ingredient. Such was the case of C.S. Noble of Claresholm, Alberta. Noble had migrated from North Dakota to the future province of Alberta in 1902. He was immediately successful in farming and real estate. The high wheat prices during the war led him to purchase the Cameron Ranch, situated near the confluence of the Oldman and Little Bow Rivers. He immediately set to breaking the twenty thousand acres of rangeland. His son later recalled the event:

> Headquarter buildings were erected and four additional camps with barns and living quarters were set up at convenient points to work outlying parts of the farm. Lumber and supplies were moved out from Nobleford by wagon, trucks, and steamers with wagon trains.
>
> In 1918, 10 steam tractors ran night and day to break up the land. Dams had been built across draws to hold water and large horse-drawn tanks carried it to the steamers. Coal was hauled for them from the Taber mines. Nearly 400 acres were broken each 24 hours. It was a memorable sight and the smoking monsters broke up the whole tract in record time.[21]

While wartime demands for wheat spurred mechanization, the postwar collapse of the international wheat market postponed further development. Following wartime controls, the Winnipeg Grain Exchange reopened to trading in wheat futures on 18 August 1920. The price of No. 1 Northern wheat averaged just over $2.73 per bushel in September 1920. A year later, however, the price had dropped to under $1.50 per bushel, and in October 1921 it had fallen again to under $1.20 per bushel.[22] In just over one year Canadian Plains farmers had seen the price for their principal crop drop by almost $1.60 per bushel. Such a catastrophic decline had an immediate effect on farmers' purchases, including machinery. Even though they may have wanted one, tractors became a machine farmers learned to do without. The connection between falling wheat prices and decreased tractor sales was direct, as shown in Table 2.

These figures support the argument that the mechanization of Canadian Plains agriculture was an ongoing process, yet also reveal that the pace of change was understandably subject to the farmers' economic condition. Canadian Plains farmers were intent on mechanizing, and did so when they had the means. When farmers were under duress, such as in the early twenties and with the start of the Great Depression, they held back on their purchases and waited until conditions improved.

While subject to the vagary of the wheat market, Canadian Plains farmers could not ignore the internal logic of a process such as mechaniza-

tion. Once under way, mechanization had a dynamic all of its own. For example, one of the consequences of mechanization was the loss of the skills required to farm with horses. This reinforced the general trend toward more power machinery because young farmers were increasingly oriented toward it. This was apparent to contemporaries such as Evan Hardy of the College of Agriculture at the University of Saskatchewan. In 1925 Hardy observed that,

> The horse pulling competitions are reviving a slowly dying interest in teamstership. Many of our men and boys, growing up or working on the farm, have been thinking more of the automobile truck and tractor than of training and driving horses. The lack of expert teamstership was evident throughout the contests....[23]

The increasing prosperity of the late twenties allowed many farmers to look at machinery other than tractors. The combine had appeared, and increased the overall trend toward mechanization. Canadian Plains farmers were interested in the possibilities of the combine because it combined the reaping and threshing tasks. As has been noted, the mechanical reaper was an early implement on the Canadian Plains. It only did part of the harvesting job, however, cutting the grain and tying it into sheaves. The sheaves still had to be "stooked" and left to dry, after which they were collected and threshed. Each step was labour-intensive and time consuming. Canadian Plains farmers also turned to machines to ease the threshing burden. In 1898 there were 368 threshing outfits in the entire North-West Territories, but by 1908 there were 3,219 in Saskatchewan alone.[24]

TABLE 2

TRACTOR SALES ON THE CANADIAN PLAINS, 1919-1931[25]

(Number of units sold)

YEAR	MANITOBA	SASK.	ALBERTA	TOTAL
1919	3,627	3,514	1,703	8,844
1920	3,671	4,229	2,379	10,279
1921	1,057	1,655	716	3,428
1922	1,361	2,475	386	4,222
1923	911	2,524	731	4,166
1924	465	1,213	434	2,112
1925	1,008	2,176	869	4,053
1926	1,498	3,704	1,311	6,513
1927	1,414	5,727	2,885	10,026
1928	2,209	8,703	6,231	17,143
1929	2,423	6,906	5,228	14,557
1930	1,541	4,350	3,100	8,991
1931	186	267	334	787

The combine allowed the grain to be cut and threshed in one operation. Such relatively complicated pieces of machinery had evolved over many decades. A patent for a combined harvester and thresher was issued

in the United States as early as 1828. A combined harvester was tested in Michigan in the late 1830s, and spawned other units which operated in the state until at least 1853. A year later one such machine was shipped to California, but was sold in 1856 and apparently abandoned shortly thereafter. Stripper type combines were also in use in Minnesota in 1884.[26]

The early experience with combines in California was successful, and during the 1880s a number of firms began producing the machines commercially. Combines were in regular use in the state during the next decade, and had begun to spread northward. In 1912 a representative of a Spokane, Washington, combine manufacturer attending the Lethbridge, Alberta, Dry Farming Congress boasted that combines were rapidly being introduced into Oregon, Washington, Idaho, Utah, and Montana. He suggested that it was just a matter of time before the machines would be in general use in those states. He also explained that while most of the then current models were designed to be pulled by horses and powered by drive wheels, some had gasoline engines to power them and the new models could be pulled by tractors.[27]

California was not the only grain-growing area to witness the evolution of a combine. In 1843 a stripper type machine was developed in Australia. It was modified in the 1880s by Hugh Victor McKay, and by 1910 McKay's Sunshine factory was shipping units as far away as Argentina. The success of the McKay combine attracted the attention of Canada's Massey-Harris Company, which developed its own version of the machine. Massey-Harris marketed its combines internationally, but did not sell them in Canada.[28]

Apparently Massey-Harris did not feel that there would be a market for combines on the Canadian Plains. Combines had been developed in areas where the climate permitted the uniform ripening of the grain, allowing what has come to be known as straight combining. The climate of the Canadian Plains did not favour this practice and, as has been shown, farmers in the area relied on their mechanical reapers and steam or gasoline driven threshers. This is not to suggest that there were no experiments with the combine on the Canadian Plains. In 1910 two farmers near Welby, Saskatchewan, imported a Holt twenty-foot ground-drive combine from California. They successfully handled six hundred acres of wheat during each of the three harvests between 1910 and 1912. In 1913 they planted their acreage to flax, and the combine was used on it. It is important to note that this rig was pulled by a tractor; a Hart-Parr 30-60 tractor, to be precise. When more combines appeared in the twenties there was a corresponding increase in the need for tractors to pull them.[29]

In 1912 the Holt Company claimed to have three of their combines operating in Alberta; one at Strathmore, one at Tilley, and one at Bassano. According to one contemporary source, "Some doubts are expressed as to the ability of the California method to conditions prevailing here, but

the Holt Co. have the faith of conviction and assert that they will win their way to favor."[30] Farmers on the Canadian Plains were doubtless concerned about having to wait until the crop was completely ripe before combining it. Their experiences with early frosts were probably a factor in the farmers' thinking. This problem was overcome by the development of the swather, and by the appearance of combines designed to pick up the windrows.

In 1910 two South Dakota brothers, Ole and August Hovland, built a swather as well as a thresher designed to pick up the windrows. Little came of it until Helmer H. Hanson and his brother Ellert, who had known the Hovlands, moved to Lajord, Saskatchewan. In 1926 they developed two twenty-foot swathers, and rigged a combine to pick up the windrows. Their progress was observed by officials of the International Harvester Corporation, which perhaps explains why that company was the first to market swathers in 1927.[31]

The development of the swather removed many of the farmers' concerns about combining, and from modest beginnings the sale of combines grew rapidly. In 1922 the International Harvester Corporation experimented with one of its units on the federal experimental farm at Cabri, Saskatchewan, while the Massey-Harris Company tested a twelve-foot, motor-driven combine at the Swift Current, Saskatchewan, Experimental Station. This latter test was so successful that the federal government purchased the unit the same year. The J.I. Case and International Harvester companies also sold a few machines in the province.[32] Once under way, combine sales soared, only to decline with the coming of the Depression. Table 3 shows the increase in sales in the late twenties and the impact of the Dirty Thirties:

TABLE 3
COMBINE SALES ON THE CANADIAN PLAINS, 1926-1931[33]

YEAR	MANITOBA	SASK.	ALBERTA	TOTAL
1926	2	148	26	176
1927	21	382	195	598
1928	206	2356	1095	3657
1929	158	2484	858	3500
1930	134	939	541	1614
1931	33	92	54	179

Combines offered farmers several advantages over traditional harvesting equipment. According to E.S. Hopkins, Dominion Field Husbandsman in 1928, a twenty-bushel crop, grown on six hundred acres, could be harvested by a binder and threshed by a separator for 17 1/2 cents per bushel. The same crop could be harvested by a combine for 9 1/3 cents per bushel. Farmers could also reduce their crop loss by harvesting with a combine. In 1928 the Swift Current Experimental Station ran tests

which showed a 1.16 percent loss with straight combining, and a 3.58 percent loss with a traditional binder and separator.[34]

What this meant to a farmer can best be appreciated by examining the case of an individual farmer. Anthony Tyson farmed near Neidpath, Saskatchewan, south-west of Swift Current. A partial account of his farm statistics appears as Table 4:

TABLE 4
ANTHONY TYSON'S FARM STATISTICS — 1917-1929[35]

YEAR	ACRES	BUSHELS THRESHED	WAGES	THRESHING
1917	120	1055	$343.50	$158.25
1918	155	950	57.75	176.00
1919	250	210	* .00	38.00
1920	250	00 (Hail)	283.00	8.00
1921	215	2631	390.20	430.45
1922	215	5400	607.00	923.00
1923	230	5280	410.00	800.00
1924	250	4150	362.50	566.80
1925	255	4716	320.00	773.40
1926	272	4678	284.00	701.70
1927	280	6162	435.00	1149.30
1928	270	8100	568.00	1409.56
1929	255	2400	366.00	338.76

* It is not clear why Mr. Tyson did not pay any wages for farm help in 1919. Perhaps he did not need any help that year because of the light crop, although the following year he was hailed out and still paid out nearly $300.00 for help. It is possible that in 1920 he had a hired man for other duties.

Using Mr. Hopkins's estimate of 9 1/3 cents per bushel to harvest a crop with a combine, had Anthony Tyson purchased a combine to harvest his 1927 crop, he would have spent $537.07 on the harvesting. His cost in 1928 would have been $753.30, and in 1929 it would have been $223.20. Over this three-year period he would have spent $1,549.57 using a combine, compared to the $2,897.62 he actually spent. The saving would have been $1,348.05. In addition, Mr. Tyson spent $1,369.00 on labour in this three year period. He may have been able to halve this figure had he used a combine during the harvest, thereby saving an additional $684.50. His total savings, therefore, would have been $2,032.55. With the cost of a combine at the time running between $1,200.00 and $3,000.00,[36] Mr. Tyson would have been close to paying off an initial investment in just three years.

These calculations are general and the situation with the combine hypothetical. Still, they do emphatically illustrate the gains to be made by obtaining a combine. Farmers such as Mr. Tyson could do their own rough calculations, and the result was the increasing use of combines.

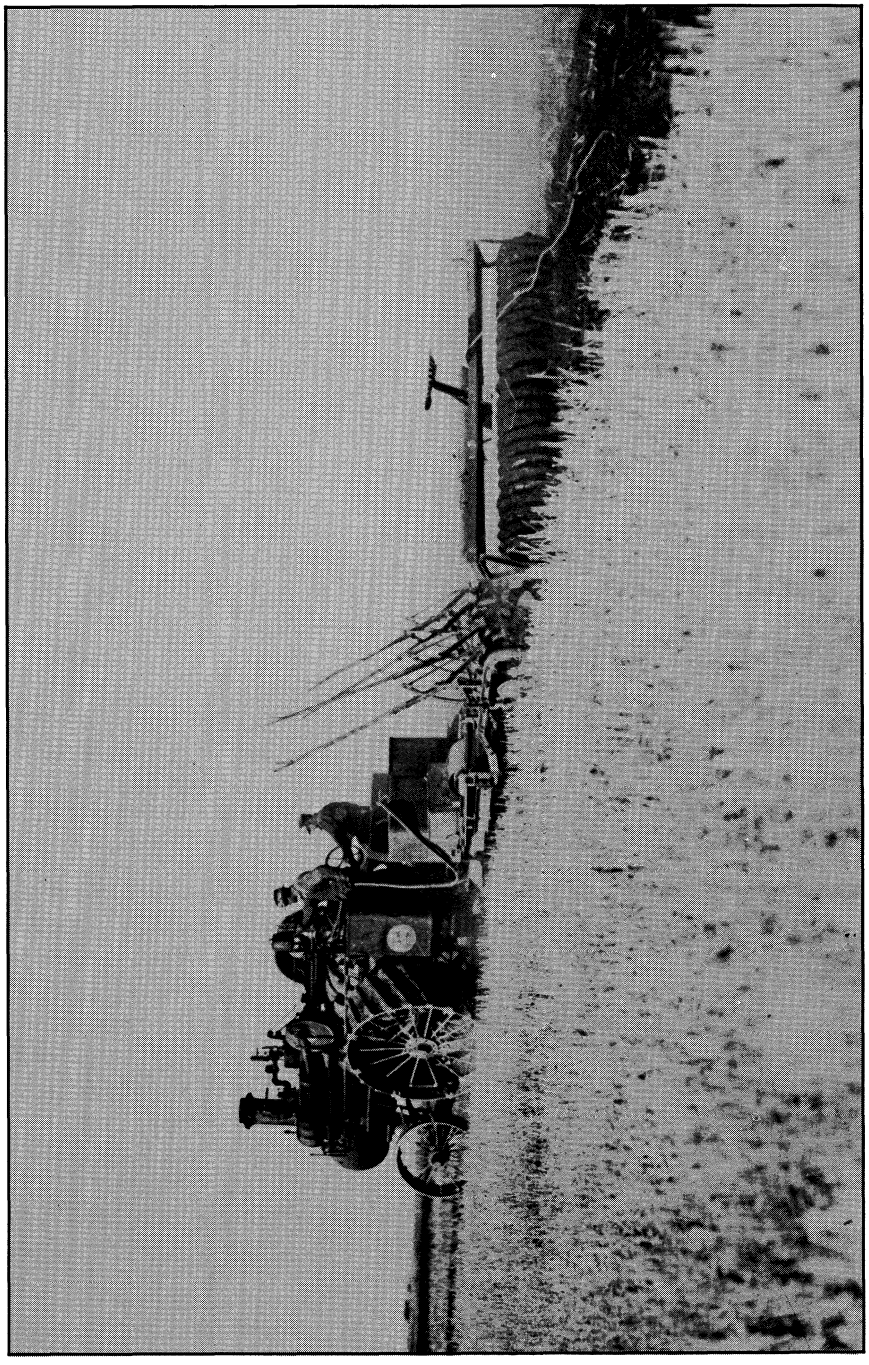

Figure 1: Steam traction engine with plow and packer, Oxbow, Sask. District (circa 1910).

Source: Saskatchewan Archives Board Photograph R-A 108.

As Mr. Tyson's records indicate, the cost of farm labour was an important consideration in farming mathematics. Labour was not cheap, when it could be found. There was never enough labour for farmers, particularly at harvest time. Excursion trains were organized to bring badly needed help from Eastern Canada to the Plains. Still, there never seemed to be enough help.[37]

Furthermore, the wages paid were only part of the cost of labour. At harvest time the farm family was expected to provide board and lodging to the temporary workers. In addition to being costly, harvest labour put a serious burden on domestic arrangements in the farm home. As one contemporary observer noted, "The Combine is a farm machine which reduces the labour for women on the farm. The drudgery of cooking and serving the harvest hands is eliminated with the reduced need for labour to do the harvesting." The farm wife may have played an unheralded role in increasing mechanization, since the number of harvesters required for the two similar sized crops of 1924 and 1929, went from 21,000 men to virtually nil at least in part because of the use of combines.[38]

While the combine helped the farmer with some of his problems, particularly during the harvest, it also created new ones for him. The combine was most effective when the crop had reached uniform ripeness. This meant careful attention to spring seeding to insure that the entire crop reached maturity at the same time. A farmer might leave a green field to ripen, but this increased the risk of frost damage. As a contemporary observer concluded,

> ...the use of the Combine is not a cure-all for farm ills. The use of it may assist, however, in solving some of the problems of the harvest. The successful Combine users are those who farm throughout the year with the use of the Combine as the goal.[39]

The growth in combine use in the late twenties thus heralded a major change in farming methods on the Plains. Traditionally, the peak work period of the farmer's year was the fall — harvest time. The combine shifted this period to the spring. By eliminating the need for large crews to operate the binders and separators, and increasing the need to plant early so as to insure a ripe crop in time for combining, the combine altered the farmer's work year drastically.

The combine also reinforced the trend toward power equipment. Not only did farmers now need tractors to pull the combines, they also saw the need for power to pull larger tillage and seeding implements in the spring. Unfortunately there are no statistics available on how much of this machinery Canadian Plains farmers were purchasing, but it must have been substantial because implements designed to be pulled by horses could rarely be used with tractors. Fortunately there are statistics on another farm machine, the truck, and it is possible to glimpse the impact of the combine.

The combine spurred the use of trucks because combines could hold a wagonload of grain in their tanks. Rather than haul the combine to a storage area for unloading, many farmers saw the logic of unloading the combine in the field and hauling the load out by truck. This method also saved the farmer from hiring additional and expensive horses, wagons, and men to drive them, to haul the grain to an elevator. This effect is documented by the increase in the number of truck registrations in the late twenties. In 1926, for example, Saskatchewan had 8,688 trucks. The following year saw an increase to 11,346, and by 1929 there were 18,671 trucks registered in the province.[40]

Combines also had an impact on the sale of other types of machinery, notably threshers. Unfortunately records on such sales are incomplete. In 1928, the first year in which thresher sales figures are available, threshers outsold combines 6,247 to 3,657 on the Canadian Plains. The following year, however, there were 3,500 combines sold compared to 2,095 threshers. In 1930 threshers regained the advantage with 2,046 sales to 1,614 combine sales. In just three years combine sales had gone from half that of threshers to essentially equal footing.[41]

Thresher sales were also affected by the coming of the Great Depression, and in 1931 only 445 units were sold on the Canadian Plains compared to 179 combines. Combines continued to take second place to threshers in sales during the early thirties, but by the latter half of the decade combines had gained the lead. By 1940 combines were consistently outselling threshers by a wide margin in the three Plains provinces. In 1945 the trend was firmly established, and combines outsold threshers 5,940 to 88. The transition begun in the late twenties had been resurrected by profits and good crops during World War II. By 1951 there were nearly 43,000 combines in Saskatchewan alone.[42]

The mechanization of Canadian Plains agriculture prior to 1930 was pronounced. This trend was so strong that this mechanization could be described as a characteristic of the type of farming in the area. Looking back upon the period, the 1955 Saskatchewan Royal Commission on Agriculture and Rural Life observed that,

> A strong trend towards tractors and combines was evident in the 1920's. One can assume that, had serious economic depression and drought not occurred during the 1930's, the change from horse to tractor power would have been complete by the early 1940's.[43]

Canadian Plains farmers who did not keep pace with mechanization paid a harsh price, however, and that was being forced to give up farming. Mechanization was a mixed blessing, for while it allowed farmers to do more, it eventually meant fewer farmers were required to work the land. The first indication of this process began to appear in the mid-twenties.

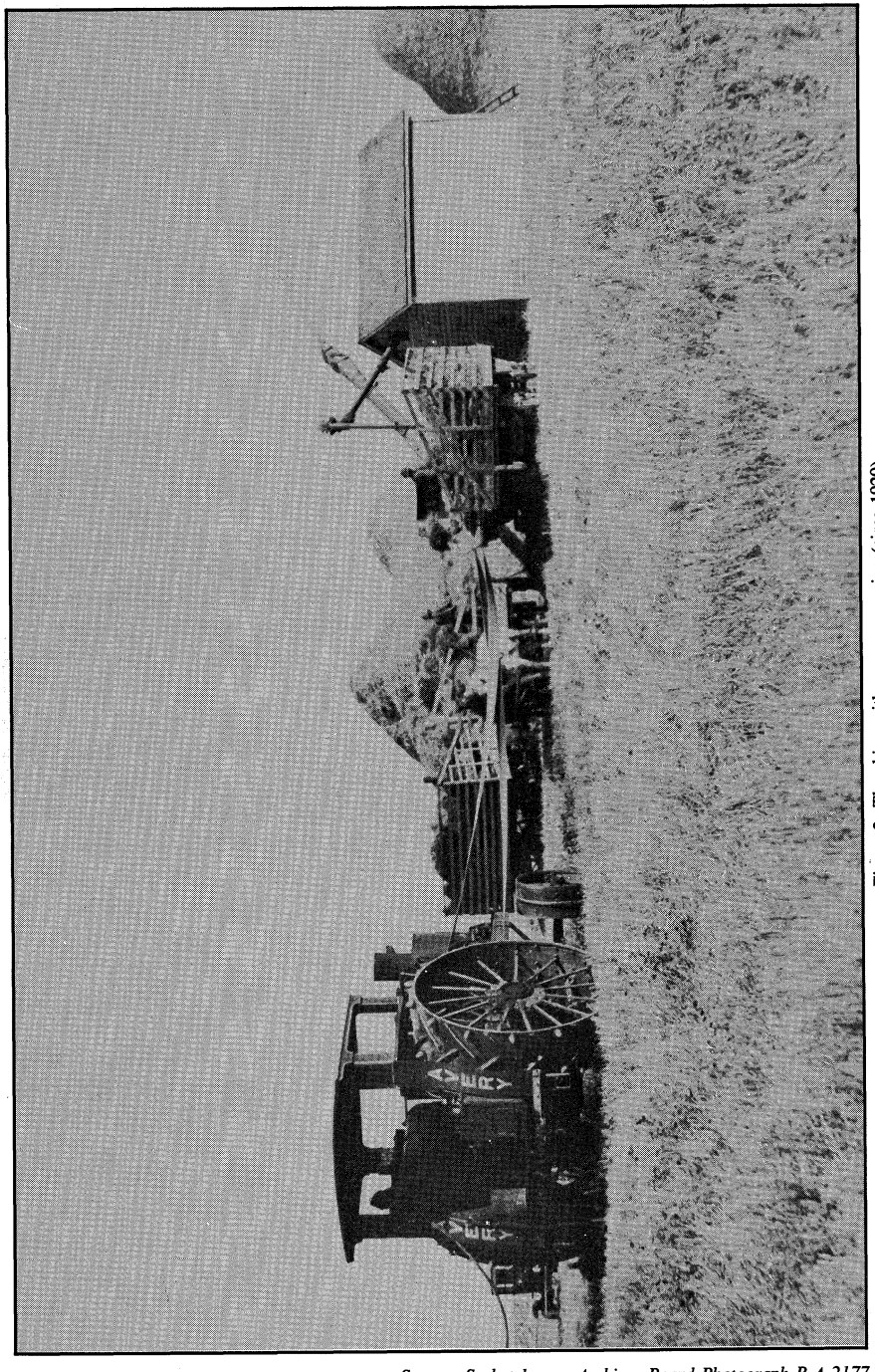

Figure 2: Threshing with an avery engine (circa 1920).

Source: Saskatchewan Archives Board Photograph R-A 2177

Saskatchewan, the leading agricultural province, first noted this effect of mechanization as early as 1926. For the first time since it was settled there was a decline in the number of farms in the province that year. While other factors, such as the fall in wheat prices in the early twenties, were no doubt operating, it appears that some farmers in Saskatchewan were taking over their brethren. They were able to do this because increased mechanization allowed them to work more land.

In 1921 there were 119,451 farms in Saskatchewan, but five years later there were almost two thousand fewer. The entire decline appears to have been in the number of farmers working between 101 and 200 acres of land. In 1921 there were 37,059 farmers in Saskatchewan in this category, yet five years later there were only 33,276, a drop of nearly four thousand. Half of this number appear to have expanded their holdings because there was an increase during this period of almost two thousand in the number of farmers who were working 201 or more acres; from 80,570 to 82,520. The remaining two thousand were likely those who left farming. In terms of the percentage of holdings, those in the 101 to 200-acre category fell from just over 32 percent of provincial farmers to just over 28 percent. Farmers holding more than two hundred acres increased from just under 67.5 percent to over 70 percent of all provincial farmers. As might be expected, there was also an increase in the average size of farms, from just over 368 acres to almost 390 acres.[44]

As North America's last major agricultural frontier, the Canadian Plains area benefitted from the mechanization of agriculture under way when it was first settled. Canadian Plains farmers knew the advantages of mechanization, and purchased accordingly when they could afford it. This resulted in phenomenal strides in the amount of land devoted to agriculture during the first decades of the twentieth century. Steam traction engines, in particular, aided in this development, before giving way to the more efficient gasoline-powered tractor. Tractors were supplemented by combines during the twenties as the trend to mechanization continued.

The 1920s, particularly the latter half of the decade, were thus of critical importance to agricultural mechanization in the area because they were the second stage of a process which transformed farming on the Canadian Plains and laid the base for our modern form of agriculture. There were profound changes in the implements farmers used and in their traditional work year, with a premium being placed on early planting, and a lessened harvest burden. Not all farmers benefitted to the same degree, or mechanized at the same rate. Hundreds of them paid a harsh penalty for delaying mechanization, and were forced off the farm. They were soon to be joined by thousands more when full mechanization resumed during World War II, the effect of which was seen in the late 1940s and during the 1950s.

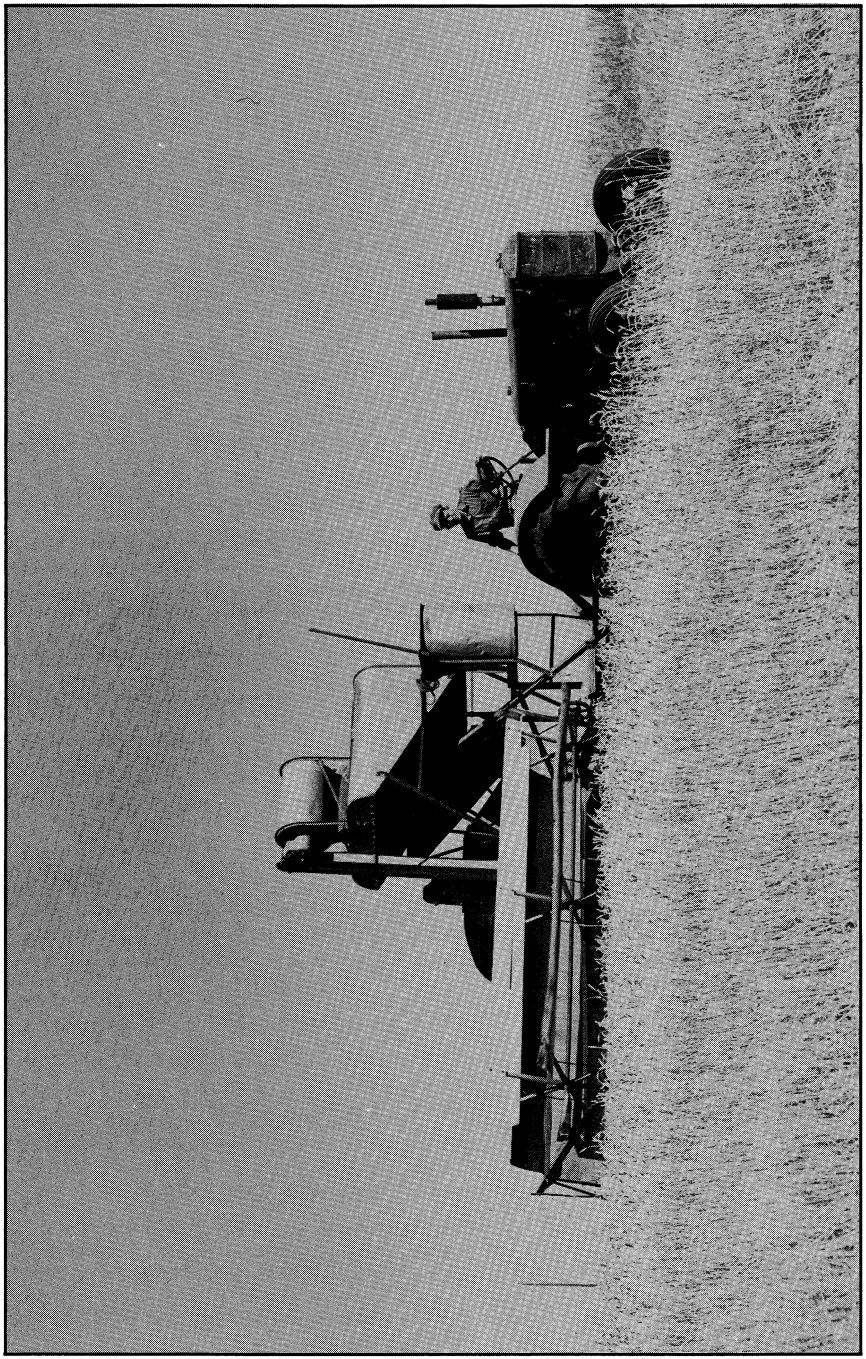

Figure 3: Combining south of Saskatoon, October, 1951.

Source: Saskatchewan Archives Board Photograph R-A 11,309(2)

NOTES

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Book Reviews

Building Beyond the Homestead, edited by David C. Jones and Ian MacPherson, with introduction and conclusion by Ian MacPherson. Calgary: University of Calgary Press, 1985. Pp. 235, maps, tables, illustrations.

When introducing this collection of articles, all but one of which were presented to "The Forgotten Majority: A Conference in Canadian Rural History" at the University of Victoria in 1984, Professor MacPherson points out that while use of the staples theory or analysis of protest parties have provided valuable insights, the resulting works "have ignored totally or partially significant areas in the development of rural life on the Prairies." Matters inadequately treated include "class tensions in rural communities, countryside-village-town relationships, the role of religious and voluntary organizations, and the process of outmigration," as well as "aspects of rural thought on education, family life, morality . . . industrialization and urbanization." During the 1970s, however, for reasons such as an increasing awareness of the growing rural crisis, a number of academics, pursuing varied interests, have been seeking to reduce the deficiency by examining rural communities and rural culture much more thoroughly. This series of writings, for the most part spanning the 1890-1930 period and dealing with such diverse topics as the settlement process, frontier marriage, institutions created to make rural life more healthy and satisfying, farm labour and mechanization, adaptation of past farming experiences to prairie realities, and relations between providers of capital and farmers, is one of the results.

Two articles deal specifically with western rural settlement. James Richtik in "Settlement Process in the 1870s: An Example of Manitoba's Pembina Mountain" examines English-speaking settlers, mainly Ontarians or having Ontario connections, who settled near present-day Carmen, the homestead district then most removed from Red and Assiniboine settlements. John Lehr in "'The Peculiar People': Ukrainian Settlement of Marginal Lands in Southeastern Manitoba," on the other hand, analyzes the populating of the Stuartburn region between 1896 and 1912. In both cases, original settlers (primary decision-makers) sought locations possessing certain resources: wood, water, hay and, with differing emphasis, productive soil. Kinship ties, and among Ukrainians, religious affiliation, encouraged homesteaders to settle adjoining lands. Settlers subsequently entering the two areas (secondary decision-makers) acted differently. Ukrainians continued to be drawn to southeastern Manitoba by kinship ties, where they segregated themselves along religious lines, even though it often meant taking up increasingly marginal land. For later English-speaking settlers, according to the evidence thus far discovered, "the dominant factors determining individual choices were the physical characteristics of individual sites."

In certain respects, Paul Voisey's "A Mix-up Over Mixed Farming: the Curious History of the Agricultural Diversification Movement in a Single Crop Area of Southern Alberta" parallels Lehr's article. Both deal with perceptions settlers had of themselves as farmers, owing to their background and experiences. Ukrainians, leaving an area of peasant agriculture where few had farmed over twelve acres, were intent upon establishing semi-subsistence farms, emphasizing livestock much more than crops, at least initially. Consequently, they chose a location with a wide resource base. In their eyes, twenty acres of good land on a quarter section was more than adequate — bush and low lying areas would provide many of their needs as well as certain marketable commodities. Not until near the end of the period Lehr examines did sons of the first pioneers by out migration demonstrate rejection of the type of farming envisioned by their parents.

Voisey's subjects, on the other hand, migrated to the Vulcan area from Ontario and the United States beginning in 1904. About 90 percent came from east of the 100th meridian. Such people had lived in mixed farming country, displayed much enthusiasm for mixed farming, and "insisted that mixed farming not only paid better, but represented agriculture's most advanced stage of development." Yet in Alberta they did not follow that method. Having selected an area better suited to specialization in wheat (and also intent on being commercial farmers) they promptly proceeded to raise that crop. Just how they accommodated themselves to the contradiction between stated beliefs and adopted practices is well-detailed in this article.

A trilogy of writings in the book deals essentially or partially with personnel doing the actual work of farming, with two having as their subject the farmhand. Joseph Cherwinski in "In Search of Jake Trumper: the Farmhand and the Prairie Family Farm" delves into such topics as the sources farmers looked to for hired hands, what characteristics they desired farmhands to possess, causes for disagreement between farmers and employees, the farm wife's view of the farmhand, what farm workers expected beyond competitive wages and job security, and the part played by farmhands in the assimilation process. That "skilled, reliable labor was scarce and expensive," that the chances of a farmer retaining a farmhand for over a year were small, and that both the farmer and his hired man viewed their relationship as a temporary expedient of an economic nature are some of the conclusions reached. Cherwinski contends that people like Jake Trumper, the ideal farmhand in W.O. Mitchell's *Jake and the Kid*, probably never existed. Moreover, why they would at least be a rarity is clear. Farmers in general, having to consider their own economic circumstances and realizing that costs other than those for labour were beyond their control, were inclined to take lightly advice that the answer to their labour needs lay in providing secure employment at competitive wages and in treating the hired hand very much as one of the family.

Though Cecilia Danysk concentrates on the period from the war years to the late 1920s rather than from 1890 to 1930 as does Cherwinski, her article, "'Showing These Slaves Their Class Position': Barriers to Organizing Prairie Farm Workers," constitutes a valuable sequel to the latter's contribution. Like Cherwinski, she comments on farmhands' working conditions, wages and so forth, but is primarily concerned with unsuccessful attempts by the Industrial Workers of the World and the One Big Union to provide agricultural workers with a trade union organization they so badly needed, owing in part to their not being covered by any ameliorative labour legislation. In the course of her work, Danysk pinpoints numerous internal constraints which made unionization of farmhands next to impossible, for example, the nature of the constituency to be unionized, isolation of and difficulties in communication with workers, and the type of work they performed. To these were added such external handicaps as police actions and the position of the farmhand vis-à-vis the law. The foregoing, plus other control mechanisms, designed to provide agriculture with a "large, cheap and tractable" work force, constituted "insurmountable barriers to the organizers who labored to bring the benefits of collective action to prairie farm workers." As a consequence, labour organizers succeeded in doing little more than agitating and disrupting work here and there on a temporary basis.

While Cherwinski and Danysk are concerned with farm workers in general, Ernest Ingles examines only one segment of the total labour force, an element somewhat surrounded by myth, in "The Custom Threshermen in Western Canada 1890-1925." And he casts substantial light on the subject when discoursing on such of its aspects as the economic status and characteristics of owners of steam threshing outfits, problems associated with their operation and movement, the ratio of outfits to farms in existence, the financial side of their acquisition and operation, relations between farmers and threshermen, the composition of threshing crews and their wages, life on a threshing crew, and efforts by threshermen to organize associations. Also explained are how and why the large steam threshing outfits, beginning in the war years, gradually gave way to smaller, gasoline-powered equipment owned increasingly by individual farmers and how and why this new machinery in turn encouraged adoption of the combine. An interesting result of the existence of steam threshers was the enactment of numerous laws and bylaws by public authorities, in the odd case to assist but generally to control and regulate the activities of threshermen. On the basis of his findings Ingles credits custom threshermen with making an important contribution to the development of western Canada's grain-based economy. Above all, between 1890 and 1925, they "enabled undercapitalized farmers to harvest their crops in a timely and economical manner." At the same time, they introduced the farming community to power farming.

Like the three articles just discussed, three others dealing wholly or extensively with rural prairie women and women's concerns might also be characterized as forming three parts of a whole. To describe them briefly, though perhaps too simply, the first examines farm women's place in prairie society, the second, a variety of matters of interest to an important farm women's organization and, the third, a movement whose activities in specific areas were high among such women's priorities.

Elaine Leslau Silverman's "Women's Perceptions of Marriage on the Alberta Frontier" is a synthesis and analysis of data collected through interviewing 130 women who settled there between 1900 and 1930. It describes rural marriage as something expected of women by their parents and their community, "an appropriate step into adulthood," which need not embody warmth between participants. It was, in short, a "working partnership" which facilitated economic survival and reproduction. Most farm women did not see themselves as members of the middle class or subscribe to its myths. Rather, they "defined themselves and remained working class — not economically perhaps, but culturally and psychologically." The psychology and economy of marriage, together with other factors, not surprisingly, imposed restrictions on women's actions where creating and participating in organizations and institutions was concerned: "They could only build community institutions from which they could quickly disentangle themselves and *hurry home*. [Italics mine] Their urge to create women's institutions which could embrace on the public stage all kinds of women . . . was often repressed."

One of the organizations which prairie farm women founded and participated in and from which most could no doubt "quickly disentangle themselves and hurry home" is discussed by Rudolph Marchildon. "Improving the Quality of Rural Life in Saskatchewan: Some Activities of the Women's Section of the Saskatchewan Grain Growers, 1913-1930" examines three broad subjects of interest to farm women: women's work on the farm, marketing such farm by-products as butter and eggs, and improving cultural, social and health facilities in rural communities. Among specific matters expanded upon are the acquisition of domestic help especially during harvest, easing women's burden by electrification of the farm and/or adoption of labour-saving devices, provision of restrooms in local trading centres, the construction of community halls and access to library facilities, and the improvement of rural medical services, especially respecting availability of nurses and the creation of health centres. Of women's activities in such areas (which were not without success), Marchildon states, "their underlying concern always was the quality of rural life as a whole," and he further concludes: "Implicit in all their activities was a belief that a reordering of society in general was necessary; a society where the 'honest yeoman' and his family would take their rightful place as equals with their urban counterparts in the affairs of the world."

Achieving a measure of progress toward certain Western Grain Growers' Association (WGGA) goals was the Saskatchewan Junior Red Cross. Why it took such firm root in the province, and why it survived beyond the Depression and World War II are set out by Nancy Sheehan in "The Junior Red Cross Movement in Saskatchewan, 1919-1929: Rural Improvement Through the Schools." It was, among other things, a body through which "Country life enthusiasts and child-savers worked together to provide a clean, wholesome rural environment as the best way to conserve and enhance child life." Sheehan's conclusions respecting its work in the fields of health and education, it is worth observing, are in complete accord with the broad objectives of the WGGA as expressed above by Marchildon: "The JRC did something for children — it improved their health, character and civic mindedness.... The whole child was being educated — the physical, the moral, the emotional, and the intellectual...."

The final article in the volume is "An Exceedingly Risky and Unremunerative Partnership: Farmers and Financial Interests Amid the Collapse of Southern Alberta" by David Jones. Dealing with both parties to the partnership, it describes how individuals on each side came to stereotype the other and discusses examination by provincial authorities of both financiers' and farmers' complaints. Substantial attention is also devoted to, among other things, an analysis of bank branch records to help determine how the two parties fared in their dealings with each other during the years 1915 to 1926. Looking back over an even longer period of time, Jones explains the extension and acquisition of credit and certain of its end results: "In the settlement period perhaps the basic characteristic of the investor mentality was the belief that the boom would never end and that the primal facts of life were expansion, ever augmenting property values, regular and increasing dividends. Farmers were as duped by these assumptions as capitalists. Certainly neither had a clear vision of the trauma, the loss and the perplexing morality play in store for them when their partnership dissolved in enmity, amid rack and ruin...." Banks (and even more so mortgage companies) and farmers all suffered setbacks, with debt adjustment being an unforeseen but very important by-product.

All in all, *Building Beyond the Homestead* is a very worthwhile addition to the growing body of publications on Western Canada and is particularly welcome in view of its concentration on rural subjects. It is to be hoped that it will spark further research into neglected areas such as those singled out by Professor MacPherson. That additional research into such matters as well as those already examined is desirable is at times also indicated directly or indirectly by contributing scholars. As an example of the latter, consider the writings of Cherwinski and Danysk. Though their works complement each other very well, they are not totally agreed on factors leading men to become farmhands after World War I. To what extent was this owing to a belief that they might progress from there to farm ownership? Cherwinski asserts: "... the opportunity for the hired

hand to make it in agriculture had all but vanished after the war, so there was little incentive to continue to endure life on the farm." Danysk, on the other hand, states: "Although the goal was beyond the reach of most farm workers by the 1920s, the dream endured, kept alive by the promises of immigration agencies and by government propaganda."

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"We Were the Salt of the Earth!": The On-to-Ottawa Trek and the Regina Riot by Victor Howard. Regina: Canadian Plains Research Center, 1985. Pp. 206.

"We Were the Salt of the Earth!" by Victor Howard, a narrative of the On-to-Ottawa Trek and the Regina Riot, deals with the origin and events of that highlight of Canadian labour history in the Hungry Thirties. Its usefulness as a history of the Trek, however, is marred both by the author's style of writing and his interpretation of the events surrounding the Trek.

The style tends to be flippant and replete with trivia, snippets of irrelevancies and idle speculation. The positive assessments he makes of people, organizations and events are often countered by negative remarks that undermine what has already been stated. Even more important, his assessment of some of the key features of the Trek are at variance with the facts as we know them. This is why the book leaves us with a feeling of frustration, disappointment and even anger.

Our critical review of *"We Were the Salt of the Earth!"* is based on the following evaluation of the Trek, its significance and its place in Canadian history. The 1935 On-to-Ottawa Trek of striking British Columbia relief camp workers was one of the epic struggles of Canadian labour during the Hungry Thirties. It helped to shape Canadian history. It resulted in the abolition of the 20-cents a day relief camps. It contributed significantly to the defeat of the Tory government of Prime Minister R.B. (Iron Heel) Bennett in the fall of 1935, the election of a labour majority to Regina City Council, and the establishment of unemployment insurance in 1941.

The Trekkers developed imaginative and innovative forms of militant extra-parliamentary political and economic struggles requiring a high degree of self-discipline, courage and political acumen. The Trek won a high degree of public support right across the country. It was led by men who placed the welfare of Canada's youth above their own personal welfare.

The On-to-Ottawa Trek and the strike that preceded it were efforts to bring public pressure on the Bennett government to institute a programme of work and wages in place of the hopeless future that faced single young unemployed in the 20-cents a day relief camps. By no stretch of the imagination could it be constituted an attempt at revolution, or an attempt to overthrow constituted government and law and order as continually and falsely charged by the Prime Minister of the day and the heads of the Royal Canadian Mounted Police (RCMP).

The Regina Riot of 1 July 1935 need not and never would have taken place had it not been for the unprovoked attack of the RCMP and city police on a peaceful meeting of Regina citizens and Trekkers. By the same token the withdrawal of the police at any point during the riot would have ended it then and there. The excuse used by the police that they just wanted to arrest the Trek leaders at the meeting does not stand up. Only a few of the leaders were at the meeting that night. The leaders could have been arrested at any time during the day, while they were eating at cafés with the men or attending committee meetings. On the day of the riot (which took place in the evening), the Trekkers were in negotiation with the provincial government over ways and means to call off the Trek and return to British Columbia. The RCMP had previously closed all avenues of departure for the Trekkers — they would not let them leave on foot, by truck, by passenger train or by freight train.

One can only conclude that the 1 July attack was a calculated and deliberate attempt, ordered by Ottawa, to smash the Trek and teach Regina citizens a lesson for supporting it. The rioters on that fateful night were the police, not the Trekkers or citizens.

Mention must also be made of the involvement of Communists in the Trek, because the Cold War attitudes that prevail today about Communists were also prevalent then. It is an historical fact, and we know this also from our own experience, that Communists were actively involved in the Trek and played a constructive role. What must be borne in mind is that in the 1930s the CCF did not engage in extra-parliamentary struggle, did not go out and organize the unemployed or the unorganized. The Communists did and their militant policies won them wide support in the labour movement and even more in the ranks of the unemployed. Communists emerged as their champions and were recognized and respected as such.

Viewed against this background it becomes immediately obvious that *"We Were the Salt of the Earth!"* falls short in a number of areas. The author states that "the Tories had simply been unable to devise a credible national programme of work and wages. . . " (p. 5) adding that "the government simply couldn't afford to pay wages." (P. 11) The facts are that the government never even tried to establish a work and wages programme. Furthermore the plea of both the Bennett Tory government and the Liberal government that followed, that they could not afford a work and wages

programme costing millions, was given the lie when war was declared in 1939. Then billions, not millions, were quickly found.

The author relies heavily for his information about the strike and the Trek on the evidence of police informers and the police themselves, evidence that can hardly lay claim to being objective, factual or unbiased. Some of this evidence is taken from police files and some from the report of the Regina Riot Inquiry Commission (RRIC). All the evidence that the police gave in court and to the RRIC was aimed at exonerating the federal government and the police and putting the blame for the riot on the Trekkers and their leaders.

Using such evidence the author continually refers to the citizens and Trekkers as the "rioters," when in fact it was the police who were rioting. He quotes and appears to accept statements by police that they overheard remarks by Trekkers such as "let's break some of the windows.... let's smash every window in this bloody town... Kill him, kill the bastard." He repeats the phony claim of the mayor of Regina that the Trekkers threatened "to stage three feet of blood on the streets of Regina," and the equally ridiculous claim of a police officer that "one Mottle" bragged that "the Communist Party would bestow recognition on him for his part in the riot."

The author in his preface says that the riot grew "until men had to be shot down so that other men could prevail and restore order." (P. xi) Elsewhere he says that the riot was by men and women bent on "mutual injury" and "fun." (P. 149) He even suggests that the Trekkers may have known in advance that a riot would take place and had piled up stones secretly for that purpose, a completely false assumption. "When had the stones been hidden?" he asks. (P. 175) "Did these men know something?" (P. 174) And he tops this off by quoting a slanderous and false statement by the RRIC Report to the effect that "The speed and spontaneity of the attack is evidence of some preparation." (P. 175)

The Trekkers and citizens who were on the Market Square that night and who witnessed the riot know that the RCMP as well as the city police used their guns against the crowd. But the author minimizes the actions of the RCMP with the statement that "one or two mounted police may have fired one or two shots that night." (P. 148) Then he quotes someone else as thinking that when store windows were being smashed, the rioters "may [have been] looking for rifles."

It is also difficult to understand why the author did not expose the lies of Prime Minister Bennett, Minister of Justice Hugh Guthrie and Commissioner J.G. MacBrien of the RCMP concerning the alleged use of firearms by the Trekkers during the riot. No charges were ever made by the RCMP in court or in evidence before the RRIC that the Trekkers used or had any guns at any time or that any members of the RCMP were shot.

On the other hand the RCMP testified before the RRIC that the RCMP were armed with guns and during the riot ammunition was distributed to them.

Yet Bennett in the House of Commons on 2 July said: "There were no cartridges in the hands of any members of the mounted police last night. Yet this afternoon there are mounted police lying in the hospital shot with bullets."

Guthrie declared in the House of Commons the same day that "Shots were fired by the strikers, and the fire was replied to by shots from the city police. No shot whatever was fired by the mounted police."

MacBrien in a telegram to RCMP Commissioner Wood on 3 July stated that "strikers used firearms in [the] riot."

These were deliberate lies calculated to turn public opinion against the Trekkers and exuse the completely unjustified use of guns by the police.

The Relief Camp Workers Union (RCWU), which won the support of the majority of relief camp inmates, is charged unjustly by the author with "policies of agitation and disruption." (P. 14) Its successful efforts to organize the relief camps is described as "infiltration by covert organizers," in the language of red-baiters who describe all unions and dissent as subversive. The use by the RCWU of the term "police terror" (to describe evictions, arrests, imprisonment, harassment of all kinds) is termed by the author to be "inflammatory language which needed no rationalization." (P. 46) RCWU pickets are described as "6'6" thugs." (P. 59)

One of the tactics used by the relief camp strikers while in Vancouver to draw attention to their cause was snake parades through big department stores. The well-disciplined strikers saw to it that no damage was done during these parades. In one case in the Hudson's Bay Store, police attacked the paraders and in the ensuing scuffles some showcases were broken. The author places all the blame for this incident on the strikers. They "forced a fight with police," he says (p. 49) and quotes a police officer as stating that previously they had threatened they "would adopt more strenuous methods." (P. 50) Then the author adds, quite unjustifiably, "Did they hope to force negotiations by tempting riot and disorder?... now they had created an incident." (P. 49)

When after the Regina Riot the men returned to Vancouver, they faced up to and accepted the unpleasant fact that they would have to return to the camps and continue organizing. But the author belittles this principled decision by attributing other reasons to them. They wanted, he says, "to secure a fresh suit of clothes," and they did not want to get killed helping striking longshoremen. Both of these remarks are an insult to the Trekkers who had close and warm relations with longshoremen who had helped them throughout their struggles.

Section 98 of the Criminal Code was widely condemned in and out of Parliament in the 1930s because it was used to outlaw political dissent. Those charged under Section 98 were presumed guilty and had to prove their innocence. The relevant clause of Section 98 stated: "It shall be presumed in the absence of proof to the contrary that he is a member of such unlawful association." So great was public indignation against this undemocratic piece of legislation (originally introduced in 1919 to break the Winnipeg General Strike) that the federal government repealed it in 1936. The author cynically dismisses serious protests by unions against Section 98 as "a favourite pastime." (P. 17)

May Day originated in Chicago in 1886 and has been celebrated by the world trade union movement since that day as the day of labour. The author labels it as "the revolutionaries' holiday." (P. 45)

Arthur Evans, leader of the Trek, trade union organizer and Communist, was widely respected as a militant, courageous and incorruptible labour leader. More than once he served terms in prison for his trade union activity. The author, it seems, is reluctant to admit these facts, and instead searches for something to discredit Evans. Evans, he says, was a "drinking man" who lost his job as a union organizer "after he spent a week in jail on a drunk charge." (P. 189) What the author does not point out is that Evans, who at the time was organizing the smelterworkers in Trail, British Columbia, over the violent opposition of the company, the police and the Catholic Church, was jailed not because he was drunk (most miners were "drinking men") but because he was a union organizer.

In another section the author quotes a phony report by an RCMP officer to the effect that Evans addressed a meeting in Vancouver "in a highly inebriated condition" using "foul and profane language." (P. 63)

The author states that in July 1932 Evans disappeared and that his wife did not know where he was when she applied for relief. He speculates that Evans may have been "in the field in behalf of the WUL." (Pp. 22-23) There was no need for speculation. Evans, in his testimony before the RRIC, explained in detail where he was that summer and fall. He attended a convention of the Workers Unity League (and had to beat his way down by freight) and on his way back he addressed public meetings in Winnipeg, Calgary, the Crowsnest Pass and finally Princeton, British Columbia, where he addressed coal miners who wanted to join a union. After this he returned home and raised hell with the relief authorities because they were harassing his wife.

The author not only ignores the constructive role of Communists in the strike and Trek but indulges in Cold War red-baiting. He tries to belittle the role of the Communist party by stating that in spite of the imprisonment of its leaders (in 1931 under Section 98 of the Criminal Code), "their capacity for making nuisance seemed undiminished." (P. 9) He repeats

the false media report of Tim Buck's address to a public meeting in Vancouver where Buck is alleged to have urged his audience to "put up a struggle for a Soviet Union in Canada." (P. 33) And he completely distorts the policy of the Communist party with the statement that "compromise of the CCF was a particular ambition of the Communists." (P. 60)

Repeating the slanders of the pro-fascist Citizens League of Vancouver, the author falsely asserts that the militant, Communist-led Workers Unity League "derived its form and character from the Red International of Labour Unions, itself a Comintern agency." (P. 7)

The book contains a list of people interviewed by the author including Trekkers, some of whom have since died. This book in our view is no tribute to their memory; it does not reflect their views or the cause for which they lived and fought.

After reading the book one is still left with the questions: What point is the author trying to make? What is his approach to labour history?

Perhaps this approach is best illustrated by his remark (when dealing with the Regina Riot) that "Behind and within each 'reality,' the 'truth' of each witness, lies a lifetime of bias, discipline, intelligence and ideology." (P. 142) This would seem to indicate that to the author there are no objective truths in history, only the perceptions arrived at by each individual. If so, that is a view that we do not share. We believe that objective truth does exist in history and in the events that shape history. Unions, for example, by and large, are a progressive force in society, even though employers may regard them as evil incarnate. The suppression of the 1885 Saskatchewan Rebellion was a cruel and reactionary action as was the failure of the government to deal with the grievances that led to the armed resistance. In our view it is an objective fact that the On-to-Ottawa Trek played a progressive role in Canadian history and it was led by socially-motivated men dedicated to a better Canada for all.

Robert Savage
Member of Trekker delegation to Prime Minister R.B. Bennett in 1935 and Brian Mulroney in 1985

Robert Jackson, Trekker and delegate to Brian Mulroney in 1985

Jean Sheils (Evans), daughter of Trek leader Arthur Evans, and co-author of *Work and Wages!: Semi-documentary Account of the Life and Times of Arthur H. (Slim) Evans*, (Vancouver: Trade Union Research Bureau, 1977)

Ben Swankey, co-author, *Work and Wages!*

Victor Howard Responds

Robert Savage, Robert Jackson, Jean Sheils and Ben Swankey appear determined to discredit *"We Were the Salt of the Earth!": The On-to-Ottawa Trek and the Regina Riot.* They accuse me of red-baiting, cynicism, having no point of view, defaming Arthur Evans, using unreliable and biased sources, and not believing in the objective truths of history. Their evidence is their interpretation of various words and phrases, their own notions about various events, allegations or judgements on my part, their dismissal of police reports and testimony, and their assurance that the Regina Riot Inquiry Commission (RRIC) intended to exonerate the federal and local police and to put the blame for the Regina Riot on the Trekkers.

The reviewers have been selective in their criticism and in responding I must likewise be selective. The reviewers have lived with the history and legend of the Trek far longer than I have; they "possess" it, two of them having been there, two having written of its leader, Arthur Evans. I have no quarrel with this. I had been researching this book since 1967 and was something like the new boy on the block; nor am I a professional labour historian or a Marxist. However, in their review they have ignored most of the book — its title, the closing remarks of sympathy and tribute, and the effort "to be judicious to the point of caution" as George Woodcock puts it in an earlier review in *Prairie Forum*. I am accused of making the unjust charge that the Relief Camp Workers Union (RCWU) advocated "policies of agitation and disruption." The RCWU was not a social club. It sent men into the camps, "infiltration by covert organizers," because the Department of Defence did not want the men organized into a credible body of dissenters. Were the RCWU men to flaunt their identities and pass out copies of *Relief Camp Worker* in front of camp foremen? What were the strikes of December 1934 and April 1935, if not the result of policies of agitation and disruption? There is nothing wrong with such policies if those who form and implement them are angry, despairing and determined to better their situation. I question what the reviewers would have had these men do. Robert Savage and Robert Jackson were there. What did they do?

I do not know whether the Vancouver strikers went into the Hudson's Bay Store ready to provoke a fight. However, did they go there believing that the police would not intervene? Once there they resisted ejection, crying, "Hold fast boys." Thus it is my contention that they forced a fight with the police.

I took my "favourite pastime" cue from the realization early in my research that the men in the camps had a collective and individual sense of humour. Thus I concluded that these men enjoyed writing and signing the petitions denouncing Section 98. The reviewers claim that I am being cynical.

I described the phrase "police terror" as "inflammatory language which needed no rationalization." Of course it is inflammatory, and those who used it no more stopped to explain what they meant than the reviewers paused to explain what they meant when accusing me of "red-baiting."

The reports of the undercover police and agents who infiltrated the Vancouver strike were meant to be read by their superiors alone, and not by the public. I assume that those superiors demanded clear, explicit, detailed and unexaggerated reports. Despite this, I marked my use of them with an "extensive caveat." I came to the same conclusion about the Riot, having considerable experience in the reading and evaluation of testimony such as was provided before the RRIC. I believe that the constables there were trying to recapitulate their movements on the evening of the Regina Riot; the plainness of their language does not, to me, suggest some massive, carefully prepared scenario. Were Arthur Evans and Matt Shaw dissembling as they testified? The reviewers subscribe to objective truths in history. Is Evans's truth the truth? Is Constable Archie Apps's truth the truth?

The reviewers say of me: "He quotes and appears to accept statements by police that they overheard remarks by Trekkers such as 'let's break some windows, let's smash every window in this bloody town . . . kill him, kill the bastard!'" Actually, they have brought together three different passages. The first is reported by Constable Archie Apps (p. 149), the second by citizen Leslie Hainsworth (p. 150), and the third by citizen Samuel Stinson (p. 154).

The witnesses to the removal of bricks from possible hiding places were all citizens. Accepting their testimony, I wondered if there was some anticipation of a struggle. I concluded, plausibly in my opinion, that "given the tension of the previous two or three days, the failure of the truck convoy, the speculation that some sort of move might be made by the police, it would not be unthinkable for men to nose around for just such missiles."

The reviewers do not allude to my argument that there was insufficient evidence for the RRIC's claim that Division Three was on the square that night. Division Three may have been there, but I do not believe so. In stating this, I believe that I counter one RRIC contention that theTrekkers planned a disturbance that evening and sent an allegedly tough group of men downtown. Nor do the reviewers allude to my elaborate argument to the effect that the police provoked the riot by trying to arrest Evans in the midst of the rally, and further by the confusion in the orders to advance or not.

I finally have to cry out, "Enough!" when it comes to the assertion by the reviewers that I searched "for something to discredit Evans." I referred to him as a "drinking man" (so am I) who lost his job as a union organizer "after he spent a week in jail on a drunk charge." Sheils and Swankey, my source for this, contend that Evans was harassed by police

in Trail and that his arrest was one such example. They write that, "His arrest, as the authorities anticipated, did affect his usefulness as an orgainzer[sic]. And it also got Evans into trouble with the Communist Party, where his action was severely criticized. It was undoubtedly a factor in the decision, not long after, that he be released from his assignment in Trail." The point is not why he was arrested, but that his arrest apparently upset his superiors. In an earlier passage in the book, I introduced a report from the RCMP which represents Evans at a rally in Vancouver "being in a highly inebriated condition. . . ." I then wrote: "Whether Evans was drunk or not, and the local press did not remark on this matter at all, the RCMP officer has given us a portrait of a man under considerable stress." Sheils and Swankey state that "It [getting drunk] served as a release valve for the many pressures he was under [at Trail]." (See *Work and Wages*, p. 276.)

I resent having to take up so much space about a matter that, for me, does not loom large in my assessment of Evans's career. However, the reviewers brought it up as an example of my efforts to discredit Evans. What nonsense. If they would reread pages 21-24 of *"We Were the Salt of the Earth!"* they would see my introduction of Evans into the narrative, a passage which concludes with his testimony before the RRIC. It is an eloquent, moving perception of the disorder around him. Throughout *"We Were the Salt of the Earth!"* I regarded Evans as a man of discipline, courage, determination and humour. I once asked Mr. Swankey what he thought most characterized Evans and he replied, "his class-hatred." On page 24 I stated, "But when called upon to speak for the cause of labour, Evans drew from an intense, profound anger, a class-hatred impeccable in its credentials and guaranteed to strike awe. . . ."

What the reviewers seem to ignore is the book itself, and it would appear that their minds were already made up. They denounce the "snippets of irrelevancies," without giving examples, but perhaps they are referring to the careful attempt on my part to recreate the motive, method, organization, administration and personnel of the On-to-Ottawa Trek and the tragedy of the Regina Riot. I can only conclude that the interviewers do not want to know about the human factors that are so much a part of this story: the modesty of Bill Davis; Red Walsh's, "What of Lozofsky?"; Matt Shaw's "deep anger at never having had a chance to learn a skill"; the half dozen bottles of aspirin called for by the boys in the Vancouver Museum; the lamb stew at Golden; the Christian character of Bertha Gusland during the siege of the Calgary relief office; the eight cats and three dogs that made the Trek; the old railway constable at Medicine Hat; the Olympic Boxing and Wrestling Club of Regina; Evans's Hottentot village mayor cry to Bennett; Steve Fustas's lost family; Gerry Winters's attendance at Detective Millar's funeral. Snippets of irrelevancies?

Yes, indeed, I sought to go beyond the mythology of the Trek and the Riot to find and confront the facts. I believe that I have found out what

the Trek and Riot were about. It is unfortunate that Robert Savage, Robert Jackson, Jean Sheils and Ben Swankey do not agree, but perhaps they were not prepared to be as objective as I was.

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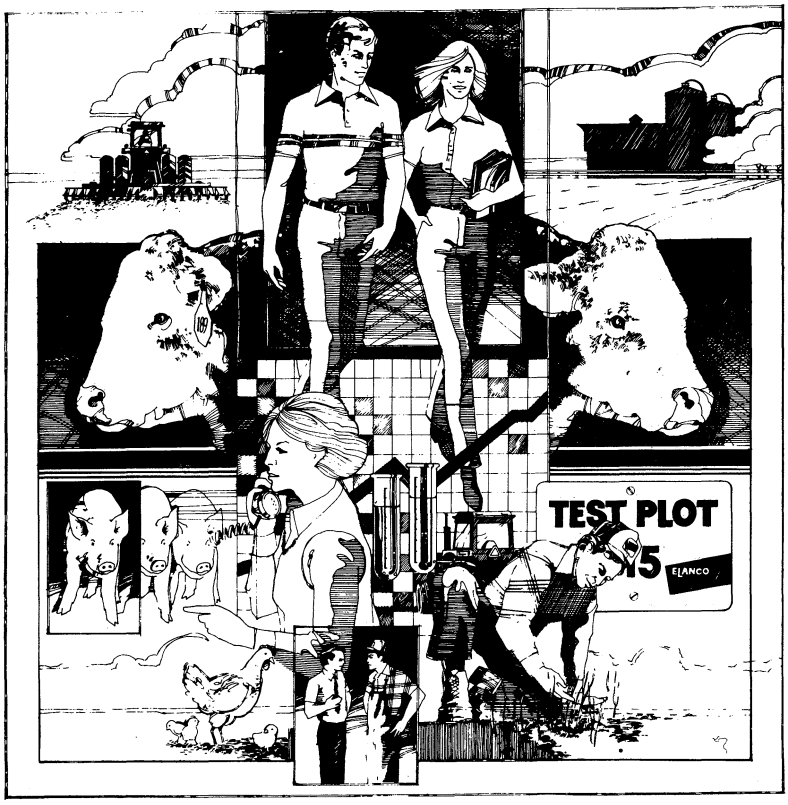

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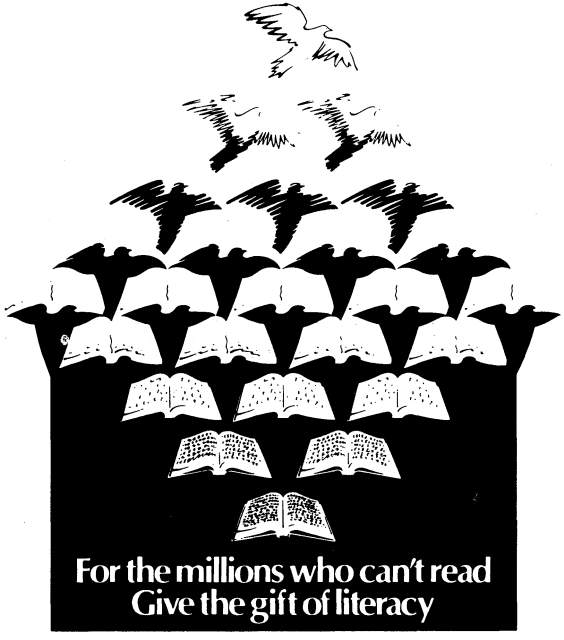

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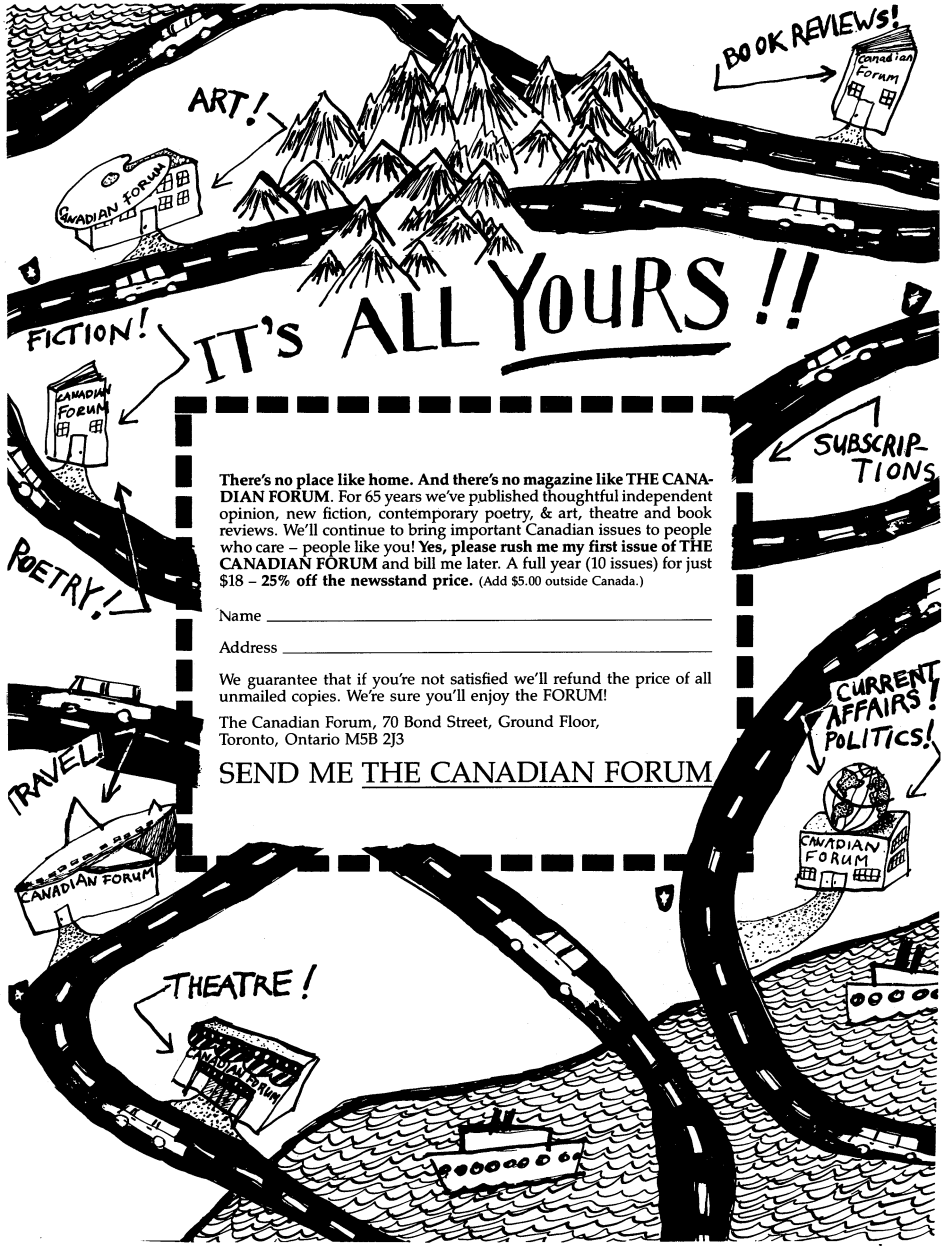

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