
FIELD CROP SUBSECTOR STRUCTURE AND COMPETITION UNDER FREE TRADE: CANADA

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INTRODUCTION

The Canadian field crop subsector has suffered through twenty years of wrenching technological and economic changes. Implementation of the Canada-United States Trade Agreement (CUSTA) in 1989, followed by the North American Free Trade Agreement (NAFTA) in 1994 and the Uruguay Round Agreement on Agriculture in 1995, have placed Canadian crop producers in a much more open and globalized economy where they must compete directly with producers in other countries who often have been more sheltered from financial distresses than have Canadian producers. Research on crops, tillage practices and pest control methods have, in recent years, relied more heavily on contributions from the private sector as public support for agricultural research has stagnated. The grain handling system in Western Canada has undergone a rapid restructuring with many low throughput elevators in rural areas being replaced by a much smaller number of modern high throughput elevators situated along major railway lines, resulting in long haulages for the majority of producers and deterioration of many secondary roads. Some deregulation has occurred in the institutions that deal with inspection, grading and transportation of Canadian grains, and farmers have been required to absorb more of the costs of these activities. More highly educated crop producers, taking advantage of the continuing advancements in mechanical technolo-

gies as well as the need for more stable incomes, have responded by finding off-farm employment activities.

Severely depressed farm incomes in the late 1980s and again in the late 1990s have been accompanied by highly charged farm protests, rapid out-migration of farm labour and continued government support of farm incomes, though the level of support has been reduced substantially from what existed in the 1980s. Although the NAFTA promised free trade and a "level playing field," Canadian crop producers have watched in dismay as the levels of government support in other countries (principally the United States) have risen while that in Canada has fallen in recent years. The Canadian Wheat Board (CWB), which has exclusive authority for export of prairie-grown wheat and barley, remains an obstacle to genuine free trade among the three NAFTA countries.

Continuing Economic Pressures On Primary Producers

Many of these trends are expected to continue throughout the next twenty years as economic pressures on the rural economy show no sign of receding. The real prices of grains and oilseeds are expected to continue their slow downward trend due to rapid technological changes and a slowing of the population growth rates in developed (and many developing) countries. The International Food Policy Research Institute (IFPRI) projects the real prices of cereal crops will decline by an average of 17 percent by 2020, though this is a slower rate of decrease than that experienced over the past twenty years due to a slowing of increases in grain yields (Pinstrup-Andersen et al, 1999). An era of free trade would strengthen the forces underlying these trends and cause economic hardships for those producers who can not compete successfully with other domestic and foreign producers. Governments around the world have shown an increased understanding of the deleterious economic effects of massive intervention in the marketplace and, as a result, can be expected to reduce the effective levels of protection of their agri-food industries. Canadian crop producers are likely to experience a world of less stable output and input prices, severe pressure to produce high quality goods as cheaply as possible, and minimal governmental protection against undesirable outcomes from the market place.

Forces Of Structural Change

A large number of forces are likely to influence the direction and speed of structural change as well as the relative competitiveness of the Canadian field crop subsector during the next twenty years. These include imminent developments in international trade, changes in the organization and goals of agricultural research, continuing evolution of agricultural policies in Canada and competing countries, further changes in the institutions that organize and regulate the licensing, grading, inspection, transportation and handling of Canadian grains and oilseeds, the possibility of a new set of regulations (including those related to climate change, use of biotechnology in agriculture, and production methods used on farms), improved opportunities for off-farm employment, and a continuing shortage of capital investment in primary agriculture and the infrastructure surrounding it. These forces will affect the financial livelihood of farm people as well as those who live in rural areas and depend on the success of primary agriculture to support their standards of living. The expected impacts of these forces on the opportunities and constraints that will face the Canadian field crops subsector over the next twenty years are discussed in the following sections.

DEVELOPMENTS IN INTERNATIONAL TRADE

Changes in the pattern of international trade in grains and oilseeds could have vast impacts on the success and financial viability of the Canadian crops subsector. The traditional export destinations of surplus grains were Great Britain and other countries in Western Europe but these markets mostly were lost with the formation of the common market and the astonishing increases in production of grains and oilseeds in these countries during the past three decades. The primary destination of Canadian exports of hard red spring wheat then moved to the Soviet Union and China with barley exports going largely to the United States, China, Japan and Saudi Arabia. Exports of the more recently introduced canola have gone predominantly to Japan, with increasing sales to the United States, Mexico and countries in the European Union (EU). In addition to massive economic, social and political changes that have taken place in China and countries of the former Soviet Union, developments in the EU and the United States will greatly affect the success of the Canadian field crop subsector during the next two decades.

Countries Of The Former Soviet Union

The former Soviet Union still is a large deficit region in grain production. However, continuing fiscal difficulties in most of these countries preclude their ability to import much surplus agricultural production from exporting countries. This situation is expected to change during the next twenty years. IFPRI projects that countries in Eastern Europe and the former Soviet Union will become major net exporters of cereals by 2020 (Pinstrup-Andersen et al, 1999). The enormous agricultural potential of countries in this region, combined with the dynamics unleashed by the switch from centrally planned to market based economies, should spur rapid increases in agricultural production, possibly allowing many of these countries to become competitors in the export market for grains and oilseeds. However, many legal, institutional, and financial problems still must be overcome before these powerful private sector forces can be unleashed.

China

At present, it is unclear whether or not China will become a major importer of grains and oilseeds over the next twenty years. Agricultural productivity in China has improved following the market oriented reforms introduced by Deng Xiaoping in 1978. However, population and income growth have led to an increase in consumption of many agricultural commodities. The United States Department of Agriculture (USDA, 2000) projects modest growth in grain imports by China but admits that considerable uncertainty exists regarding accuracy of available data and future Chinese economic and social policies. In a comprehensive study of China's grain production and consumption, Huang et al, (1997) concluded that China's overall imports would increase modestly, due mostly to increased demand for feed grains as a result of rising consumption of meat. They predicted a rising average income level that will lead Chinese consumers to increase their consumption of meats, vegetables and fruits, and reduce their consumption of cereals, as has occurred in other rapidly growing countries in Asia. If this happens, a larger market for feed grains can be expected.

The United States

Wheat consumption in the United States has rebounded from a historical low of 110 pounds per capita in 1972 to about 150 pounds by the end of the

twentieth century (Vocke, 2000). Much of the increased demand has been supplied by Canadian wheat producers. Since CUSTA was implemented in 1989, Canadian exports to the United States of wheat, durum and wheat flour have increased from about 350,000 tonnes to nearly 2 million tonnes (AAFC, 2001). This increase has been the result of at least three forces. First, NAFTA eliminated quotas and tariffs for wheat trade between the United States and Canada, allowing economic forces to determine movements of the product. Second, the elimination of transportation subsidies in Canada for moving grains and oilseeds to export terminals on the west coast and Thunder Bay has made moving grains to the United States relatively less costly. Third, extensive use of export subsidies by the United States has provided financial incentives for U.S. product to be exported and created opportunities for Canadian producers to supply part of the deficits in the United States.

The United States is the largest exporter of wheat in the world. Increased imports of this product from Canada have annoyed many producers in the United States, especially those in the border states. Suspicions that the CWB is able to use its market power to the disadvantage of U. S. producers run high in the farming communities of these states and continued trade frictions can be expected. However, the proximity of the large U. S. market (especially compared to the vast distances that Canadian grains and oilseeds need to be transported to export terminals on the west coast and Thunder Bay) will continue to provide an attractive market outlet for low-cost Canadian producers. If all artificial impediments to trade were removed, it is likely that a much higher volume of Canadian grains and oilseeds would flow southward into the United States.

European Union

Agricultural policy reforms brought about by the European Union's Agenda 2000 are expected to promote wheat production over other crops (Vocke, 2000). Declining support prices for EU wheat and a lower valued currency already have allowed some EU wheat to be exported without subsidies (Vocke, 2000). The USDA expects that by 2004-5, the EU will be able to export wheat on a regular basis without subsidies (USDA, 2000).

It is likely that the EU will remain a formidable competitor of Canada in the international wheat market during the next twenty years even without significant policy reforms. This could be exacerbated with the entry into the EU of several central European countries, especially Poland, the Czech Republic and Hungary, all of which have very productive land bases and the potential for major increases in agricultural productivity.

Canada's Declining Market Share

The Food and Agriculture Policy Research Institute (FAPRI, 2000) at Iowa State University projects that Canada's grain exports will increase in the next decade, but Canada's market share will go down. They estimated that total world wheat exports will increase by 23 percent by 2010 but Canada's wheat exports will increase by only 4 percent. They predicted that countries in Eastern Europe, Russia and other countries in the former Soviet Union will continue to be small net importers of wheat in 2010. They projected exports of Canadian barley to increase by 7 percent by 2010, but total world barley exports to grow 21 percent by that time.

Despite the uncertain trade outlook for grains and oilseeds, most analysts predict modest growth in Canada's exports. Canada's producers always have been very competitive in international markets and are expected to remain so.

CHANGES IN AGRICULTURAL RESEARCH

Agricultural research in Canada has led to major increases in productivity in the field crop subsector over the past century. Research and technology have allowed primary producers to substitute fertilizer and herbicides for scarce land, machines for labour, and new crops (like lentils) for traditional crops, thereby creating the conditions for the structure of agriculture to evolve into one of bigger, more specialized farms. These trends are expected to continue over the next twenty years. However, major changes in the way that agricultural research is funded and organized, plus the impending revolution in the life sciences, have implications on what it might mean to be a farmer in the future.

Increased Private Sector Funding Of Agricultural Research

Major changes have occurred in the structure and conduct of the agricultural research establishment in Canada. Traditionally, most crop research has been funded by the public sector but the private sector has assumed a larger role in recent years. This trend is likely to continue for at least three reasons (Klein and Kerr, 1995). First, the growing desire within federal and provincial governments to reduce public spending and taxes means less money (at least in real terms) is likely to be available for public sector research. In the 1995 budget, the federal government reduced expenditures on agricultural research by 25 percent but provided an additional fund that required matching funds from the private sector. This Matching Investment Initiatives Program has continued and it (or a like program) is expected to be extended well into the future. The provincial governments have supported some agricultural research and they, also, have required matching funds from the private sector for most of their recent research programs.

The second reason for increased private sector funding of agricultural research is due to the increased development of differentiated food products. The types of research necessary to produce these specialized products creates opportunities for financial rewards from private sector investment in research. The advent of patents on crop varieties (as a result of Plant Breeders' Rights legislation in 1991) has provided incentives for profitable research investments. Already a substantial number of varieties of crops and oilseeds with attractive new characteristics have been developed in Canada, particularly canola. Relatively low private returns from investment in development of new varieties of wheat and barley (Vocke, 2000) indicates that most research on these crops will continue to be done in the public sector while much more research on canola is likely to be conducted by the private sector.

A third reason for more private sector research in agriculture is a growing recognition that a substantial proportion of the rewards from crop research has been realized by producers (Klein et al, 1996). Institutional structures have been set up to collect producer contributions in the form of check-offs on grains and oilseeds sold. The research priorities for these funds are set by committees that represent producers and others involved in the processing and exporting of grains and oilseeds and not solely by the agricultural scientists and their ad-

ministrators. This has led to changes in research directions with a greater emphasis on solving practical applied problems of farmers and less concentration on long term basic research in agriculture.

Revolution In The Life Sciences

It appears that agricultural research will become more integrated with that of the other life sciences, including pharmacological, medical and forestry research. This opens the possibility for many exciting opportunities for Canadian grain and oilseed producers. Improvements will be made in texture, flavour, quality, variety, and shelf-life of food products as a result of research on the interface of plant biochemistry, genomics and human nutrition. Crops will be modified genetically to produce healthier and more nutritious foodstuffs, as well as bio-fuels, building materials, bio-plastics, nutraceuticals, pharmafoods and other desirable consumer products. Crop productivity is expected to increase through selection of higher yielding varieties, increased tolerance of genetically modified crops to herbicides and pests, increased resistance to pathogens, and adaptations to weather, soil and environmental stresses. Genes that affect plants' tolerance to drought, cold, salinity, and other yield decreasing conditions have been identified and can be added to current commercial crops to increase their yield potential under stressed growing conditions.

These products will all be patented, meaning that only those who agree to pay for them will be permitted to use them. Technology agreements with vertically integrated life science companies, already a reality, generally require specific methods of growing and handling, meaning that primary producers will have less influence in decision making. Output decisions increasingly will be made by food processors and other end-users that will seek contracts for production of specific products with farmers. To ensure that the specified quantity and quality of the product is delivered, they will need to monitor the progress of the crop and the activities of the farmer.

While opportunities will be available for farmers to produce higher valued, specialized products, involvement in vertically integrated supply chains will change what it means to be a farmer (Klein and Kerr, 1995). Many will become employees or subcontractors of large firms and part of a "virtually integrated network involving technology providers, input suppliers, growers,

merchandisers, food processors, retailers, and consumers” (Dial, 1999). All the partners in the supply chain will need to work together to produce specialized, high valued products for demanding customers. The genetic material used by farmers will be developed in the laboratory of the input supplier and patented. Farmers will be forced to cede some of their discretion in making production decisions. Furthermore, markets will become less useful as providers of information for decision making. Differentiated products are not sold in spot markets and farmers will have to negotiate prices with individual buyers (Klein and Kerr, 1995). Markets for standardized products will become less reliable as generators of price signals.

The farm and rural community in Canada will be affected greatly by the changes introduced by new developments in the life sciences. Some producers will be able to exploit these new opportunities and may be well rewarded for their entrepreneurial abilities and insights. Others in the rural community, however, may not be so fortunate. The technological treadmill where supply increases more quickly than the growth in effective consumer demand will continue, putting unrelenting downward pressure on farm prices. Those who are unable or unwilling to adapt to the increased competition will feel the financial pain of reduced revenues for producing generic products and, possibly, the humiliation of losing some control in the operations of their farms.

EVOLUTION OF AGRICULTURAL POLICIES

The farm population in Canada has long been able to mount an effective lobby for government support despite the continuing decline in farm population. However, this level of support may not continue as agriculture accounts for a smaller and smaller proportion of the total goods and services produced. The economies of the three prairie provinces have been growing rapidly in the late 1990s despite historically low grain prices. Rampton (2000) quoted Roger Gibbins (President of the Canada West Foundation, a Calgary based think-tank) as stating “This means that city dwellers ... are going to be less and less concerned about the state of the regional transportation system or the health of the rural economy.”

Less Government Support

Most Canadian agricultural policies that distorted market signals in the field crop subsector have been eliminated during the last decade. The two-price wheat policy was discontinued in 1989 when the CUSTA was implemented. Subsidized freight rates were discontinued in 1995 following the implementation of the Uruguay Round Agreement. The Gross Revenue Insurance Plan (GRIP), in which inflation-adjusted prices were guaranteed to be no lower than a 15 year moving average (with two-thirds of the money coming from governments), was discontinued in 1996. The current programs include the Net Income Stabilization Account (NISA, in which individual producers set up their own plans based upon whole farm net incomes), crop insurance, and low level, some would say ineffectual, safety nets like the recent Agricultural Income Disaster Assistance (AIDA) program. These programs still contain significant public funding but are much less distortionary than were many of the past programs that made payments on the basis of yields or areas of specific crops. Government support for the crops subsector has been reduced to levels well below those of the United States and the EU.

Governments in Canada, at both the federal and provincial levels, show no sign of reversing the trend to less intervention in the crops sector. Society generally has become much more knowledgeable about the long term counter-productive effects on farm incomes of subsidies, quotas, and many types of regulations. Indeed, the Canadian population has shown a great deal of support for smaller government, lower taxes, and increased integration of the country's industries into the world economy. Annual polls conducted by Maclean's weekly newsmagazine have shown since 1991 that Canadians have embraced free trade in a globalized economy (Maclean's 2000-2001). In the most recent Maclean's/Global Television network poll, 71 percent of Canadians were in favour of Canada having free trade agreements with many countries. However, the federal government has been unwavering in its support of the CWB, the state trading agency for western export wheat and barley.

Competitive Agriculture — The Goal For The Future

Future agricultural policy is likely to result in fewer market distortions though support for safety nets will remain as the field crop subsector continues to adjust to economic conditions. It is likely that the long term goal of develop-

ing a more competitive and leaner agricultural industry will continue but with an increasing focus on providing agricultural products that are tailored for specific demands anywhere in the world. Governments are likely to focus their efforts on developing institutions that contribute to the competitiveness of their primary producers and encourage value-added agri-businesses that increase employment and value of production. Due to a broader understanding of the impacts of different kinds of transactions costs on overall profitability, governments likely will recommend (or even assist) the establishment of a greater degree of vertical integration and strategic alliances at all stages of supply chains. They may promote new ways of doing business, like new generation co-operatives (that make it easier to obtain additional sources of financing). New generation cooperatives focus on value-added processing as opposed to the traditional cooperative's focus on commodity marketing.

CHANGES IN EXISTING REGULATIONS

The Canadian field crop subsector operates under regulations established by several governmental and quasi-governmental bodies. The most important of these are the Canadian Grain Commission (CGC), the Canadian Wheat Board (CWB), and the Canadian Food Inspection Agency (CFIA). The CGC regulates the crop subsector under authority of the Canada Grain Act, Special Crops Insurance Plan and related regulations. The CGC authorizes elevator tariffs, sets standards for dockage, moisture testing, shrinkage, cleaning, and other grain handling services, administers regulations relating to grades, grading and inspection, licenses grain elevators and grain dealers, and reviews recommendations of grain standards committees. The CWB is authorized to be the sole export agent of western produced wheat and barley. The CFIA, under the authority of the Plant Protection Act, administers regulations that relate to variety registration, plant breeders' rights, seeds, phytosanitary measures necessary for import, domestic, and in-transit movement of grains, and various inspections of grains and grain products.

In recent years, a number of changes have been made that allowed for more flexibility in the production and marketing of grain and oilseed crops. Some services have been privatized and users have been required to pay for at least some part of many regulatory services. However, in at least two areas (the

licensing of new varieties of crops and the state trading agency that markets western Canadian wheat and barley in foreign markets), existing regulations still restrain the Canadian field crop subsector. Canadian producers will need some relaxation in present regulations so that they can take advantage of new opportunities that will arise with a movement towards genuine free trade.

Licensing New Varieties Of Grains And Oilseeds

The most important legislation affecting the introduction of new varieties of grains and oilseeds is the Canada Seeds Act and Regulations. Regulations prohibit the sale (or imports or exports) of seed unless it conforms to the prescribed standard and is registered according to law (Lesser, 1988). The regulations require all new varieties to conform to a single uniform standard, and prescribe that varieties must be registered by the Canadian Food Inspection Agency (Watson, 1993). The legislation is meant to ensure production of standardized, high quality commodities for domestic and foreign consumers.

New cultivars of grains and oilseeds cannot be licensed and made available to Canadian producers until they have gone through three years of cooperative tests where they are grown under the same conditions as previously licensed varieties. Any new variety must fit the Canadian grading system and meet or surpass previous varieties on a wide array of characteristics. Failure to meet any one of the standards results in disqualification of the candidate varieties.

The key decision making body for licensing new varieties of grains and oilseeds in Western Canada is the Prairie Registration and Recommending Committee for Grains (PRRCG). The PRRCG evaluates test data presented by plant breeders and makes recommendations for or against the licensing of prospective varieties. The PRRCG consists of four subcommittees: (1) wheat, rye and triticale; (2) barley and oats; (3) oilseeds; (4) special crops. Each of these has three evaluation teams, composed of experts in each area, to objectively examine test data on the key performance characteristics of agronomic performance, disease susceptibility, and processing quality. There are no economists on these committees and marketing information is excluded from consideration of candidate varieties.

The Canadian licensing system for new varieties facilitates a low cost, effective and safe supply chain for generic commodities that are demanded by consumers who have relatively homogeneous tastes. However, it severely limits the opportunities for developing new varieties that have special characteristics that may be demanded in potentially high value markets. The rules also prohibit promising varieties from being imported, shipped through or used in Canada. In an era of free trade, Canadian producers would be severely handicapped if they are unable to plant varieties that would meet the heterogeneous tastes of high income consumers.

The Canadian Wheat Board — Marketing Wheat And Barley For Export

Enforcement of strict quality standards has provided the basis for marketing efforts by the CWB. All wheat and barley produced for export in Western Canada must be marketed through this state trading agency. The CWB has come under challenge in recent years from primary producers (many of whom want more freedom to market their crops), as well as foreign governments, farm organizations and multinational grain companies that are competitors of the Board (and who accuse it of unfair and anti-competitive practices). The Board has responded to these pressures by becoming a much more flexible marketing agency with offers of price contracts, dedicated marketing channels, forward price forecasts, and more aggressive retailing. It is likely that the marketing of cereals (particularly for the international market) will adjust further to accommodate the increasingly sophisticated demands of consumers in various areas of the world during the next several years.

Regardless of whether or not the CWB survives the many challenges it faces and remains the sole exporter of western Canadian wheat and barley, it seems certain that more aggressive marketing will be undertaken to sell minor or specialized products. Multiagency and multinational business linkages will result in reduced transactions costs, thus making Canadian crop producers more competitive in a globalized economy.

NEW REGULATIONS

While a clear trend of less government intervention in agriculture has evolved in recent years, Canadian crop producers are likely to face several new regulations in the future. Due to concerns about global warming, new regulations designed to reduce the production of greenhouse gasses may well be imposed on the agricultural industry. The Biosafety Protocol that aims to regulate the international shipment of genetically modified foods and food products will have implications for production of grains and oilseeds in Canada. Many commonly used, inexpensive, and effective herbicides and pesticides are likely to be deregistered in response to consumer demands for safer and healthier food products. New regulations will help to ensure consumer acceptability of Canadian food products but will impose higher costs on crop producers.

Labelling Of Genetically Modified Foods

The Canadian regulatory system was developed to supply consumers who had relatively homogeneous tastes with a generic product at the lowest possible cost. However, the existing quality standards severely limit the opportunities for developing new varieties of grains and oilseeds that have special, genetically engineered characteristics for potentially high value markets. The current regulations will not work so well when consumers demand food products with additional characteristics that cannot be incorporated into the existing grading system (Hobbs, 1998) or when agri-food firms wish to market unique, boutique-style food products. The existing regulatory system is the very antithesis of what is needed for the marketing of food products that result from life science research.

To facilitate the production and marketing of grain and oilseed products that are produced by life science research, regulatory changes will have to be made in the licensing, handling and transportation of these products. Increasing consumer concerns about genetically modified foods makes it likely that Canada eventually will have to implement some type of labelling requirements for them. The EU already has imposed mandatory labelling requirements for most foods that contain genetic modifications. Japan has mandated labelling for 29 categories of food products (McCluskey, 2000). Even Monsanto, one of the largest agricultural chemical companies, is on record as supporting more

regulations for genetically modified crops and has pledged never to put human genes into plants used as food (Western Producer, Dec. 7, 2000).

Identity Preservation

Mandatory labelling of genetically modified foods would impose severe production, handling and storage restrictions on crop producers. It would be necessary to impose restrictions on production, such as minimum separation of crops to avoid cross-pollination. Regulations would be required to ensure that each crop is handled and stored separately (all the way through the supply chain) to avoid any mixing of products. This could be done either by methods of crop segregation or identity preservation and both begin at the farm level (Lin et al, 2000). Crop segregation involves cleaning of all equipment, transportation vehicles and storage containers to avoid any mixing with foreign materials during loading, unloading, storage and transportation of the product until it reaches the ultimate consumer. Testing by government (or government authorized) inspectors for genetic content of the food product may be necessary at several stages. Identity preserved systems generally require strict separation and containerization that is maintained at all stages throughout the supply chains.

Identity preserved systems would be more stringent and expensive to implement than would segregated systems. Testing for specific genetic content normally would be conducted prior to containerization. The current system, based on the least expensive method of getting generic commodities to market, will not be suitable in an age of specialized products that fill high-valued niche markets around the world. Much of the volume-dominated system will have to be replaced by a system that handles smaller quantities of specialized products at higher unit costs (Riley and Hoffman 1999).

All product handling will be much slower and thus more costly as a result of product segregation. Grain elevators will need numerous bins to keep the different products separate. Unfortunately, most of the new high-throughput elevators built across the prairie provinces in recent years were designed for rapid and low cost handling of bulk grains and oilseeds and many of the small, multiple binned elevators have been razed. The Canadian grain handling and transportation system is ill equipped to handle the many designer grains and

oilseeds that will need to be strictly separated to allow the agri-food industry to access the markets that increasingly will demand heterogeneous food products.

PART-TIME FARMING

It has become increasingly difficult in recent years to make a satisfactory living on small or medium size farms. The vast majority of farm families now receive the bulk of their net income from off-farm sources. Zafiriou and Smith (2001) noted that more than 90 percent of family income on farms that annually have gross returns less than \$100,000 comes from off-farm sources. Even among the larger farms in Canada (those that have gross incomes over \$100,000 per year), nearly half of family income is earned off the farm. This has occurred as a result of a number of factors, including availability of larger and more reliable machinery, commercial availability of many farm services, higher levels of education of farmers and their spouses, and strong urban economies. Due to the availability of large-scale specialized machines and buildings, many types of farms can be operated today with minimal labour input. Many specialized operations such as planting, spraying and harvesting, can be contracted if necessary. The key input requiring time is management, and much of this can be provided in the evenings and weekends.

Off-Farm Employment Opportunities

Farmers are much better educated than before, nearly equalling the educational level of non-farm people (Statistics Canada, 1995). More education has increased their opportunities and made it possible to supplement their low and declining net farm incomes. With a strongly growing urban economy, and development of new communication technologies that allow some of the work to be done in remote locations, farmers and their spouses increasingly have taken full- or part-time positions off the farm and have used the net farm income to supplement their family incomes.

This trend is likely to be sustained — and maybe even accelerated — over the next two decades. Continuing technical changes, especially in the emerging life sciences, will provide many opportunities for small-scale production of specialized products that can be accommodated in an increasingly flexible off-farm work schedule. However, the changing pattern of work and

lifestyles among small- and medium- size farmers likely will have repercussions for the rural communities where these people live. This development has not received sufficient study from agricultural economists and rural sociologists.

CAPITAL INVESTMENT

Economic stagnation of the Canadian field crop subsector during most of the last twenty years has led to a deterioration in capital assets in the main grain growing areas. The number of country elevators has shrunk almost continuously from 5,145 in 1965, to 3,658 in 1977 to 1,153 in 1997 to 848 in 2000 (Canada Grains Council). This trend is expected to continue as major grain handling companies continue to rationalize their operations by abandoning the use of relatively small high-cost country elevators in most areas of the prairies in favour of large capacity, high-throughput elevators that are situated on main or secondary railway routes.

The rural infrastructure, particularly the transportation network (including secondary roads and rail beds) has run down due to a lack of investment over many years. The weakened infrastructure has meant increased costs and much less convenience for primary producers, particularly in the prairie provinces.

Grain Handling And Transportation

Abandonment of the subsidized freight rate regime and partial deregulation of the railways has spurred a massive adjustment and consolidation of the grain handling network. The Saskatchewan Wheat Pool has demolished over 350 small country elevators situated along branch lines while constructing 22 high throughput terminals on main rail lines with 100 car loading capacities (Schmidt, 2000). Other grain handling companies, including AgriCore, United Grain Growers, Pioneer and Cargill have followed similar investment strategies.

In some rural areas, major investments have been made in construction of modern grain handling facilities. However, some observers worry that excess capacity has been built into the grain handling system in recent years as grain handlers have vied for market share by constructing high volume elevators. The Saskatchewan Wheat Pool, in particular, has struggled under excessive

debt and has lost market share. The Dominion Bond Rating Service expects that some grain companies will be unable to remain viable (Ewins, 2000).

Rural Infrastructure

There is a critical need to find ways to boost capital investment in rural infrastructure in the prairie provinces and to adjust the taxation scheme to be more in line with use of the infrastructure. Since many attractive investment opportunities continue to be available in urban areas, governments, particularly in the prairie provinces, can be expected to look for new ways to encourage renewed capital investment in rural Canada.

CONCLUSIONS

The Canadian field crop subsector produces low cost, internationally competitive food products that are safe and nutritious but are of standardized, homogeneous quality. Family farms have been under a great deal of economic stress as a result of low commodity prices worldwide, changing technologies and erratic input prices. Commodity prices in real terms are expected to continue their slow downward trend over the next twenty years, increasing the financial pressures on primary producers.

The structure of the field crop subsector in Canada has continued to evolve in response to the opportunities, pressures and constraints it faces. The farm population has decreased both in absolute terms and as a proportion of Canadian population, resulting in much larger grain and oilseed farms. Rural infrastructure has run down, primarily a result of the consolidation of the grain handling and transportation network and lack of government investment in its maintenance and improvement. Fewer country elevators remain where farmers can deliver their grains and oilseeds; secondary roads have seen increased usage by big trucks that are hauling large loads over much longer distances.

At the same time, increasingly well-educated farmers and their spouses successfully have sought part- and full-time employment in urban centres. This has kept the family incomes of most rural-based people at similar levels to those who live in urban areas. With new and improved machines and new

technologies of farming, they have been able to combine non-farm occupations with farm work. This trend is expected to continue during the next two decades.

Several economic, regulatory and international forces will propel the forthcoming changes in the structure of the Canadian field crop subsector. These include expected changes in domestic and international demand for Canadian grain and oilseed products, less government support for primary producers, more private sector involvement in agricultural research, reduced regulations for licensing new varieties and marketing western grains in export destinations, imposition of new regulations that protect the environment and identify genetically modified food products to consumers, and enhanced opportunities for off-farm employment. If genuine free trade emerges among the North American countries, a less regulated, market-oriented structure will be needed if Canada's primary producers are to take full advantage of the many agri-business opportunities that will ensue.

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