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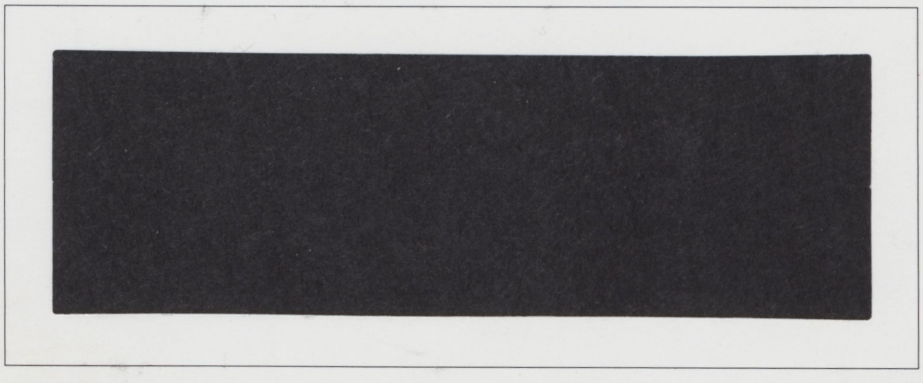

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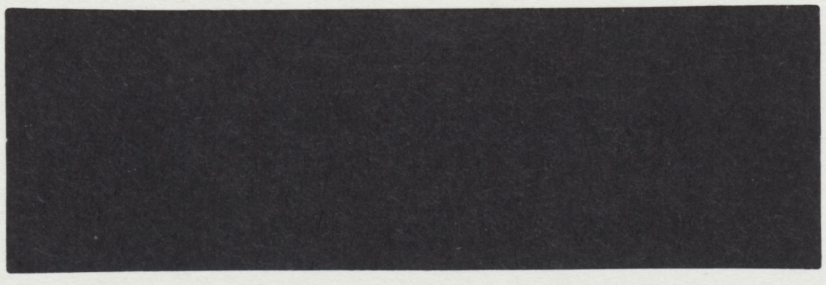

REGIONAL IMPLICATIONS OF COMPENSATORY FREIGHT RATES FOR PRAIRIE GRAINS AND OILSEEDS

(Working Paper 3/91)

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PREFACE

This study was conducted under contract with Agriculture Canada. It was initiated in January, 1990, following the federal government's Growing Together Conference in Ottawa

An Advisory Committee was struck to guide the conduct of the study. It consisted of Douglas D. Hedley, H. Bruce Huff, Zuhair A. Hassan, Jeff Corman, James Atcheson, Malcolm Cairns, Bruce Kirk, Roger Eyvindson, Brian Paddock, Elizabeth Riach, Howard Migie, Richard Barichello and Robert Romaine. The Advisory Committee and study team met January 14-15 in Calgary, February 23 in Ottawa, May 7-8 in Vancouver and June 11 in Ottawa.

The purpose of this study was to estimate the economic impacts in Canadian agriculture and related industries from various options for change in the Western Grain Transportation Act. This document is of a technical nature. It describes in detail the procedures, models and results for these policy options. Two shorter reports accompany this document:

1) Kerr, W.A., G. Fox, J.E. Hobbs and K.K. Klein. 1990. A Review of Studies on Western Canadian Grain Transportation Policies. Working Paper, Policy and Grains and Oilseeds Branches, Agriculture Canada, Ottawa.

2) Klein, K.K., G. Fox, W.A. Kerr, S.N. Kulshreshtha and B. Stennes, 1990. Summary of Regional Impacts of Compensatory Freight Rates for Prairie Grain. Working Paper, Policy and Grains and Oilseeds Branches, Agriculture Canada, Ottawa.

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1. CURRENT ENVIRONMENT

1.1 Introduction

Transportation of grains from the prairie region has a long history of regulation in Canada. In 1897, the government of Canada signed the Crow's Nest Pass Agreement with the Canadian Pacific Railway (CPR). Under terms of this Agreement, the CPR committed itself to transport prairie grains to the Lakehead at reduced rates that were fixed "in perpetuity". The Railway Act of 1925 extended the "Crow" rates to the Canadian National Railway and, with further legislation in 1927, extended the coverage of statutory rates to export of grains and flour through west coast (Vancouver and Prince Rupert) as well as Churchill ports. Over the years, these statutory rates were extended to cover dozens of other products ranging from oilseeds to dehydrated alfalfa.

Initially designed as an incentive for growth of the western Canadian agricultural industry, the statutory freight rates have in recent years been accused of inhibiting economic growth and diversification in the region. Producers of export grains on the prairies were not required to pay the full costs of transporting their products to export locations; this increased the on-farm price of these grains. Livestock producers in western Canada therefore had to pay higher prices for one of their most important inputs (feed grains). This price distortion in the feed grain market helped to determine the pattern of livestock production in Canada. Higher feed grain prices on the prairies led to lower livestock production in those provinces, which in turn, discouraged grain-based value-added economic activities like feed processing, livestock trucking and meat processing on the prairies.

Critics of the statutory freight rates for grain also argue that the lower rates don't increase the net incomes of prairie grain producers in the long run. The value of the subsidized freight rates becomes

capitalized into the value of land, giving a capital gain to landowners but resulting in higher capital requirements for beginning farmers.

In the 1970s, the federal government became concerned about the impacts of the statutory Crow freight rates on the transportation system. The government wanted to ensure a transportation system that would be able to meet the requirements of anticipated increased exports of grain. Changes to the Railway Act were proposed by the federal government following studies by the Hall Commission, the Snavely Commission and Gilson. The proposals generated a great deal of controversy. Livestock producers (and the farm organizations representing them) supported increases in producer costs for grain transportation because that would lower the farm level prices of grain. If the freight rates for grain were to remain subsidized, they wanted the value of the subsidy to be paid directly to the grain producers who would then have to pay the entire cost of transporting grain; this would lower farm level prices of grain. On the other side, the Prairie Pools wanted the transportation rates to remain subsidized, with the entire subsidy paid to the railways. This would keep farm level grain prices at a higher level. Although unstated, the rationale for the Pools' position had at least two components. First, the public perception of a large subsidy payment (initially $658 M) directly to farmers may not be favourable to the industry in the long run. Second, the Prairie Pools are the largest grain handlers in the prairie provinces with a widely dispersed network of country grain elevators. If producers received the subsidy directly from the government, there is no guarantee that they would use it to pay for rail transportation of their grain to export terminals. Some may grow more high-value, low volume crops. Some may feed more grain to livestock. Some may haul their grain by truck to inland terminal elevators if, by doing so, they would reduce their total transportation bill for grain. Any of these actions would reduce the profitability of low-throughput country elevators and would require a faster restructuring of the grain handling system on the prairies.

Farm organizations in Quebec supported the status quo, i.e., paying a transportation subsidy for western grain directly to the railways. They argued that producers in both eastern and western Canada had made investment decisions on the basis of the Crow freight rate structure; any change in relative grain prices between the two parts of Canada would inflict injuries on producers who had made these investments. They also argued that a subsidy paid directly to western producers would be inequitable, since grain producers in the east would not be eligible for the same subsidy.

In November, 1983, the Western Grain Transportation Act (WGTA) was passed by Parliament. This Act institutionalized the payment of a Crow Benefit (initially calculated at $658 M, but after adjustments for inflation was $720 M in 1989-90) to the railways. The main effect of the WGTA was to provide sufficient funds for the railways to ensure that the grain transportation system did not deteriorate. Payment of the Crow Benefit directly to the railways had the effect of keeping farm level transportation costs for prairie grain at a relatively low level, however, provision was made for the percentage of total freight costs paid by the producers to gradually increase over the years. In 1989-90, producers paid approximately 30 percent of the total costs of moving their grain to export locations.

Following passage of the WGTA, prairie-based livestock (and many grain commodity) organizations continued to lobby for payment of the Crow Benefit subsidy directly to producers rather than to the railways. In recognition of the effects the WGTA was having on the livestock industry, the Alberta government in 1985 introduced a subsidy for the use of feed grains by livestock producers to offset the perceived damage the low freight rates were inflicting on Alberta's livestock industry. The program initially paid users of feed grains in Alberta $21/tonne to offset the higher farm level prices that were a result of the WGTA. The Crow Offset subsidy in Alberta was scaled down to a level of $11/tonne by 1989-90. The effect of the Crow Offset subsidy was to raise the price of feeder cattle and breeding stock for beef and swine herds in Alberta. In the fall of 1989, the Saskatchewan and Manitoba governments introduced their own Crow Offset subsidies as well.

As part of a general review of agricultural policies in Canada, the issue is again before the Canadian people. The purpose of this study is to quantitatively assess the impacts of a number of policy options open to the federal government regarding the transportation of prairie grains to export locations.

1.2 Agriculture Canada Policy Review

The Federal Minister of Agriculture launched a review of agricultural policies in Canada in the spring of 1989. Industry stakeholders became involved in the review process at a conference held in Ottawa in December 1989. The need for a thorough review of policies stemmed from the changed circumstances in the agricultural industry as well as from a perception that either current policies were not as effective in meeting their objectives throughout the 1980s as they had been in previous decades or that the objectives of agricultural policy had changed. The Canada-U.S. Trade Agreement (CUSTA) which went into effect in January, 1989 created opportunities and challenges for the Canadian agri-food industry. Canada, along with over 100 other countries, was involved in intense negotiations in the Uruguay Round of the GATT; Canadian agriculture had a big stake in reducing barriers to agricultural trade around the world. Growing consumer awareness of food safety and environmental issues created new demands on primary producers and food processors. Hovering like a dark cloud over all the new challenges to the industry was the severely depressed market situation for most grains and oilseeds which was brought on by worldwide over production. An export subsidy battle between the United States and the European Community depressed market prices even further. High real interest rates during the 1980s contributed to farm financial problems across Canada. Even record-level subsidies to the Canadian producers from 1986 to 1988 failed to stop farm bankruptcies and quit claims on land across Canada.

Many observers of the Canadian agri-food industry believed that existing institutions and policy instruments were obscuring the true market signals to primary producers, thus inhibiting their abilities to adjust to new market opportunities. The ad hoc nature of many farm programs made the

governmental presence in agriculture unpredictable and interfered with decision making by producers. Many governmental interventions in the market place were increasingly recognized as being potentially susceptible to countervail actions.

The goal of the policy review process was to develop a new set of agricultural policies based on increased market responsiveness, greater self-reliance in the agri-food sector, recognition of regional diversity and increased environmental sustainability.

Following a Conference in Ottawa in December, 1989, a number of government-industry task forces were created to examine the implications of various agricultural policy options. One of the committees was given the mandate of studying three agricultural transportation programs: Western Grain Transportation Act (WGTA), Feed Freight Assistance (FFA) and Minimum Compensatory Rates (MCR) for canola products. This group was chaired by Mr. George Leith and consisted of representatives from the federal and provincial governments, grains industry, livestock industry, grains and oilseeds processing industry, farm organizations and transport carriers.

The Minister of Agriculture requested the 44-member Transportation Committee to examine the following issues with respect to the WGTA:

1) method of payment of the Crow Benefit;
2) options that would contribute to reduced costs and improved efficiency of the grain handling and transportation system with or without a change in the method of payment; and
3) amendments to the WGTA and other legislation or regulations.

Specific issues related to FFA and MCR were also assigned to the Transportation Committee.

The Transportation Committee decided to examine the implications of ten policy options, which were organized into five categories:

1) Status quo;
2) Phase out WGTA with no producer compensation;
3) Pay the producer perpetually on the basis of the:
   a) Gilson proposal,
   b) Hall proposal,
   c) Alberta/British Columbia proposal;
4) Pay the capitalized value of the Crow Benefit on the basis of the:
   a) Agricultural Diversification Alliance proposal,
   b) Manitoba Advisory Council #1 (10-year bond),
   c) Manitoba Advisory Council #2 (15-year bond),
   d) Manitoba Advisory Council #3 (15-year annuity based on historic shipments); and
5) Safety net.

The Transportation Committee struck four subcommittees to assess the implications of each of these options for:

1) grain prices in the western provinces and elsewhere in Canada;
2) grain production in the western provinces and elsewhere in Canada;
3) livestock production and prices in the west and elsewhere in Canada;
4) provincial offset programs;
5) value-added/diversification (other than livestock);
6) prairie land values;
7) prairie land use;

8) farm incomes;

9) grain handling system participants;

10) reduced costs or improved efficiency of the grain handling and transportation system;

11) use of the Canadian transport system;

12) amendments to the WGTA and other legislation or regulations;

13) trade; and

14) the environment.

The Transportation Committee began meeting in March 1990 and reported to the Minister of Agriculture in July, 1990.

1.2.1 Relationship of This Study to the Transportation Committee

This study is completely separate from the review process that is being conducted by the Transportation Committee. This is an independent economic analysis of the major policy options for grain freight rates in western Canada. Nevertheless, the options considered in this study represent all categories of options under discussion by the Transportation Committee except for the safety net category, which has not yet been well defined.

Some of the options analyzed in this study are exactly the same as or variants of those under consideration by the Committee; however, others under consideration by the Committee are not analyzed in this study.

No members of the study team are on the Transportation Committee. However, three members of the Advisory Committee for this study are on the Transportation Committee. They have provided an important link between the two independent bodies.

For the most part, this is a quantitative assessment of impacts that could be expected from changes in the WGTA rate structure. The Transportation Committee has used a consensus-building approach to assess in a mostly qualitative way the impacts of changes in the WGTA rate structure; it had no mandate to make recommendations.

1.3 Objectives

The purpose of this study is to evaluate quantitatively the expected impacts on all sectors of the Canadian agricultural industry, as well as on related secondary industries in the prairie provinces, of a number of policy options related to the transportation of prairie grains and oilseeds. The evaluation is meant to reflect conditions in agriculture at the end of the 1980s, thus providing policy makers with the most up-to-date information available at a time when pressures to change the present WGTA freight rate structure are emerging from a number of sources: multilateral trade negotiations at the GATT, ongoing bilateral negotiations under the terms of the CUSTA, livestock producers in western Canada who see changes to the WGTA freight rate structure as necessary to ensure their long run competitiveness, and the Alberta and B.C. provincial governments who believe that changes in the freight rate structure are necessary for creating more grain-based value-added activities in their provinces.

The specific policy options to be analyzed in this study include:

1) continuation of Crow Offset Programs in the three prairie provinces (status quo);
2) producers pay full compensatory rates but receive no compensation for loss of the WGTA (assuming no efficiency gains in grain handling and transportation);
3) producers pay full compensatory rates but receive compensation for loss of the WGTA in the form of an annuity that is based on eligible grain production, with gains in efficiency in grain handling and

transportation as a result of additional deregulation in the transportation industry (this is similar to the proposal by the Agricultural Diversification Alliance of early 1990);

4) producers pay full compensatory rates and receive continuous compensation on the basis of area cultivated (similar to the Gilson proposal of 1982);
5) change in the method of pooling costs of grain transportation from Thunder Bay to the lower St. Lawrence with WGTA rates, and full compensatory rates with compensation in the form of an annuity that is based on the historic volume of grain shipments (similar to the proposal of the Manitoba Advisory Council #3).

Each of these policy options will be compared to a base case that represents as closely as possible the situation in Canadian agriculture at the end of the 1980s.

The impacts of primary interest in the analyses of policy options include:

1) changes in patterns of crop production in the prairie provinces;
2) changes in total levels of production for major crops in the prairie provinces;
3) changes in summerfallow in the prairie provinces;
4) changes in net margins to the crops sector in each of the prairie provinces;
5) changes in land values in each region of the prairie provinces;
6) changes in exports of grain from western Canada;
7) changes in beef cattle populations in each province of Canada;
8) changes in net margins to the beef sector in each province;
9) changes in hog populations in each province;
10) changes in net margins to the hog sector in each province;
11) changes in household incomes in each of the prairie provinces;
12) changes in industrial activities in each of the prairie provinces;

13) changes in government payments to crop and livestock producers in each province;

14) Changes in total economic welfare in Canada.

1.4 Scope

This study is restricted to analysis of aggregate impacts at the regional, provincial and national levels. Though each of the options analyzed have important financial implications for farms of different sizes, enterprise combinations and debt-equity ratios, no assessments are made of impacts at the farm level.

The assessment of impacts is conducted for the major categories of grains, oilseeds and livestock only. Minor commodities such as alfalfa dehydrate, sunflowers and sheep are not examined in this study.

Although many possibilities exist for changes in the regulatory structure of grain transportation with a different freight rate structure, this study considers that the future regulatory structure would not be much changed from the one that has existed in the past. This means that freight rates for grain would continue to be regulated and that actual freight rates would be distance related. No analyses of completely deregulated freight rates for grain are attempted since it is very difficult to envision what such a system would be like. Similarly, no analyses are conducted for the movement of prairie produced grains through U.S. ports.

1.5 Organization of the Report

In the second chapter, a brief review is made of previous studies that have been conducted on the Crow and WGTA freight rate structures. This chapter is an abbreviated version of a complete analysis of previous studies (Kerr et al, 1990).

A description of the analytical methods used in this study is contained in the third chapter. The analyses are conducted with two types of models: a regional linear programming model of Canadian agriculture and input-output models of the industrial sectors of each of the prairie provinces.

The fourth chapter contains a description of the policy options for grain freight rates in the prairie provinces. This chapter contains a discussion of several issues that are pertinent to an analysis of changes in the structure of freight rates.

An analysis of Crow Offset Programs in each of the prairie provinces is presented in the fifth chapter. In this chapter, an estimate is made of the long run impacts of continuing with the programs that were in place in the three prairie provinces in early 1990.

The sixth chapter contains an analysis of full compensatory rates for producers where the producers receive no compensation and no gains occur in efficiency of grain handling and transportation. This set of conditions results in the maximum economic impacts of all policy options with the Thunder Bay pool that are analyzed in this study. Also in this chapter is a discussion of the sensitivity of the model's results to changes in grain prices.

In the seventh chapter, the policy option of full compensatory rates with gains in handling and transportation efficiency is analyzed. An analysis is made of the Agricultural Diversification Alliance's proposal. This proposal requires producers to pay full compensatory rates and to receive compensation for the loss of the Crow Benefit in the form of an annuity. The annuity is calculated from a 25-year capitalization of Crow Benefits, paid out over a fifteen-year period on the basis of eligible grain production. Results are presented for expected impacts in the short, intermediate and long runs if full compensatory rates were phased-in over a period of ten years.

A variation of the Gilson proposal is analyzed in the eighth chapter. This requires producers to pay full compensatory rates, but 81 percent of the present Crow Benefit would be paid directly to producers on the basis of area cultivated.

The pooling issue is analyzed in the ninth chapter. A change in the pooling basis from Thunder Bay to the lower St. Lawrence has been proposed by the Canadian Wheat Board. This proposal is analyzed for WGTA and full compensatory rates with compensation in the form of an annuity paid in the latter case on the basis of historic shipments as proposed by The Manitoba Advisory Council.

A summary of expected impacts from the different policy options is provided in the tenth chapter.

Implications of the policy options on primary agriculture in the various regions of Canada, on secondary industries in the prairie provinces, on bilateral and multi-lateral trade agreements that Canada has with other countries and on the environment are included in the eleventh and final chapter.

2. REVIEW OF WESTERN GRAIN TRANSPORTATION STUDIES

A complete review of relevant studies pertaining to the grain handling and transportation system (GHTS) can be found in Kerr, et al (1990) which is an adjunct to this report. Approximately forty different studies related to grain freight rates on the prairies were reviewed. It can be safely said that they employ such a wide range of methods, so little convergence in geographic areas and products included, and so little overlap in the time periods considered, that they constitute a basket of fruit far more diverse than the traditional concept of "apples and oranges". It is nearly impossible to compare results from these studies.

This does not mean that the studies of the grain handling and transportation system (GHTS) were poorly done or that their conclusions were faulty within the assumptions made and the limitations of the methods chosen. In most cases, they were undertaken to answer specific questions for specific clients and were not intended to provide information which could be used in an evaluation undertaken for broadly defined public policy objectives.

The GHTS which moves grain in Western Canada is heavily regulated from the farm gate until control of the product passes either to domestic end users or international carriers. As regulations determine the procedures followed by the various economic actors engaged in the complex and interdependent processes which comprise the GHTS, questions arise as to the effect of the regulations on the incomes of the participants and system efficiency. Producer organizations, provincial governments and some federal departments have initiated research which was not comprehensive in scope. As the GHTS is, first and foremost, a system and must be treated as such in any public policy decisions, analysis which lacks a comprehensive approach is likely to be of only limited use in the public policy process.

It is probably not surprising, then, that attempting to draw on existing studies for a major policy review failed to provide sufficient information for effective decision making. Hence, the first and most obvious conclusion arising from the examination of previous studies of the GHTS is that a comprehensive approach that evaluates impacts in all areas of Canadian agriculture is a necessary and worthwhile exercise when any major assessment of the GHTS is required for public policy decisions.

Economic studies can have two aspects: 1) a theoretical component with qualitative predictions and, 2) empirical estimates. Generally, all studies provide the former, while the latter is less common. The theoretical-qualitative models, whether empirically tested or not, are concerned with providing indications of the direction of change (e.g., a decrease in acres sown to wheat) based on economic logic. Previous studies of the GHTS provided a reasonable level of consistence in predictions of directions of change. This was encouraging as it implied a consensus on the basic underlying structure of the GHTS and the economic forces which affect it. Unfortunately, a consensus has not been achieved regarding the magnitudes of the predictions.

Another major limitation of existing studies of the GHTS are that their estimates have been overtaken by events. The most significant of these events have been: 1) the change from "Statutory Rates" to the subsidies of the Western Grains Transportation Act (WGTA) and; 2) the change from a booming agricultural economy in the 1970s to a depressed economy in the late 1980s.

The studies can be loosely divided between those conducted before and after 1985. Studies conducted before 1985 were concerned primarily with the distortions arising from the existing Statutory Rate system and the effects of changing it, including pre-implementation studies of the WGTA. Those undertaken since 1985 have either evaluated the effect of the WGTA or proposed changes to it. The major impetus for these latter investigations has been the issue of whether the railways or the producers should receive the WGTA payments.

2.1 Studies Completed Prior to 1985

Studies conducted prior to 1985 tend to be more comprehensive than those undertaken subsequently, and hence, have the potential to be more useful for public policy determination. Unfortunately, they suffer from assumptions which do not reflect the situation in 1990; estimates are based on forecasts of subsequent prices and inflation which have turned out to be far too high. There were three major phases of research activity in the pre-1985 period: 1) studies of the distortions caused by the statutory rates; 2) studies proposing changes to the statutory rates and; 3) pre-implementation examination of the WGTA as enacted.

The major event which provided the catalyst for a change to the GHTS with statutory rates in place was the establishment of two Royal Commissions in 1975 - the Hall Commission (HCR, 1977) and the Snavely Commission (SCR, 1977). The Hall Commission documented the declining efficiency of the GHTS while the Snavely Commission provided evidence that the railways were experiencing a serious shortfall in revenue when transporting grain. The combined realization that a change in policy was required, as well as the availability of quantitative benchmarks upon which to base estimates (which were provided by the Snavely Commission) led to a flurry of research activity.

There were three major assumptions in almost all of the studies conducted prior to 1985: 1) excess demand elasticity facing Canadian grain exports is infinite; 2) the supply elasticity of prairie grain production is close to zero and; 3) livestock supplies are very responsive to changes in feed costs. The most significant research effort in this period was three interrelated studies by Harvey (1980), (1981), (1982). These studies provide a comprehensive estimate of the likely effects of abandonment of the statutory rates. Harvey suggested that abandonment without compensation would mean that:

> ...western Canadian agriculture would suffer an income loss, on impact, of between $225 and $330 million (annually)... It is estimated that grain and livestock production responses to this impact on income would, in time, reduce the loss in total agricultural income to between $104 and $127 million per year... The implications are that real final product from agriculture would increase by between

> $100 million and $130 million per year, and that there would be further gains in value added by the secondary industry sector of perhaps $70 and $90 million per year. In other words, if the grain rates were raised to a compensatory level, the western economy will experience a net increase in real income of well over $170 million per year. (Harvey, 1980, pp xi - xii)

The Hall and Snavely Commissions and the studies which subsequently arose led to the Gilson consultative process. The major recommendations were: (1) that the Federal Government would commit to a subsidy equal to the 1981-1982 revenue shortfall; (2) that grain shippers would pay only an inflation capped portion of any transportation cost increase, with the federal Government paying the residual; (3) that, initially, the railways would directly receive the subsidies but by 1989-90 the grain producers should receive 81 percent of it and; (4) that the grain shippers pay the full cost of any grain shipments in excess of 30.4 tonnes. Of course, these recommendations brought forth additional studies. Kirk's (1983) report represents the most comprehensive evaluation of the Gilson proposals. In addition to the Gilson package, three other scenarios were examined: (1) the Gilson proposal without an inflation cap; (2) pay the railway the base year revenue shortfall in perpetuity and; (3) a complicated proposal whereby the subsidy would be apportioned among the grain producers, livestock producers and the railways. The results suggested a range of outcomes - annual increases in grain production worth $2.2 - $2.4 billion and in livestock production of between $0.7 - $1.1 billion. However, the study assumed higher inflation rates and prices than have actually occurred. No information was provided on the process of adjustment.

Before a great deal of research could be undertaken, the Western Grain Transportation Act was enacted in November 1983. The major provisions of this Act were that: (1) $659 million would be paid annually to the railway; (2) producers would pay cost increases up to 3 percent for the period 1984-1986 and up to 6 percent thereafter, unless their transportation cost exceeded 10 percent of the price of grain; (3) subsidy would be paid on a maximum of 31.5 million tonnes but it could be reduced if volume decreased. In addition, the Act mandated an automatic review of the program. This provided the incentive for a large research effort. A number of specialized studies, such as that by Lerohl et. al. (1984) on impacts on Alberta, by Furniss (1984) on the effect on input industries, by Davey and Kirk (1984) on livestock

and by Narayanan and Atcheson (1985) on the impacts on individual farms were undertaken. The results are too specialized to be of general interest.

Even in the early period of the WGTA, the question of whether the producer or the railway should be paid the subsidy became a major issue for research. One of the most extensive of these studies was a report prepared by Arcus Consulting Limited (1985). While the results were presented in a very disaggregated manner, they suggested that the benefit created for grain producers of having the subsidy go to the railway would be $696.3 million; wheat $435.4 million, barley $165.5 million and oats $11.2 million. Unfortunately, the study has limited usefulness as it considers only western Canada and is limited in the commodities covered. In addition, the projections were made with price projections which were, in hindsight, too optimistic.

The emphasis of the research began to change with the approach of the legislatively mandated review of the WGTA method of payment, slated for 1985. This provided the spur for the "current era" of GHTS studies.

2.2 Studies Completed After 1985

Conceptually, some of the better research on the GHTS was done as background to the report of the Committee of Inquiry on Crow Benefit Payment. Unfortunately, the review of the WGTA was ill-timed and, as a result, the output of the research efforts were largely wasted in a medium run context. The review was ill-timed from a research point of view for three reasons: (1) the WGTA's provisions had been operable for only a short time, and hence, as the cost to the farmers had not increased significantly, resources were still largely used as they were when the statutory rates applied; (2) the changes had not had time to have any significant effect on railway efficiency and; (3) the price declines of the late 1980s

were not yet manifest. The latter problem was to undermine the usefulness of the results of a considerable amount of work conducted in the mid-1980s.

The first major research effort which took account of declining world prices was that undertaken by the Economic Council of Canada. Indeed, the study was commissioned in reaction to the income crisis in the prairie grain economy. Part of that larger study was a report by Fulton, et al (1989). The study's estimates are based, in part, on formal modelling, and in part on casual empiricism. The effects on grains and oilseeds, livestock, farm income, income distribution, land prices and trade negotiations were estimated or discussed. Wheat and barley production were estimated to have been 6-7 percent lower under the WGTA relative to paying the Crow Benefit directly to producer, while cattle and hog production would have increased by six percent and two percent, respectively. The study also noted that the value of the WGTA had increased from 25 to 30 percent of net farm income in 1980 to 40 percent in 1987, reflecting the decline in grain prices. Of course, this is an underestimate since net farm income would have been negative in the absence of other major government programs such as the Western Grains Stabilization Program, Crop Insurance and the Special Canadian Grains Program, as well as the WGTA payments. This suggests another problem which studies to date have not treated adequately. Any discussion of changes to the WGTA should be referenced to the financial position of prairie grain farmers. Western grain farmers' incomes in recent years have been supported by transfers from the federal Government to a considerable extent. This means that, even if grain prices recover, the income and asset position of farmers may not improve as there will be an offsetting decrease in levels of support. The WGTA payments, on the other hand, are independent of grain prices. Clearly, any income effects associated with the removal of the subsidy could be mitigated if the financial position of farmers had improved. Unfortunately, it will take a significant and sustained increase in grain prices before that point is reached. This timing aspect of a change to the WGTA system has not been adequately addressed in existing studies.

In 1989, each of the prairie provinces commissioned major studies of the method of payment undertaken either under the auspices of the provincial Government or in the private sector. The Alberta study was released in August (Lerohl et. al. 1989). The study's intent was to focus on the direct effects of a changed rate structure in terms of full cost pricing of branch lines, variable incentive rates, and shifts in pattern of rail/truck use. Five scenarios were investigated:

1) current practice -base case;
2) pay the producer with only output effects included;
3) pay the producer and dockage remains on farm;
4) pay the producer and all grain is moved to the west coast and;
5) pay the producer with increased shipments to the U.S.

The final scenario is unique because it explicitly attempted to analyze grain exports to the U.S. as a result of the Canada-U.S. Trade Agreement.

The results were summarized as follows:

> ... the total cost of handling and transporting grain produced in Alberta in 1988 was $544 million. A change in the MOP (method of payment) would lead to an increase in overall grain production in Alberta of 323,000 tonnes (2.1%). ... On a commodity basis, wheat production would decrease by 3.2% while oats, barley and canola production would increase by 8.1%, 1.6% and 17.0% respectively. These production changes would result in a decrease of approximately $6 million (1.1%) in total grain handling and transportation costs. If dockage were kept on farms after a change in the MOP, the cost saving would be approximately $15 million (2.7%). The elimination of cross hauls of Alberta grains after a change in MOP would lead to a cost saving of $40 million or 7.3%. If more canola and oats were shipped directly to the U.S., a cost saving of $25 million or 4.6% could be realized. The cumulative effect of all of these scenarios, relative to the base case, is a cost saving of approximately $75 million (13.5%). Had 25% or 100% of barley exports moved via truck to the U.S., rather than by rail to ports, the cost savings would have been even larger. (p.2).

In September 1989, the Saskatchewan Wheat Pool (1989) released a report which, among other things, considered WGTA abandonment. That study concluded that the major provincial impacts would be:

1) abandonment would cost grain producers $400 million per year;
2) a benefit of $14 million and $7 million for the beef and hog sectors respectively and;
3) the number of beef cattle finished in the province would increase by 380,000 per year.

In Manitoba, a group of studies was conducted by Deloitte Haskins & Sells (1989a) (1989b) (1990) for the provincial Agricultural Advisory Council. Two scenarios were developed:

1) pay the producer and distance related rates and;
2) pay the producer and commercial rail rates.

They assumed a given export price for wheat but assumed that only 50 percent of an increase in freight costs would be reflected in the price of barley and 60 percent for canola. The results they obtained for Manitoba were:

1) decreased wheat production of 1.6 percent;
2) increased barley production of 5.5 percent;
3) increased canola production of 2.9 percent;
4) increased cattle production of 24 percent and;
5) increased hog production of 28 percent.

The final paper reviewed was released in January 1990 by the Agricultural Diversification Alliance (1989). That study proposed that the WGTA subsidy should be bought by the federal government through the use of an annuity amortized over 25 years but paid out over 15 years. No original

quantitative research was undertaken, but rather, the Committee which prepared the report made a "preliminary and subjective assessment of its proposals" (pp. 2-3) and concluded that:

1) less than a 1 percent decrease in grain/oilseed production would occur;
2) livestock production would increase by 400,000 beef cows, 500,000 slaughter cattle and 300,000 hogs; and
3) gross farm income on the prairies would increase by $600 M per year.

In summary, there is a virtual consensus in the previous studies regarding the qualitative effects:

(1) of the current WGTA arrangement;

(2) of changing the method of payment;

(3) of abandonment, whether through buy out or discontinuation and;

(4) on central and eastern Canada.

Differences in methods and assumptions have however, led to different magnitudes of expected impacts. Further, many of the studies are now outdated, particularly those whose approach is best suited to broad public policy purposes.

3. METHODS OF ANALYSIS

3.1 Overview

The major objective of this study is to evaluate the impacts on Canada's agricultural and related industries of a number of policy options relating to grain transportation on the prairies. The agricultural industry in Canada is diverse; it contains many interrelationships among commodities and among regions. Quantitative models of the agricultural and secondary industries in Canada are required to capture these interrelationships and to project the likely magnitudes of any changes in production, resource use and income in the various regions of Canada.

Two types of quantitative models were used in this study: a regional model of Canadian agriculture and three separate input-output models of the industrial sectors of the three prairie provinces. The Canadian Regional Agricultural Model (CRAM) was originally developed in 1986; at that time it was based on 1984 data (Webber et al, 1986). Subsequent revisions have been made to the original version of CRAM, including the development of retention functions for livestock inventories (Webber et al, 1988), major modifications to the dairy sector (Stennes, 1989) and the collection and insertion of 1989 technical and cost coefficients for this study. The input-output models of the three prairie provinces, developed by Statistics Canada, are based on 1984 transactions among industrial sectors in each of the prairie provinces.

Although the models were used independently in the analytical portion of this study, they were linked together through a data transformation procedure. CRAM was used to estimate the aggregate farm level consequences of each policy option for each province: changes in crop production and exports, changes in livestock production and shipments, changes in net margins, changes in value of land. Results from the CRAM analysis were then transformed to a suitable format so they could be used in the input-

output models. The input-output models were used to predict impacts on the secondary industrial sectors in the prairie provinces from each of the policy options considered in this study.

Descriptions of the models are contained in sections 3.2 and 3.3. The specific policy options evaluated in this study are described in Chapter 4.

3.2 Canadian Regional Agricultural Model (CRAM)

CRAM is a regional linear programming model of Canadian agriculture. It simulates production, marketing and transportation of the major agricultural commodities produced in Canada. It optimizes production of these commodities within the constraints of agricultural resources and final demands for the products. It is a single year model based, in its current configuration, on the calendar year 1989.

The model represents the crop sector of the Canadian agricultural industry with production occurring in 29 separate regions having different soil and climatic conditions: seven in Alberta, nine in Saskatchewan, six in Manitoba and one in each of the other seven provinces (Figures 3.1, 3.2 and 3.3). Crops in the model include four grades of wheat, barley/oats, flax, canola, corn (for grain and silage), soybeans, tame hay, pasture and other crops. The category called "other crops" differs by region and represents historic production levels of minor crops such as pulses, sunflowers , potatoes, buckwheat and canary seed. The model permits choices to be made among the available crops, including the planting of crops in western Canada on either summerfallow or stubble. The model selects the most profitable crops to be grown in each region within the specified constraints.

Crops produced in each region can be used to meet the demands for livestock feed, domestic consumption, or export. Domestic consumption is assumed to be fixed at the provincial level. Excess

FIGURE 3.1 CROP REGIONS OF ALBERTA

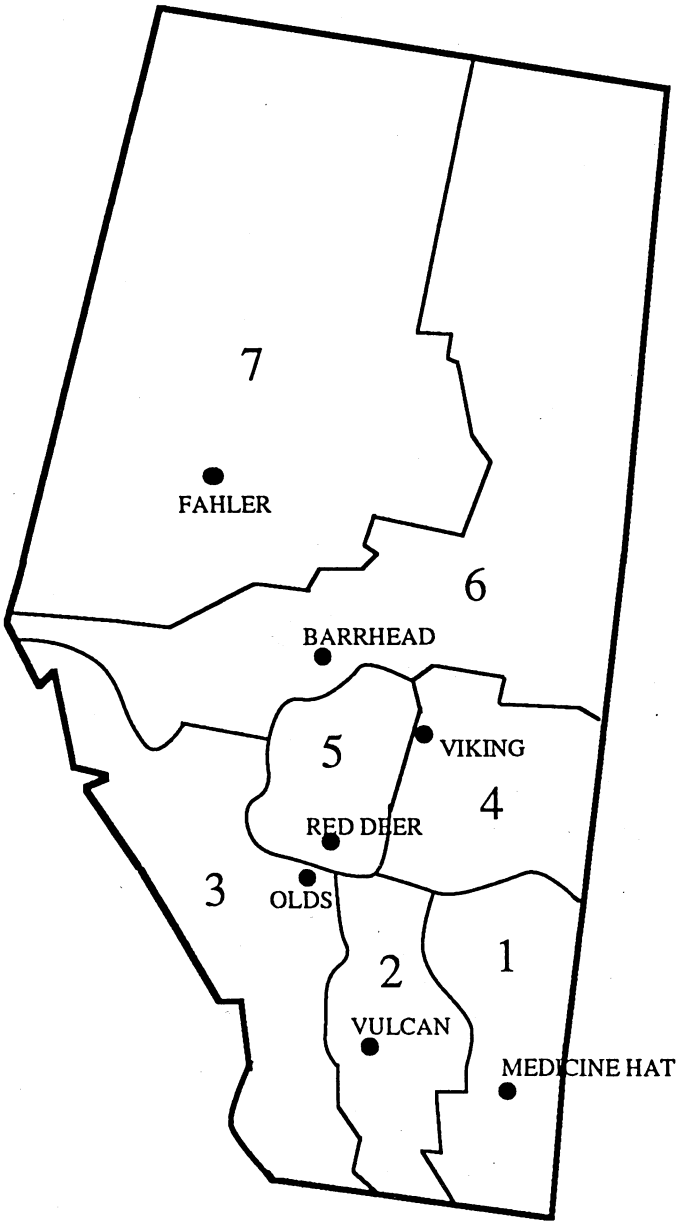


FIGURE 3.2 CROP REGIONS IN SASKATCHEWAN

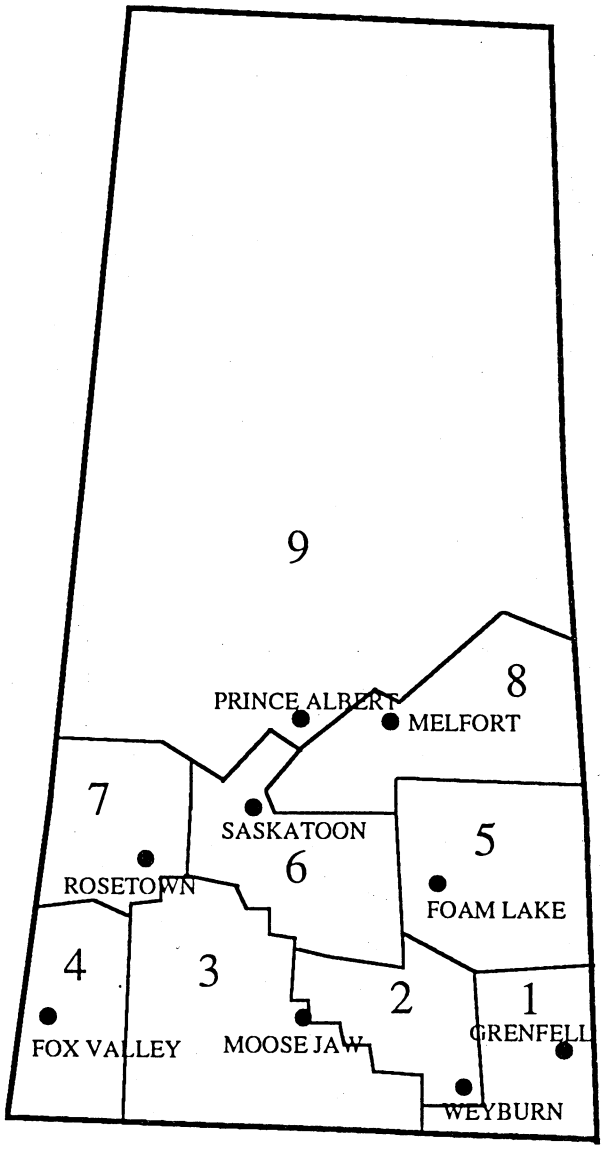
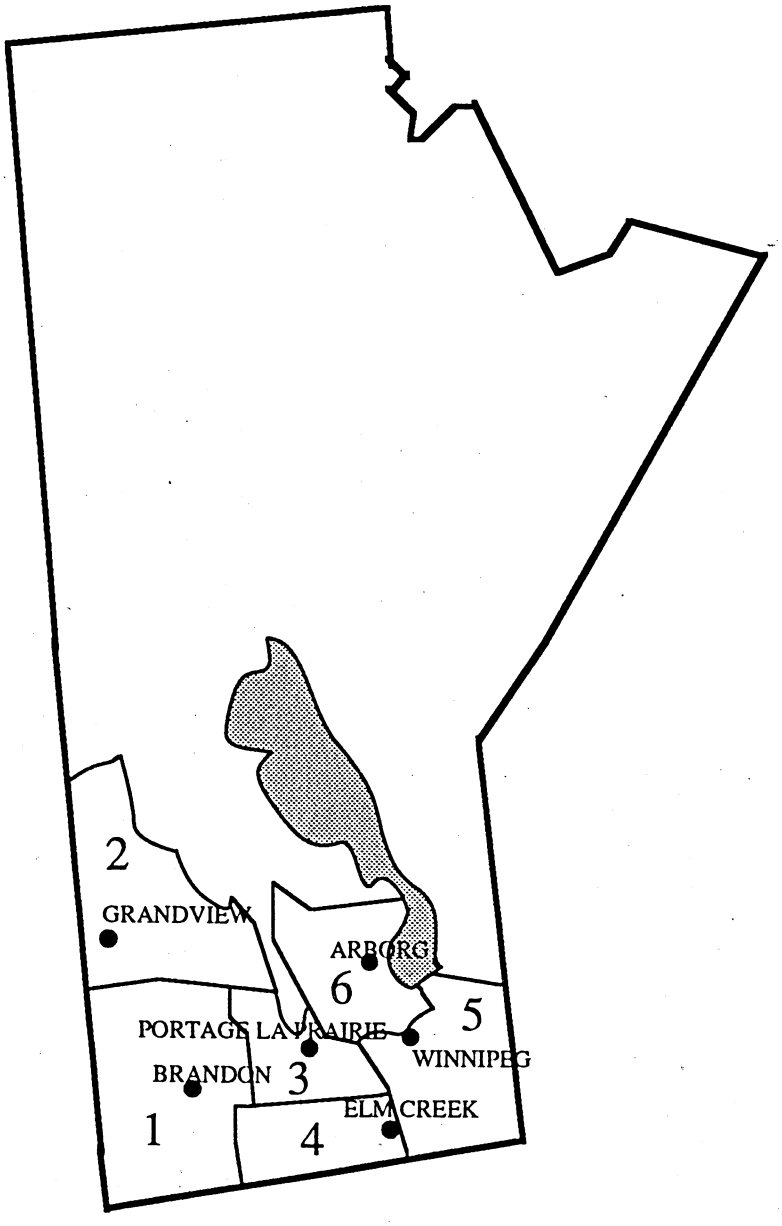


FIGURE 3.3 CROP REGIONS IN MANITOBA



supplies of each crop are transported to terminal locations (Thunder Bay or west coast) for export, with freight costs assessed on the sales of the products.

CRAM selects the optimum amount of summerfallow in each region of the prairie provinces on the basis of the relative profitabilities of available crops planted on summerfallow and stubble, with the constraint that the area of summerfallow must equal the area of summerfallow crop in each region.

Only the variable costs of crop production are included in the model. Fixed costs such as depreciation, interest on investment, owned labour and management costs are not taken into account.

Livestock production is modelled at the provincial level for all provinces except the four in the Atlantic region which are treated as a single livestock producing region. Livestock commodities in the model are beef, hogs, dairy and poultry. Low and high quality beef are produced, with low quality beef coming from the slaughter of mature dairy and beef cows as well as bulls. Pork primal cuts are produced in the hog sector of the model. Fluid and industrial milk products are represented in the dairy sector of the model. The production of eggs, broiler meat and turkey meat are represented in the poultry sector of the model.

Animals are fed grains that are grown in the crops sector of the model: stored forage, pasture, barley and corn for beef and dairy animals, barley for hogs and wheat for poultry. Protein supplements are treated as a cash cost in the model. Substitute feed rations for the beef animals are permitted in the model. Based on relative profitability, feeder animals can be fed different ratios of feed grains and forages. The model also chooses the optimal rate of growth of feeder animals, within specified constraints. Similarly, the breeding herd of beef cattle can be fed different proportions of feed grains, pasture and stored forage.

The opening stocks of all categories of livestock are specified exogenously. When analyzing a policy option that would change the farm level price of feed grain and thus the relative profitability of livestock production, changes are made to the opening stocks of animals by use of retention functions (described in Section 3.2.2). Replacement ratios for each class of livestock are specified to ensure that closing stocks equal opening stocks in a no growth situation. The model can also be used to analyze growth or reduction in herd size.

Domestic level demand is specified for low and high quality beef, pork, final dairy products, eggs, broilers and turkeys. Excess supplies can be exported. Both meat and livestock animals can be transported to other provinces and to export locations. Beef (in the form of either live animals or dressed meat) can be imported into Canada. Live animals can be imported either for feeding or for slaughter purposes.

Poultry and dairy production are constrained by quotas on provincial levels of production as mandated by marketing boards. Production of these commodities is used to satisfy domestic demands.

The objective of the model is to maximize consumers' plus producers' surplus. Consumers' surplus is increased when the price of food falls due to greater production. Producers' surplus measures the difference between gross agricultural income and costs of production and transportation. Commodities traded internationally are valued on an export basis. Farm level grain prices are derived by subtracting handling and transportation costs from the in-store prices at the terminals.

Accounting in the model is done on a regional basis by tracking gross revenues, cash costs and farm value-added. Grains fed to livestock in Canada are valued at their opportunity costs with revenues to the crops sector being offset by equivalent costs to the appropriate livestock sectors. Since only variable costs of production are included in the model, returns to the crop and livestock sectors are calculated as net margins above variable costs.

CRAM generates a series of "shadow prices" for farm land in each of the 22 regions of the prairie provinces. A shadow price for land can be defined as the net rental value of one extra hectare in its best possible agricultural use, within the demand constraints of the model. Since CRAM is a comprehensive model, the shadow price incorporates the simultaneous effects of extra variable costs of production, summerfallow and transportation as well as the possible lower overall price level of the most profitable crop that could be grown on one extra hectare in that region.

3.2.1 Stepped Demand Functions

The price of farm products is generally dependent on the quantity produced and offered for sale as well as on demand for the product. The higher the quantity produced, the lower is the price, if everything else is constant. This effect is captured in CRAM through a series of demand functions for the major categories of final agricultural products. The demand functions are downward-sloping which means that prices are lower for higher levels of production.

Since Canada trades all categories of grains and oilseeds, as well as beef and hogs, Canadian producers face both an import and an export price for these commodities. The small country assumption is used in CRAM; this means that changes in Canadian production will have no effect on world price levels. Thus, domestic prices must be between an export price floor and an import price ceiling. The downward-sloping demand functions in CRAM for wheat, barley, canola, high quality beef, low quality beef, primal cuts of pork, important final dairy products, broilers, eggs and turkeys represent price levels between the floors and ceilings.

Since CRAM is a linear programming model, the downward slopes to the demand functions must be approximated in a series of linear segments or steps. Each step represents a distinct price change for a stated quantity of output. By increasing the number of steps and decreasing the quantity increments

associated with each step, the stepped demand curve can be made almost smoothly downward sloping. Unfortunately, each additional step increases the overall size of the model, thus increasing the computing requirement for solving it. For this reason, ten steps were used for each of the demand functions in this study. This represents a compromise between accuracy of representing the demand functions and manageable size of model.

3.2.2 Retention Functions

Inventories of beef animals and hogs are responsive to changes in variables which affect the profitability of production in these sectors. They are particularly responsive to changes in their own prices as well as prices of feed grains. Opening stocks of breeding and feedlot animals in the beef, hog, dairy and poultry sectors of CRAM are determined outside the model on the basis of estimated retention functions. Optimization occurs within the constraints imposed by the opening stocks of breeding animals for each class of livestock.

Retention of beef animals and hogs in western Canada will be affected not only by changes in the farm-level price of feed grains, but also by changes in direct government payments for feeding these grains. Livestock producers view increases in the freight rates for transporting grains to export locations as a decrease in feed grain prices; a decrease in feed grain prices is an incentive to increase livestock production. The elasticity of retention is an estimate of the percentage increase in herd size for a one percent decrease in feed grain prices.

The retention functions are based on long run estimates of elasticities of herd size with respect to changes in either feed grain prices or the price of feeder calves. Elasticities of retention with respect to feed grain prices used in this study were obtained from the Agriculture Canada FARM model (Charlebois, 1987):

. beef breeding herd (western Canada) -0.22

. stockers and feeders (western Canada) -0.20

. long yearlings (western Canada) -0.30

. sows (B.C. and Alberta) -0.22

. sows (Saskatchewan and Manitoba) -0.20

This means that if feed grain prices decrease by one percent in western Canada, the beef breeding herd will increase (in the long run) by 0.22 percent.

A problem exists in determining the appropriate retention elasticities for livestock in British Columbia. A change in the freight rate would directly affect farm level grain prices only in the Peace River region of B.C. This area contains only 14.8 percent of the beef feeder animals and 5.6 percent of the hogs in the province (Statistics Canada, 1986). Most of the remaining beef and hog feeders are located in the lower mainland and Vancouver Island areas where many are fed locally produced or imported grain that would not be much affected by farm level prices on the prairies. On the other hand, feed for some interior feedlots is trucked from southern Alberta; this would be affected by changes in farm level prices on the prairies.

In the absence of dependable estimates of effects on grain prices throughout British Columbia from changes in railway freight rates from the prairies, it was assumed that B.C. grain prices would be affected only in the Peace River region. Retention elasticities for B.C. livestock were therefore adjusted downward to represent the proportions of the various classes of animals that are located in the Peace River region. This simplifying assumption may result in a slight underestimation of livestock impacts in B.C. from changes in the WGTA rates.

Since none of the policy options analyzed in this study were expected to affect grain prices in central and eastern Canada, retention elasticities with respect to feed grain prices in this part of the country are not used. However, feeder calf prices in Ontario may rise if, in some policy options, fewer feeder cattle are shipped from western Canada to Ontario. A retention elasticity with respect to the price of feeder calves in Ontario of 0.5 was also obtained from Agriculture Canada's FARM model (Charlebois). This means that if the price of feeder calves increase by two percent, the number of breeding cows in Ontario would increase by one percent.

3.2.3 Government Programs

Existing government programs have affected current cropping and livestock production practices in Canada. Therefore, the base case, against which all policy options are compared, is somewhat dependent on past and current government programs.

All major federal and provincial programs that affect resource allocation in Canadian agriculture are included in CRAM. A separate accounting is made for government expenditures in each of the ten provinces. In general, the types of programs that are included are:

1) credit programs and interest subsidization,
2) crop insurance and crop damage payments,
3) subsidies on inputs (except for farm fuel rebates, since the value of these rebates has already been taken into account in calculating the variable costs of production),
4) grants, and
5) deficiency payments.

CRAM was calibrated for a 1989 base (except for crop yields, which were set at average levels for the 1982-88 period - see Section 3.2.5). All items in the government payments section of CRAM reflect actual payments made to producers by federal and provincial governments in 1989. The Special Canadian Grains Program and Western Grain Stabilization Program were not included since no payouts were made from these Programs to farmers in 1989. The full list of government programs is available in the data files of CRAM. For illustrative purposes, the following programs are included for Alberta:

1) Crops sector

- . credit programs
- . crop damage payments (i.e., from waterfowl)
- . property tax rebates
- . input price protection (i.e., Alberta Fertilizer Price Protection)
- . wage subsidies
- . Primary Agricultural Producers rebate
- . Alberta Agricultural Development Corporation program benefits (i.e., interest assistance)
- . Farm Credit Corporation subsidies
- . joint federal-provincial crop insurance

2) Livestock sector

- . herd compensation
- . fuel tax rebate
- . credit programs
- . capital grants
- . livestock predator assistance
- . Crow Offset Program
- . property tax reductions

- wage subsidies
- interest assistance
- tripartite stabilization program.

In British Columbia, northern Ontario, eastern Quebec and the Atlantic provinces, benefits to the livestock sector from the Feed Freight Assistance Program are included.

Benefits from the government programs were pro-rated on an area or livestock unit basis in CRAM. This permitted an assessment of expected changes in government expenditures that may accompany changes to the WGTA freight rate structure. The model assumes that producers have the same response per dollar regardless of whether it comes from governmental or market sources.

3.2.4 Supply Managed Commodities

The production of dairy and poultry products is limited by marketing boards in Canada under the authority of the Farm Products Marketing Agencies Act. Producers in each province are allocated quotas on either output or some input. Prices for some of these commodities are set according to formulas that are designed to cover all costs of production.

Changes to farm level prices for feed grains as a result of a change to freight rates would affect the cost of producing these supply managed commodities. However, cost of production formulas are used to establish farm level prices for these products. If input costs are reduced, prices for these products would also be reduced, leaving the producers of these commodities unaffected from a profit perspective, to the extent that formula prices accurately reflect costs of production.

One possible effect on supply managed commodities from a change in freight rates of prairie grains could be on future allocations of quotas for production. Each of the marketing boards occasionally allows additional production whenever the quantity of the commodity that is demanded at the formula price is greater than the existing quota. There has been some effort to allocate new quota to provinces where either demand has grown at a faster pace than the national average or costs of production have decreased relative to the national average. Since higher freight rates on the prairies would be expected to lower feed costs in those provinces, there is some reason to believe that Manitoba, Saskatchewan and Alberta would receive a larger share of future allocations of quota for these commodities. On the other hand, continued growth in the populations of Quebec, Ontario and British Columbia may outweigh the advantages of lower production costs on the prairies in any future decisions regarding allocations of quota. In any case, allocations of new quota by marketing boards is an inherently political process the outcome of which is difficult to anticipate.

For this study, production from the dairy and poultry sectors were held constant during evaluations of all policy options. It was felt that any possible advantages from lower farm level grain prices that would accrue to prairie producers of these commodities (and disadvantages to producers in other provinces) were too insignificant to measure.

3.2.5 Data Requirements

CRAM maximizes the difference between gross agricultural income and costs of production and transportation of agricultural commodities, within the constraints of resource availabilities and wholesale-level demand. Data must be provided for each of the variables that can affect the maximization procedure.

On the gross income side, CRAM requires data on either fixed farm-level prices for output or, in the cases where prices are determined within the model, demand schedules for the output. In this study, 1988-89 final realized prices for grain are used (Table 3.1). These prices are in-store Vancouver and Thunder Bay. Farm level prices are reduced from these levels by the cost of transporting and handling the grains or oilseeds.

Livestock prices are endogenously determined, based on downward sloping, stepped demand functions. Price levels for livestock products that were determined in the solution for the base case are in Table 3.2. These prices change slightly every time beef and pork production levels change.

Prices for poultry, dairy and other products are required for operation of the model. Since these prices were held constant in this study, they are not reported here. They are included in the data files for CRAM.

Table 3.1 Base Price Levels for Grains & Oilseeds, Thunder Bay & Vancouver

CROP	GRADE	PRICE ($/tonne)
WHEAT	1 CWRS	215.67
	2 CWRS	196.68
	3 CWRS	191.19
	FEED	161.06
BARLEY	1 FEED	124.23
FLAX	1 CW	387.00
CANOLA	1 CANADA	334.00

Source: Agriculture Canada. 1989. Market Commentary.

Table 3.2 Endogenously Determined Prices for Livestock Products in Base Case ($/tonne)

PRODUCT	WESTERN CANADA	EASTERN CANADA
High Quality Beef	3,100.00	3,261.00
Low Quality Beef	2,926.00	3,005.00
Pork Primals	2,270.00	2,229.00

Product yields are an important part of the model. Yields must be specified for each grain, oilseed, forage and other crop in each of the 29 regions in the model. Furthermore, yields must be differentiated in western Canada between summerfallow and stubble cropping practices. In this study, crop yields were average levels for each crop during the 1982-88 period. Crop yields for the various regions in Alberta, Saskatchewan, and Manitoba are in Table 3.3. Crop yields for the other provinces are included in the data files for CRAM.

Product yields for livestock depend on feeding programs, rates of gain and type of animal. They are included in the data files for CRAM.

Variable costs of producing crop and livestock products are required for the optimization of CRAM. In this study variable costs of producing crops were developed from survey data obtained from Agriculture Canada, as well as from other published and unpublished sources. Costs used in this study were meant to reflect 1989 average cost conditions. Costs of producing grain and oilseeds for Region 5 in Alberta (Red Deer area), Region 6 in Saskatchewan (Saskatoon area) and Region 3 in Manitoba (Portage La Prairie area) are in Table 3.4. Costs of producing crops for all other regions are included in the data files of CRAM.

Variable costs of livestock production in CRAM differ by class of animal, feeding program and rate of gain. Variable costs do not explicitly include the cost of feed grains and forage; these intermediate products are implicitly purchased from the crops sector at their opportunity costs. All variable (non-feed) costs for livestock production are included in CRAM's data files.

The costs of transporting agricultural products from province to province or from province to export terminals are important data in this study. The WGTA and full compensatory rates for transporting

Table 3.3 Yields for Crop Regions in the Prairie Provinces, 1982-89 Average (Bu/Acre)

		WHEAT		BARLEY		CANOLA		FLAX
Prov.	Region	Fallow	Stubble	Fallow	Stubble	Fallow	Stubble	Fallow
B.C.	1	38.6	27.3	49.2	43.4	21.2	18.1	
Alta.	1	29.4	18.4	44.3	39.0	23.1		39.5
	2	32.5	30.6	59.1	52.1	27.9	23.0	20.0
	3	30.1	27.3	58.3	46.3	23.7	19.6	15.8
	4	39.8	28.1	57.9	51.1	26.8	22.1	18.4
	5	55.0	38.8	72.8	64.1	29.7	24.3	21.5
	6	44.5	31.4	61.2	53.8	26.7	23.5	18.8
	7	38.6	27.3	49.2	43.4	21.2	18.1	13.3
Sask.	1	30.0	21.2	43.6	38.4	27.1	19.8	14.3
	2	30.1	21.2	45.1	35.8	24.1	17.6	14.4
	3	26.1	17.4	40.6	35.8	22.9	16.7	12.2
	4	25.3	17.0	39.4	34.8	25.7	18.8	14.8
	5	35.4	24.9	53.3	42.3	31.1	22.7	16.2
	6	31.4	22.1	45.9	40.4	27.0	19.7	16.3
	7	33.1	23.4	51.2	40.7	27.2	22.4	16.0
	8	35.9	25.2	60.9	48.3	30.6	22.3	19.6
	9	36.9	26.0	58.4	46.4	28.1	23.1	20.5
Man.	1	30.6	28.8	56.3	49.6	25.0	20.6	16.6
	2	31.5	29.9	58.5	46.5	28.0		18.5
	3	36.9	31.4	67.8	53.9	26.8	22.1	18.5
	4	38.3	32.5	64.8	57.0	26.6	21.9	19.6
	5	41.9	29.6	58.5	51.6	21.7		19.6
	6	39.1	27.5	59.2	47.0	21.7		17.9

Source: Alberta Agriculture (1988), Saskatchewan Agriculture (1988) and Manitoba Agriculture (1988).

Table 3.4 Variable Costs of Producing Crops in Three Prairie Regions ($/ac)

	WHEAT		BARLEY/OATS		CANOLA		FLAX
	Fallow	Stubble	Fallow	Stubble	Fallow	Stubble	Fallow
ALTA. REG.5							
Fert.	10.5	18.29	11.17	19.27	12.26	23.42	7.85
Chem.	12.61	9.61	9.61	12.90	9.36	15.28	6.83
Fuel	3.77	3.98	3.98	4.90	5.08	4.42	7.44
Machine	8.39	7.57	7.57	9.01	7.56	7.81	11.85
Other	14.68	21.34	24.26	26.02	29.31	29.29	20.02
SASK. REG.6							
Fert.	4.79	12.08	5.45	10.66	7.24	18.58	7.56
Chem.	6.26	9.89	4.72	7.68	13.30	11.09	9.95
Fuel	2.90	3.98	4.28	4.48	8.56	3.80	1.74
Machine	4.83	5.64	7.33	6.55	8.67	5.85	3.16
Other	19.93	21.07	26.35	20.92	22.45	27.93	15.71
MAN. REG.3							
Fert.	7.53	26.02	12.05	19.33	12.77	17.75	9.32
Chem.	7.54	12.44	6.38	10.80	8.48	8.48	12.88
Fuel	1.73	3.96	0.88	2.35	2.84	2.22	0.97
Machine	5.11	8.99	5.03	7.87	7.64	4.41	2.99
Other	23.84	27.35	28.36	20.44	28.31	27.29	27.10

[1] Other costs include seed, insurance, building repairs, utilities, interest on operating expenses and miscellaneous.

Source: Unpublished farm surveys, Agriculture Canada.

grains from each region in western Canada to Vancouver and Thunder Bay are in Table 3.5. The full compensatory rates shown in Table 3.5 include a projected increase in efficiency of 1.5 percent per year for transporting grain to market (described in Section 4.3.1).

Producers must also pay for handling costs of grains and oilseeds. These are charges for receiving, elevation, loading-out, removal of dockage and terminal cleaning. Handling charges in the base case for the various crops are presented in Table 3.6.

Transportation costs for livestock were based on personal communications with shippers in Calgary, Edmonton, Vancouver and Kamloops as well as with provincial marketing board representatives in British Columbia and Saskatchewan. Rates vary by type of animal and destination. Representative livestock transportation costs are in Table 3.7.

Opening stocks of livestock were based on January 1, 1989 levels, as reported in Statistics Canada, 1990. Opening stocks of intermediate classes of feeders and replacements must be calculated from the breeding herd stocks to maintain consistency in the model. All stock numbers are included in the data files for CRAM.

In British Columbia, it was assumed that only animals in the Peace River region would be affected by changes in grain transportation rates on the prairies; (see Section 3.2.2). Based on the 1986 Census of Agriculture (Statistics Canada, 1986), the proportion of B.C. hogs in the Peace River region was .056, the proportion of B.C. beef cows in this region was .148 and the proportion of B.C. bovine feeders in this region was .227.

Availability of crop land, forage land and pasture land in each region constrain the optimal solution. These data represent 1988 inventories of land in the various categories; they are included in the data

Table 3.5 WGTA & Full Compensatory Freight Rates From Prairie Crop Regions to Vancouver & Thunder Bay

			WGTA Rates[1]		Full Rates[2]	
Prov.	Region	Location	VCR[3]	TB[3]	VCR[3]	TB[3]
B.C.	1	Dawson Creek	7.82	15.39	22.62	44.54
ALTA	1	Medicine Hat	9.15	10.04	26.49	29.07
	2	Vulcan	8.56	11.05	24.77	31.97
	3	Olds	8.41	11.51	24.33	33.31
	4	Viking	8.56	10.34	24.77	23.93
	5	Red Deer	8.71	11.51	25.20	33.31
	6	Barrhead	8.41	11.51	24.34	33.31
	7	Falher	9.13	13.57	26.49	39.28
SASK	1	Grenfell	11.74	7.67	33.96	22.19
	2	Weyburn	11.51	7.96	33.31	23.05
	3	Moose Jaw	10.64	8.41	30.79	24.34
	4	Fox Valley	9.9	10.04	28.64	29.07
	5	Foam Lake	12.42	8.11	35.95	23.48
	6	Saskatoon	10.04	8.86	27.07	25.63
	7	Rosetown	10.49	9.3	30.36	26.92
	8	Melfort	10.83	8.86	31.33	25.63
	9	Prince Albert	10.34	9.15	29.93	26.49
MAN	1	Brandon	13.11	6.93	37.94	20.04
	2	Grandview	12.42	7.37	35.95	21.33
	3	Port. La Prairie	13.57	6.33	37.28	18.32
	4	Elm Creek	14.04	6.33	40.62	18.32
	5	Winnipeg	14.04	6.03	40.62	17.46
	6	Arborg	14.95	6.48	43.25	18.75

[1] Quoted WGTA rates are for 1989-90.
[2] Full compensatory rates are derived from 1989-90 WGTA total rates, and adjusted for increased railway efficiency by a compound factor of 1.5 percent per year for ten years.
[3] VCR and TB are Vancouver and Thunder Bay, respectively.

Source: Grain Transportation Agency. 1989. Canadian Freight Tariff Report.

Table 3.6 Base Handling Costs for Grains & Oilseeds ($/tonne) Prairie Provinces

PROVINCE	WHEAT	BARLEY	FLAX	CANOLA
Alberta	9.09	10.84	11.52	12.08
Saskatchewan	8.82	10.43	13.99	14.12
Manitoba	10.09	12.32	13.74	13.11

Source: Canadian Grain Commission 1988.

Table 3.7 Representative Livestock Shipping Costs in CRAM

SOURCE	LIVE FEEDER DESTINATION	LIVE CATTLE	DRESSED HOGS	BEEF AND PORK
		($/500 lb. calf)	($/200 lb. hog)	($/lb.)
B. C.	Alberta	18.71	7.48	0.029
Alberta	Manitoba	24.57	9.78	0.034
Alberta	Ontario	61.88	21.50	0.075

Source: Personal communications with shippers.

files for CRAM (Statistics Canada 1989, Ontario Ministry of Agriculture and Food 1988, Manitoba Agriculture 1988, Saskatchewan Agriculture 1988, and Alberta Agriculture 1988).

Various other data including those that represent constraints on rotations and summerfallow, are included in the data files for CRAM.

3.2.6 Limitations of CRAM

Aside from the well-known limitations imposed by a linear programming model (linear relationships known with certainty, non-integer variables, imposition of optimizing behaviour), CRAM has some additional shortcomings for examination of policy options of grain transportation from the prairie provinces. First, it is a static model. It can not analyze the dynamic mechanisms required to get from one equilibrium to another. Second, although CRAM includes the major crop and livestock commodities grown in Canada, it does not include some commodities that may be important in specific regions. In fact, only 86 percent of the crop movements which qualify for WGTA rates are captured in the model. Third, since accounting in CRAM is on a calendar year basis, any intra-year changes in prices cannot be analyzed. Fourth, market prices for intermediate products are not established in CRAM. There is no price for hay; there are no prices of feeder calves in the various provinces even though feeder calves are free to move from province to province in response to market opportunities; similarly, there are no local or regional prices established for feed grains. CRAM develops a general equilibrium set of prices and quantities for the major agricultural commodities in Canada. Export prices are fixed at world price levels, less the costs of handling and transportation to terminal locations. The farm level price of barley destined for the export market is the opportunity cost for feed used in livestock expansion decisions. Once the livestock herd is established (which is denoted by opening stocks of the various classes of animals), the animals must be fed. The livestock herd in each province draws feed to meet nutritional

requirements from the least expensive sources. The only prices established by the general equilibrium solution are for final products.

The lack of capability for analysis of intra-year changes in prices is of particular concern in the local feed grain market. Shortages of feed grains in some regions can occur following years of drought, especially late in the crop year before a new crop has reached maturity. Feed grains may have to be transported from other regions of the prairies, thus increasing the local prices of feed grains in the importing regions.

There is no lack of evidence that local markets for feed grains exist in the prairie provinces. Off-board prices for feed grains reported by Alberta Agriculture reveal an active and fluctuating market for feed grains across the province. For example, in 1985, the average off-board price of barley in Lethbridge was $19 per tonne higher than in Edmonton. On the other hand, in 1982, the off-board price in the Peace River region was more than $5 per tonne higher than in Lethbridge. Within year fluctuations can be even more variable.

Although there is no doubt that local differences in feed grain prices have occurred in various regions of the prairie provinces, a problem exists in predicting not only the magnitude of these differences but also which regions will have the highest prices. A careful analysis of production and consumption of feed grains over the past several years reveals that every region in Alberta (which has the largest livestock herd among the prairie provinces) had a net surplus of feed grains, even during the drought years in the mid-1980s. Feed barley was exported from every region during every crop year, even though in retrospect, producers would have received higher prices for their feed barley by selling it to local livestock producers during some of those years.

Analysis of expected impacts from a change in freight rates for grains requires some assumption regarding expectations of grain and livestock producers. Will feed grain producers expect local prices for feed grains to increase and therefore restrict their sales to the Canadian Wheat Board? If producers do that, local feed grain prices may not rise to levels observed in past years. Will livestock producers in western Canada expect local feed grain prices to rise? If they do, expansion of their livestock herds may be restrained.

The peculiarities of local markets for an intermediate product are difficult to capture in an aggregate model of the Canadian agricultural industry. They could be better addressed in a farm level model. CRAM is designed to analyze regional impacts in the various agricultural sectors on an annual basis. It cannot be used to analyze intra-year changes in price. It also does not have provision for analyzing decisions that are not profit maximizing, as would be decisions to sell barley to the Canadian Wheat Board at a price that turns out to be lower than off-board prices.

A sector model like CRAM misses local situations where producers might, at times be afforded opportunities for individual gains. On the other hand, producers may sometimes sacrifice economic gain due to lack of full knowledge of opportunities available, aversions towards risk, time and labour constraints, or other reasons that may be entirely rational on an individual basis. This makes it difficult to tell whether results from CRAM may be biased upwards or downwards.

There is no doubt that the limitations of CRAM make the interpretation of results more difficult. However, the strengths of CRAM to analyze the impacts of changes in freight rates from the different regions in western Canada should not be underestimated. CRAM is a general equilibrium model that encompasses the production and transportation activities for the vast majority of Canadian agriculture. The advantages of using a general equilibrium type of model far outweigh its disadvantages. A general

equilibrium model forces arbitrage to occur. In CRAM, agricultural commodities are produced in regions where they have a comparative advantage.

3.2.7 Validation of CRAM

Validation of a model is important for lending credibility to any analyses for which it is used. The base case must be realistic so that meaningful comparisons can be made to it. Validation of CRAM entailed checks on:

1) areas planted to major crops in each province,
2) total production of major crops in each province,
3) summerfallow area in each province,
4) exports of major crops from the prairie provinces,
5) domestic disappearance and exports of beef animals, dressed beef and pork primals, and
6) movements of feeder cattle and calves from province to province.

The base case was not expected to duplicate the agricultural production in any particular calendar year. After all, CRAM is an optimizing model; it finds the solution with the highest value of objective function across the whole country's agricultural industry. CRAM does not incorporate the uncertainty of information on yields, prices and costs that face producers in the real world; in CRAM, all coefficients are known with certainty. There are many constraints on producers' activities which are not captured by the model: Canadian Wheat Board quota constraints, rotational constraints based on soil and climatic conditions and perhaps others. Some crop and livestock activities that are available to producers are not included in CRAM: e.g., sheep, horses, pulse crops, and others. Furthermore, crop yields used in the base case represent averages for the period 1982-88; this was done to preclude biasing the results from unusually high or low yields in a particular region.

The base case developed by CRAM was reasonable, given the above caveats. The areas planted to all crops were within the bounds of crop plantings between 1982 and 1988. The area planted to wheat in Alberta was near the top end of the range; the area planted to wheat in Saskatchewan was at the bottom end of the range. The area planted to barley was at the bottom end of the ranges for each of the prairie provinces. Flax and canola plantings were well within the ranges of actual crop plantings between 1982 and 1988.

Production of all major crops was within the range of actual production for the 1982-88 period, except for canola in Saskatchewan which was about 20 percent higher in the base run than the highest actual level of production during these years. This was due to the fact that the highest planting of canola in Saskatchewan over this time period was in 1988; in that year, canola yields were much lower than average. The combination of choosing a relatively large area on which to plant canola with the average yields for the 1982-88 period resulted in the high production of canola in Saskatchewan in the base.

Summerfallow ratios in each of the prairie provinces were within their ranges over the 1982-88 period.

Exports of major crops in the CRAM base were within the ranges of actual exports over the 1982-88 period. Exports of barley were near the low end of the range due to the relatively low plantings of barley in each of the provinces. Exports of canola in the base case were near the top of the range due to the relatively high production of canola in the base.

Domestic disappearance and exports of beef and pork were close to actual levels in 1989. Exports of beef in the CRAM base was marginally higher than recorded levels; however, actual levels of beef exports in 1989 were lower than in previous years.

The movements of feeder cattle from western Canada to Ontario in the base were quite close to actual published movements in 1989. The difference between 1989 actual shipments and CRAM shipments in the base case was less than one percent.

Overall, it was judged that the base case was reasonable and could be appropriately compared to results from analyses of other policy options.

3.3 Input-Output Model

Changes in direct effects of a policy may ultimately lead to far reaching impacts on the economic performance of the region, and/or country as a whole. Direct impacts on grain and livestock production from changes in freight rates may lead to other changes in the region through changes in industrial production, personal disposable incomes, gross domestic product, government revenues, and regional employment. A change in regional employment may lead to a further change in demand for products produced by various local industries, and thereby cause another round of adjustments in output, personal disposable incomes, gross domestic product, trade, and employment. These changes in an economic system are often called secondary impacts of a program or policy change.

In some cases private costs (or benefits) may not be the same as social costs (or benefits). If decisions are made on the basis of private net benefits, they may not lead to a social optimum. Some secondary impacts on non-agricultural industries involve discrepancies between social and private costs. However, it should be stressed that not all discrepancies between private and social net benefits are the result of secondary impacts.

Total impacts of a policy change can be of economic or non-economic types. Social and psychological costs to farmers of making adjustments in various enterprises may be non-economic types of impacts.

Such impacts are often ignored in economic analyses. The economic type of impacts can also be divided into two broad types--market effects and non-market effects. Market effects include changes in the market economic activity resulting from the change in freight rates. Non-market effects include changes in the demographics or social characteristics of the region, changes in government and legal institutions in the region, and changes in the social value of natural resources.

Secondary impacts in some situations may be as important as direct impacts. Furthermore, different direct impacts may not have identical secondary impacts. For these reasons, it is important to evaluate secondary impacts of changes in freight rates. In the following subsections, the method of secondary impact estimation is described. The relationship between the results of CRAM and the secondary impact analysis is also addressed.

3.3.1 Secondary Impacts of Freight Rate Changes

Consider various regions with open borders that have experienced a change in freight rates for grains and oilseeds. An increase in freight rates (such as that resulting from charging producers full compensatory freight rates without any compensation) will alter regional competitiveness of production of a given crop. In some outlying regions, where distances to markets are long, production and shipment of a bulky product, such as grains or oilseeds, may become uneconomic. These activities would likely be changed. Alternatives may be devised to further process the bulky and low value products into more compact, high valued products such as livestock, dehydrated alfalfa products, vegetable oil, and others.

Changes in the enterprise mix on farms in various regions will have two types of impacts: impacts due to backward linkages and stemming-from impacts. Changes in the crop area or size of livestock enterprise will result in different inputs demanded by farmers. For example, a decrease in crop production will lead to decreased demand for fertilizer, machinery repairs, fuels and lubricants. An

increase in livestock in turn will increase demand for inputs such as purchased feeds, pharmaceutical and veterinary services. Therefore, different enterprises will have different secondary impacts--both in terms of industries affected and magnitudes of impact on the affected industry. These impacts are also called induced impacts.

The induced impacts can be further identified as of two types. First, changes in the enterprise pattern will lead to a different impact on different industries present in the region. This is because various farm level enterprises interact differently with local industries. This type of induced impact is called an industry support impact. Second, each crop or livestock enterprise will result in different returns to primary factors of production. The most important of these are wages and salaries as well as incomes of unincorporated businesses. These payments constitute a major share of regional personal income. Changes in the income level may lead to a different type of economic impact. It may lead to different current expenditures by consumers as well as different expenditures on durable and semi-durable goods. Lower consumer expenditures would lead to lower output by various industries with an eventual decrease in gross domestic product, trade, and employment. This type of impact is called an income-induced secondary impact.

The second type of impact (stemming-from impact) of a policy change is a result of forward linkages between the directly affected sector (in this case agriculture) and the rest of the industries in the region. A forward link exists between agriculture and other industries if the output of agriculture is used as an input in the production process of another industry. As compensatory freight rates are effected, there may exist opportunities for increased production of processed oilseed and livestock products. Availability of relatively cheaper raw materials may spur processing of oilseeds through existing or new oilseed crushers. Similarly, provinces such as Saskatchewan may be able to compete in the production of meat, rather than exporting both feed grains and feeder animals, thereby increasing livestock slaughtering activities. Each of these industries would purchase inputs from other industries in the region, employ

additional workers and generate additional personal income. Thus, each of the forward linked impacts could be income-induced as well as industry-supported.

3.3.2 Empirical Estimation of Secondary Impacts

Secondary impacts of a change in freight rates, therefore, include impacts of both the forward and backward linkages, each of which could be induced by income changes, or through purchases of inputs from other industries (industry-support). As shown in Figure 3.4, secondary impacts of a change in policy regarding freight rates for grains and oilseed may arise from the following changes:

1) change in the input purchases of a directly affected industry;
2) change in the output and resulting input purchases of industries using products produced by the directly impacted industry;
3) change in the payment to primary resources by the directly affected industry and subsequent spending of incomes; and
4) change in the payment to primary resources by industry in impact type two above.

The first two types of impacts result from backward linkages of the directly affected industry, whereas the last two are a result of forward linkages. In this study secondary impact estimation is restricted to the first two types. One type of empirical analysis that is particularly suited to estimation of secondary market effects is interindustry analysis, or use of an input-output model.

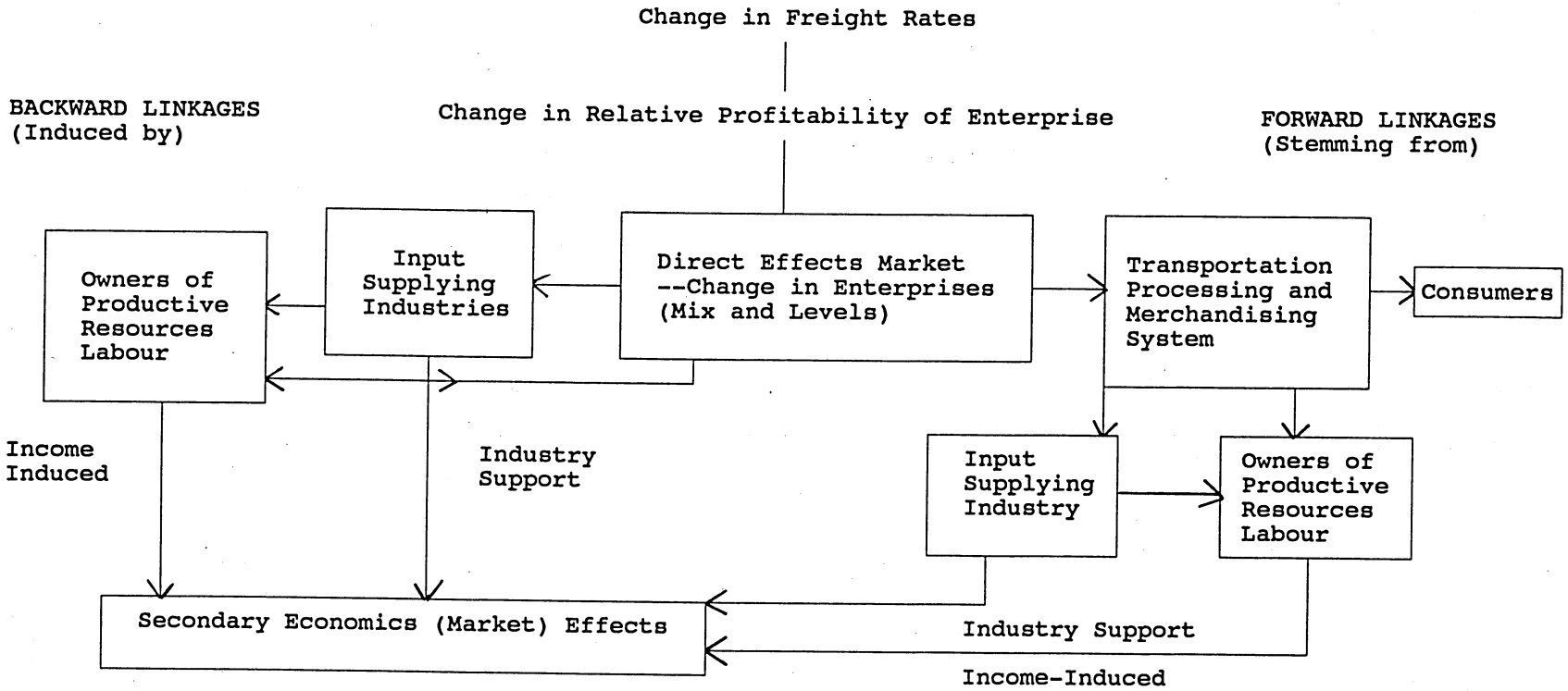


Figure 3.4: Typology of Secondary Impacts

3.3.3 Characteristics of Input-Output Models

An input-output (I-O) model is based on the flow of commodities from each of the producing sectors (or industries) to all other consuming industries. These data are conventionally presented as a transactions table. Depending upon the assumption made with respect to correspondence between a commodity and a sector, two types of transactions tables can be developed. If one assumes that each sector produces and trades only one commodity, the number of commodities must equal the number of sectors. This results in the traditional Leontief style square input-output model. If the above assumption is relaxed, and an industry is allowed to produce more than one commodity, the resulting model is called a rectangular input-output model.

A rectangular transactions table differs from the square one in many respects, the obvious one being that in a rectangular table one industry produces several commodities. This gives rise to two types of commodity flows in the model. The first type of flow is captured by a "make matrix", which depicts the production of commodities by an industry. The second flow in the model is depicted by the "use matrix", which records the commodity inputs to an industrial production process. It is also known as the absorption matrix. The other components of a rectangular transactions table are the final demand matrix--which records the sale of a commodity to domestic consumers, governments, investors, and exporters. Equally important on the expenditures side is the primary inputs payment matrix, which records value added by industries, or final demand sectors.

The rectangular input-output model is based on two key assumptions. The first is a commodity-based technology assumption, which states that an industry's total output is made up of commodities in fixed proportions. The second is that of fixed and constant technology, such that there is a constant relationship between output and input requirements.

An industry by commodity total requirements matrix per unit of final demand can be developed from the transactions matrix. This is known as the multipliers matrix. The multiplier matrix can be used to calculate output, value-added, income, and/or employment multipliers, each of which can be of two basic types: pseudo-multipliers or ratio-form multipliers. The pseudo-multipliers are expressed per unit of output of an industry, whereas the ratio-form multipliers indicate total change in income (value-added, or employment) per unit of income (value-added or employment) in the directly affected industry.

From an input-output model, multipliers can be estimated in two different ways. In one approach, households are treated as exogenous to the model. Thus, the re-spending of their income is not included in the estimation of multipliers. This is called an open model, and the resulting multipliers are termed Type I multipliers. In the second approach, local household consumption expenditures are endogenous to the model. In other words, local households are treated like other industries. They sell labour, rent property, provide financing, and perform services for which they receive compensation. The compensation received is then spent on household consumer goods. The resulting multiplier, which is called a Type II multiplier, is larger than a Type I multiplier. This is because a Type I multiplier includes only industry-support effects, whereas the Type II multiplier includes both industry-support as well as income-induced effects.

3.3.4 Description of the Statistics Canada's Interprovincial Input-Output Model

The impact analysis in this study was carried out using Statistics Canada's 1984 Interprovincial Input-Output Model. In this model, intermediate and final demands throughout an economic system are disaggregated both regionally (provincially) and industrially. The transactions table in this model is based on a rectangular accounting framework.

The model is disaggregated into eleven regions--ten provinces and the two territories which are combined to form the eleventh region. It distinguishes between approximately 200 industries and 600 commodities. For each region there exists a make matrix as well as a use matrix. International imports and exports are treated at the national level. The accounting framework is completed by a set of interprovincial trade tables for each commodity. The method of accounting and multipliers in this model is similar to that of the national I-O model. The model treats households as exogenous; therefore, the estimated secondary impacts include only the industry support (indirect) impacts.

3.3.5 Impact Analysis

Secondary impacts of compensatory freight rates can be estimated using two sets of data: a multiplier matrix and direct effects of the freight rate changes. The first set of data is obtained in this study from the Statistics Canada's interprovincial input-output model. The second set of data is obtained from CRAM, and prepared for impact analysis. The procedure followed in the transformation of CRAM results into data for the I-O model are described in Section 3.3.6.

The estimation of total impacts of freight rate change can be demonstrated as follows: Let E^0 denote the final demand under current freight rates, and E^* denote the same under compensatory freight rates. The term "final demand" may be a bit of a misnomer since freight rates may first affect the output of the agricultural sector, both in terms of enterprise mix as well as level of each enterprise. Since each enterprise has different input requirements, a change in the freight rates would eventually affect the expenditure pattern of the agricultural industry. A change in this implies a change in the intermediate demands or purchases by the sector. Let EX^0 and EX^* denote purchases by the agricultural industry under current and compensatory freight rates. Let

$$\Delta = EX^* - EX^0 \qquad (1)$$

where, Δ is a vector of change in the agricultural industry. The impact on output of various industries in a given region is obtained as:

$$G^* = (I - DRB)^{-1} DR(\Delta). \quad (2)$$

The vector G^* will include impacts (in terms of change in the output level) on various industries, including agriculture. Since the agricultural industry's changes are already accounted for through CRAM, the results can be purified in two alternative ways. First, the agricultural industry can be exogenized, indicating that its output does not undergo any further changes. Although the impacts are accurate, this type of manipulation is not available for the model used in this study. Second, the changes in agricultural output over and above the direct changes can be subtracted from equation (2). This will yield accurate results for the output of various industries, though such adjustment cannot be made in income, value-added, and employment levels.

Prior to performing impact analysis, several adjustments are made to agriculture's expenditure patterns. Since a transaction matrix is depicted in producers' prices, and furthermore, since impacts on local industries are only through those purchases that are within the region, two adjustments to the data must be made. First, purchasers' price valuation of agricultural expenditures are converted into producers' price valuations. This adjustment involves removing wholesale, retail, tax, transportation, storage, and pipeline margins out of the purchasers' price, and allocating these to appropriate receiving sectors. Second, purchases by an industry that are satisfied by foreign imports or imports from other Canadian regions are removed. This is accomplished by multiplying purchases by an industry of a commodity by that commodity's self-supply ratio. The expenditures after the above two adjustments are those locally purchased and are expressed in producers' prices.

3.3.6 Transformation of CRAM Results for Impact Analysis

Results from CRAM are presented in terms of (i) changes in area under different crops, (ii) changes in livestock enterprise--beef cattle and hogs, and (iii) changes in producers' returns above cash costs. Each of these sets of data was transformed into 100 commodities specified in Statistics Canada's I-0 model. The following procedure was followed:

1) Data on farm enterprise budgets by crops, livestock type, and regions (where possible) were obtained from CRAM. These were expressed on a per acre basis for crops and on a per head basis for livestock.
2) These budgets included a category called "other cash costs", which was a catch-all category. Using various provincial enterprise budget data, these cash costs were broken down into: seed, insurance, building repairs, utilities, interest, property taxes and miscellaneous costs.
3) Each of the expenditure items was then allocated to one or more of the I-O commodities. For example, building repairs were allocated to wood and lumber products, metal fabricated products, and repair construction. Machinery repairs were allocated to machinery parts, oil and lubricants.
4) Acreages of various crops in a region were multiplied by the per acre requirements of various I-O commodities. These were then aggregated to the provincial level.
5) Livestock numbers in a province under a given freight rate option were multiplied by per head requirements of various I-O commodities.
6) Depreciation and other items not accounted for in CRAM were subtracted from producers' net margins above cash costs. The remaining was allocated to "Income of Unincorporated Businesses".
7) For a given province, expenditures on crops, livestock, and income changes were aggregated.
8) Estimates in step seven were expressed relative to the base case, which was no change in the freight rate. This set of estimates was treated as the direct impact of a given freight rate option.

The estimates in step eight, as noted in section 3.3.5 were adjusted for marketing margins, and for local purchases, prior to their use in input-output based impact analysis.

3.3.7 Format of Analysis

The secondary impacts, as already noted, in this study are based on the open model. Thus, only indirect effects of industrial purchases are included; those effects that are induced by consumer expenditures are not included. Furthermore, the secondary impacts presented here are through the backward linkages of agriculture with other industries, the forward linkage based impacts can only be speculated.

Impacts are presented in terms of:

1) value of output of all industries in the region,
2) value of Gross Domestic Product at factor cost in the region, and
3) level of employment in the region.

4. DESCRIPTION OF POLICY OPTIONS

Five policy options in addition to the base or current method of paying for the transportation and handling of prairie grains and oilseeds are evaluated in this study. In general, the options considered differ according to how producers bear the total cost of moving grain from the local elevators to terminal positions. In some policy options where producers would be required to pay higher than WGTA rates, producers are not compensated for loss of the Crow Benefit. In other options, different methods of compensating producers for loss of the subsidy are evaluated. The specific options evaluated in this study are described in the following sections.

4.1 Option 1 - Crow Offset Programs in All Prairie Provinces

The Alberta government began offering subsidies to livestock feeders on Sept. 1, 1985 as a way of offsetting the perceived damage to the provincial livestock economy caused by the subsidized freight rates for grains. The initial program, called the Alberta Feedgrain Market Adjustment Program (AFGMAP) offered subsidies of $21/t for grain used for livestock feeding. This was the approximate difference between the WGTA rates charged the grain producers for shipping grain to terminal locations and the full rates of shipping grain.

On July 1, 1987, the Alberta Crow Benefit Offset Program replaced the AFGMAP. The level of subsidy was reduced - first to $13/t for the 1987-88 and 1988-89 crop years, and then to $11/t for the 1989-90 crop year. This was done partly in response to budgetary pressures that had been developing in Alberta, but also due to recognition that the level of hurt in the livestock industry that was caused by the subsidized freight rates was smaller than the difference between WGTA and full compensatory

freight rates. Apparently, part of the difference between these two levels of freight rates was being absorbed in the market.

The response of livestock producers to the program was dramatic. Feedlot operators in the province increased their bid prices for feedlot animals; hog producers also experienced lower costs for their most important input, feed. Producers in neighbouring provinces complained about the unfair competitive position of Alberta producers.

In mid 1989, the Saskatchewan and Manitoba governments announced that they too would offer a Crow Offset Program to livestock producers in their provinces. Beginning September 1, 1989, Saskatchewan livestock producers would receive approximately $13/t for each tonne of feed grain used to feed cattle and hogs in the feedlot. Manitoba restricted its program to slaughter cattle only. They agreed to provide Manitoba feedlot operators $9/t on grain fed to slaughter cattle.

Since the Crow Offset Programs in Saskatchewan and Manitoba came into effect only in 1989, they were not included in the base case, against which all other options were compared. This was done for two reasons, one conceptual and the other technical. First, the programs would have had no effect on the inventories of livestock in Saskatchewan and Manitoba, since the livestock inventories in the base case represent Jan. 1, 1989 levels. Second, CRAM is based on a calendar year; to have included programs that began in mid-year would have required a pro-rating of the levels of the subsidy. The results from this averaging process would have been difficult to interpret and, indeed, may have been misleading.

The first option analyzed in this study is the situation in effect in early 1990, where Crow Offset Programs are in place in all three prairie provinces, and grain producers are paying WGTA rates to transport their grains to export terminals. Option 1 assumes this situation lasts long enough into the

future that all adjustments caused by the lower feed grain prices in Saskatchewan and Manitoba have occurred.

4.2 Option 2 - Full Rates, No Compensation, No Efficiency Gains

Since 1897, grain transportation from the prairie provinces has been regulated either directly by the federal government or by an agency of the federal government. Freight rates have been set on the basis of distance hauled. No differentials in freight rates for grain were allowed between main and branch rail lines. Until passage of the WGTA in November, 1983, no incentives were allowed for large hopper cars or unit trains; since 1984, the railways have been permitted to apply for a limited range of lower freight rates at specific locations.

The WGTA requires the annual determination by the National Transportation Agency of distance related freight rates from each grain delivery point in the Canadian Wheat Board area. These rates are based on the average combined costs of the two national railways for transporting grain to Thunder Bay, Churchill, Vancouver and Prince Rupert.

The second option in this study was analyzed under the assumption that the present freight rate structure, based on distance related costs of transportation, as determined by the National Transportation Agency, would be retained where producers are required to pay full compensatory rates to transport grain and oilseeds to terminal locations. Since it was assumed that no changes would occur in the regulatory framework for grain handling and transportation, no further decreases in real costs of handling and transporting grains and oilseeds would occur.

In this option, producers would receive no compensation for loss of the Crow Benefit. This set of conditions yields the maximum economic impact that can occur to the agricultural industry in this

study, since no efficiency gains are assumed and no compensation is paid to producers for loss of their subsidized freight rates. Farm level grain prices decrease by the full amount of the difference in freight rates. This will stimulate an expansion of the livestock sector in western Canada.

In this policy option, the Crow Offset Programs in all prairie provinces are removed. Even though implementation of this policy option may require a phase-in period of freight rate increases, only the long run, fully adjusted situation is analyzed.

4.3 Option 3 - The Agricultural Diversification Alliance Proposal

A large part of market absorption of higher freight rates for grains may occur through increased efficiencies in the grain handling and transportation network. If grain handling and transportation companies are given the appropriate incentives and can find ways to decrease the real costs of moving grain from the farm to terminal locations, farm level prices of grain should not fall by the full difference between WGTA and full compensatory freight rates.

Under the previous Crowsnest Pass freight rates and the present WGTA rates, producers have paid substantially less than full compensatory rates to transport their grains and oilseeds. Associated with these statutory freight rate regimes was development of a very dispersed grain handling and transportation network. Liebfried (1990) noted that in spite of the approximate $30/tonne average cost of transporting grain in 1989-90, actual costs across the prairies vary widely. Liebfried quoted a 1984 Senior Grain Transportation Committee report that stated the costs of railway transportation of grain ranged from "about two cents to $3.40 per tonne-mile".

Railways do not earn enough from the WGTA rates to cover the costs of transporting grains on high cost, grain dependent lines. They make up for the shortfall by cross-subsidies from the low cost, high

volume lines. The high costs of some of the grain dependent lines, therefore, become averaged into the total freight bill. Since the federal government pays about 70 percent of the total freight bill in 1989-90, many grain producers and some producer organizations have lobbied government to maintain these high cost, low volume branch lines.

The federal government has, by Order in Council, protected over 15,000 miles of main lines and relatively high cost branch lines from abandonment until the year 2000.

The WGTA requires an assessment by the National Transportation Agency of variable costs of transporting grain by rail to be made every four years. The last review of costs was done in 1988. According to Cairns (1990), it is implicitly understood that any savings that are identified from branch line abandonments and replacement of railway owned equipment by government owned equipment are to be used to reduce the total freight rates paid by producers and the government even if they occur in the interval between costing reviews. Any savings from efficiencies introduced by the railways themselves are not used to reduce the freight rates between costing reviews; these savings therefore benefit the railways in the short tun. However, this implicit understanding of the division of efficiency gains was changed in the 1988 costing review, where the NTA decided that future savings from the opening of CP's Rogers Pass Tunnel would be reflected in freight rates for 1990-91 and onward. The Federal Court of Canada has upheld the NTA decision.

It is difficult to measure gains in efficiency of transporting grain on a factor-by-factor basis. Cairns (1990) estimated that the gain in total factor productivity for rail transportation of grain in western Canada over the period 1972-88 was about three percent per year. He estimated that about half of the gain in total factor productivity (1.5 percent per year) was retained by the railways; the other half was reflected in lower shipping rates.

If it is difficult to measure gains in grain transportation efficiency in the past, it is even more difficult to predict future changes in efficiency. Nobody knows what regulatory environment would be put in place if the WGTA was changed. If producers had to pay full compensatory rates for transporting grains, there should be increased incentives to lower the real costs of railway transportation. Not only would producers along high traffic lines be less inclined to support high cross subsidies to the low volume lines, there would be increased incentives for hauling grain by trucks over longer distances, especially if it was made easier for railways to offer incentive rates at major grain handling locations.

In this option, it is assumed that sufficient savings are generated from imposition of full compensatory rates that the negotiated future rate structure would reflect decreased real costs for grain transportation of 1.5 percent per year for a ten year time period. This neglects any increased trucking and road maintenance costs which may be incurred if additional rail lines are abandoned.

There have been major improvements in the efficiency of handling grain on the prairies as well. Between 1975 and 1985, the number of primary elevators in Canada decreased from 4165 to 1925 (Kirk, 1988, p. 22). Average elevator capacity increased over this decade from 95,600 bushels to nearly 150,000 bushels (Kirk, 1988, p. 22). Kirk listed a number of reasons behind the rapid increase in elevator capacity over this time period: the Canadian Wheat Board changed its operating strategy to emphasize volume of sales rather than high prices, more long term sales contracts to countries with centralized purchasing, the block shipping system for grains, abandonment of 3,400 miles of branch lines on the prairies, technological changes in the elevator industry, and continuous upward pressure on costs.

With full compensatory rates, grain handling companies would have an incentive to increase the efficiency of handling grain. Askin (1988) estimated that primary elevator operating costs decrease by 0.6525 percent for every one percent increase in turnover. It was assumed that, over a ten year period,

19 percent of the average sized primary elevators would disappear, thus increasing turnover by 19 percent. This means that over a ten year period, real costs of operating the average primary elevator in western Canada would decrease by 12.4 percent. This was the value of increased efficiency of grain handling that was used in analysis of this policy option.

These projected reductions in real costs of transporting and handling grain, would mitigate part of the decrease in farm level prices of grains and oilseeds if producers were to face full compensatory rates.

4.3.1 Dynamics of Change

It is assumed that compensatory rates are phased in and the Alberta Crow Offset Program is phased-out over a ten year period. Similarly, it is assumed that the efficiency gains occur evenly over a ten year period. Thus, farm level prices go down slowly and reach levels that are higher than farm level prices in the second policy option by the amount of reduction in real costs of handling and transportation.

Analysis of this option is conducted for the short run (defined as one year), intermediate run (defined as five years) and long run (defined as ten years). It is assumed that no changes occur in the livestock herds in the short run, due to the biological lags in production of animals. It is assumed that half the increase in livestock herds in western Canada has occurred by the fifth year (intermediate run). Full adjustment has occurred by the tenth year. In eastern Canada, it was assumed that all adjustments in the livestock breeding herds occur by the fifth year, since only intermediate run retention elasticities were available.

The impacts from this policy option are expected to be less than in the second policy option, since the price of grain on the prairies will not fall by the same amount. The increase in efficiency of grain

handling and transportation reduces the real level of compensatory rates from their levels in the second option.

4.3.2 Producer Compensation

In this option, the freight rate paid by producers would gradually rise to full compensatory levels as the subsidy to the railways is phased-out. Producers' compensation would be based on the capitalized value of the Crow Benefit over the next 25 years and paid out over a fifteen-year period. Individual entitlement to compensation would be determined using either 100 percent of historical shipments of eligible grains or 80 percent of calculated potential production of eligible grains, whichever is higher. Some crop producer groups have worried that the compensation to growers of export grains would be "diluted" to the extent that payments would be made on land that has not been used to produce export crops. The ADA proposal calls for no extra money to cover dilution; the method of calculating producer entitlement to the subsidy partially mitigates the effects of dilution.

Compensation to the producers would be paid to landowners on the basis of the following formula:

Compensation = Entitled Tonnes x Increased Rail Rate x Dilution Factor

where:

Entitled Tonnes is the greater of:

1. average annual sales of eligible crops over an historical period, or
2. eighty percent of calculated potential production of eligible crops on the land.

Increased Rail Rate is the actual increase in freight rates for grains and oilseeds at the producer's nearest shipping point.

Dilution Factor is the historical average gross tonnes shipped under WGTA divided by the total tonnes of eligible grains applied for by producers. The ADA estimated the dilution factor to be approximately 0.80.

The capitalized value of 25 years of Crow Benefit is $7.5 B, based on an interest rate of 10 percent. This is the interest rate suggested for use by Treasury Board when calculating the present value of a future stream of benefits. Since CRAM accounts for only 86 percent of grain movements that qualify for the Crow Benefit, the total compensation included in the analysis is $6.45 B.

The ADA suggested that the compensation be paid to each producer through a fifteen-year annuity with constant capital amounts and interest paid annually on the remaining balance. This would result in relatively high producer payments in early years but payments would gradually decline over the fifteen-year period. However, in the analysis of this policy option, total producer compensation is assumed to be constant during each of the years.

This method of compensation is production neutral. Patterns of grain and oilseed production should be the same (or close to the same) for compensation and non-compensation cases. Only the net margins to the grain producers would be affected by the payment of this type of compensation.

4.4 Option 4 - The Gilson Proposal

The Gilson proposal was based on a government commitment to pay, in perpetuity, the 1982 grain transportation revenue shortfall (defined as the difference between the Crow and full compensatory rates), as well as for the government to pay half of the inflationary cost increases for grain transportation that were over three percent and all of the inflationary cost increases over six percent. The payment would initially go entirely to the railways, but over time less of the payment would go to railways and more would go directly to producers. After an eight-year period, 81 percent would be paid directly to producers and 19 percent would be paid to the railways. The initial level of the Crow Benefit was calculated by Gilson to be $640 M in 1982. The Gilson proposal called for the payment to producers to be made on the basis of their cultivated acreage, adjusted for productivity. Since some

grain producers would receive payments for grain used on the farm and for which they would receive no benefit under the Crow or WGTA rates, payments to producers who grew grain only for export would be diluted. Gilson therefore proposed an Agricultural Adjustment Shortfall of $300 M be added to producer payments for the first five years ($60 M per year) to cover some of the dilution and adjustment costs.

A modification of the Gilson proposal is analyzed in the fourth option. Since CRAM accounts for only 86 percent of the Crow Benefit payments, the Crow Benefit of $620 M in 1989-90 is split with 81 percent ($502 M) going to producers and 19 percent ($118 M) going to the railways. This compensation would be paid every year for the foreseeable future.

The proposed Agricultural Adjustment Shortfall payment of $60 M per year for the first five years is not included in the analysis of this option, since only a long term analysis was undertaken. It was assumed that all agricultural adjustments had taken place prior to the analysis.

It was assumed in this option that efficiency gains of 14.1 percent (1.5 percent per year) for railway transportation and 12.5 percent over a ten-year period for improvements in grain handling efficiency would occur.

4.5 Option 5 - The St. Lawrence Pool Option

When western Canadian grain producers deliver wheat or barley for export to a local elevator, they receive an initial payment from the Canadian Wheat Board (CWB) for their grain. The initial price for each grade of these grains has been established as in-store Thunder Bay or in-store Vancouver. Farm level initial prices for a specific grade of these grains vary by the amount of the freight rate to the nearest port (Thunder Bay or Vancouver) from the local elevator, as well as from differences in

moisture content of the grain. All selling costs of the Canadian Wheat Board, transportation costs beyond Thunder Bay, loading of ships and other CWB costs are pooled. After all CWB costs and initial payments are subtracted from the total revenue achieved from sales of a particular grade of these grains during a crop year (Aug. 1 to July 31), the remaining surplus is divided by the number of tonnes of that grade of grain handled by the CWB that year. A per tonne final payment is then distributed to all producers who sold that grade of grain to the CWB during the crop year.

Historically, grain prices in Montreal and the lower St. Lawrence River terminal locations were higher than in Vancouver, partly because Canada's main foreign customers of grain were in Europe. The cost of moving grain from Thunder Bay to the lower St. Lawrence locations was about the same amount as the price premium at this location over Vancouver, thus making in-store prices at Thunder Bay and Vancouver approximately equal. However, for a number of reasons, this historical relationship has changed since the early 1970s. First, the main destination of grain exports from Canada has shifted from western European ports to eastern European and Asian ports. Second, the development of larger and more efficient ocean-going ships resulted in smaller price spreads among all ports in exporting countries. Third, the cost of transporting grain through the Great Lakes on the way from Thunder Bay to the lower St. Lawrence River has increased dramatically. These events have caused prices in the lower St. Lawrence and Vancouver to move closer to each other; indeed, in some years the in-store price in Vancouver have been higher than in-store prices in the lower St. Lawrence River for some grades of grain. Consequently, the in-store Thunder Bay price has frequently dropped below the Vancouver price.

The Canadian Wheat Board has made a proposal to change the pooling basis of CWB marketed grains (Oleson and Brooks). The proposal would require producers to individually pay for all freight charges to either Vancouver or the lower St. Lawrence River, whichever is less expensive. One problem with this proposal is that freight costs from all grain producing regions on the prairies (including Winnipeg)

would be lower to Vancouver than to the lower St. Lawrence River, and capacity constraints at the west coast (Vancouver and Prince Rupert) limit the quantity of grain that can be sent through the west coast ports. The CWB proposal anticipates this problem with a suggestion that all producers in the prairies (including those in Manitoba) pay the freight rate to west coast terminals, even though grain produced in Manitoba and eastern Saskatchewan would mostly be shipped through Thunder Bay and the St. Lawrence River. The difference between shipping costs from the eastern prairie regions to the lower St. Lawrence River and from these regions to Vancouver would go into the CWB pool accounts. This would make farm level prices in western Alberta the highest and prices in eastern Manitoba the lowest on the prairies. However, since fewer costs would then be incurred by the pool accounts, the final payments on each grade of CWB marketed grain would be a little higher than before. This would somewhat mitigate the lower prices in Manitoba from this method of pooling grain receipts and costs.

WGTA and full compensatory freight rates from each of the 23 crop producing regions in western Canada to Vancouver and Thunder Bay with the CWB proposal for a St. Lawrence pool are shown in Table 4.1. With WGTA freight rates, the least expensive terminal location for all producers would be Vancouver, even though grain produced in Manitoba and eastern Saskatchewan would be forced to go through Thunder Bay and the St. Lawrence River. With full compensatory freight rates, the least expensive terminal location for producers in eastern Manitoba would be Thunder Bay.

In this policy option, two separate analyses were undertaken, each using the St. Lawrence pooling method and either:

1) WGTA rates, or
2) full compensatory rates with compensation to producers for loss of the Crow, based on the third proposal of the Manitoba Advisory Council: payment of an annuity based on historic shipments over 15 years.

Table 4.1 WGTA & Full Compensatory Freight Rates from Prairie Crop Regions to Vancouver & Thunder Bay, St. Lawrence Pool

			WGTA Rates[1]		Full Rates[2]	
Prov.	Region	Location	VCR[3]	TB[3]	VCR[3]	TB[4]
B.C.	1	Dawson Creek	7.82	34.61	22.62	66.34
ALTA	1	Medicine Hat	9.15	29.26	26.49	48.29
	2	Vulcan	8.56	30.27	24.77	51.19
	3	Olds	8.41	30.73	24.34	52.53
	4	Viking	8.56	29.56	24.77	49.15
	5	Red Deer	8.71	30.73	25.20	52.53
	6	Barrhead	8.41	30.73	24.34	52.53
	7	Falher	9.15	32.79	26.49	58.50
SASK	31	Grenfell	11.74	26.89	33.96	41.41
	2	Weyburn	11.51	27.18	33.31	42.27
	33	Moose Jaw	10.64	27.63	30.79	43.56
	4	Fox Valley	9.90	29.26	28.64	48.29
	5	Foam Lake	12.42	27.33	35.95	42.70
	6	Saskatoon	10.04	28.52	27.07	44.85
	7	Rosetown	10.49	28.52	30.36	46.14
	8	Melfort	10.83	28.08	31.33	44.85
	9	Prince Albert	10.34	28.37	29.93	45.70
MAN	1	Brandon	13.11	26.15	37.94	39.26
	2	Grandview	12.42	26.59	35.95	40.55
	3	Port. La Prairie	13.57	25.55	39.28	37.54
	4	Elm Creek	14.04	25.55	40.62	37.54
	5	Winnipeg	14.04	25.55	40.62	36.68
	6	Arborg	14.95	25.70	43.25	37.97

[1] Quoted WGTA rates are for 1989-90.
[2] Full compensatory rates are derived from 1989-90 WGTA total rates, and adjusted for increased railway efficiency by a compound factor of 1.5 percent per year for ten years.
[3] VCR and TB are Vancouver and Thunder Bay, respectively.
[4] Thunder Bay rates include $19.22 to replace cost to export position on the lower St. Lawrence River.

5. OPTION 1 - CROW OFFSET PROGRAMS IN ALL PRAIRIE PROVINCES

This policy option approximates the actual situation in early 1990 when each of the prairie provinces had a Crow Offset Program in place. The purpose of this analysis was to assess the long run impacts on Canadian agriculture of a continuation of the present WGTA rates, with offsetting subsidies in effect in each of the prairie provinces. In particular, this analysis aims to determine the expected adjustment in the agricultural industries of Saskatchewan and Manitoba, the two provinces that instituted Crow Offset Programs in late 1989.

5.1 Assumptions and Procedures

A Crow Offset Program has been in effect in Alberta since 1985. It was assumed that the adjustments by livestock producers to the lower price for feed grains in that province had already occurred. Therefore, herd sizes of beef and hogs in Alberta as of Jan. 1, 1989 were taken to be equilibrium values for this analysis.

Since Crow Offset Programs were not instituted in Saskatchewan and Manitoba until late 1989, opening stocks of livestock (as of Jan. 1, 1989) would be based on the relatively higher price of feed grains that accompany WGTA freight rates and no offsetting subsidies for feed use. Admittedly, some beef producers in Saskatchewan may have had limited responses to the Crow Offset Program in Alberta, since that program had the effect of bidding-up prices of feeder cattle in Alberta. However, for this analysis, it was assumed that Saskatchewan and Manitoba producers of beef and pork would respond to the full extent of the estimated elasticities of retention, following introduction of Crow Offset Programs in their provinces.

The amount of the Crow Offset Programs varied by province, as was the actual situation in early 1990. In Alberta, the Program provided $11/tonne for feed grains used for feeding beef cattle and hogs. In Saskatchewan, the Crow Offset Program provided $13/tonne for feed grains used to feed beef animals and hogs. In Manitoba, the Program was available at $9/tonne, but only for grain used to feed beef cattle. The Manitoba Program is not available for feeding hogs.

The benefits of the Crow Offset Programs were converted to a per animal slaughtered basis to account for changes in the expected costs of the Programs following adjustments in the sizes of beef and hog enterprises in each of the provinces. Using average quantities of feed grain required for beef animals and hogs in the feedlot, the subsidy in Saskatchewan amounted to $18 per head of finished beef, $5.25 per cull cow on feed, and $4.25 per finished hog. In Manitoba, the subsidy was $14.40 per finished beef animal.

The long run analysis reported in this chapter assumes all adjustments in the primary and secondary sectors have occurred.

There were two steps in the evaluation. First, regional effects on the primary agricultural industry were evaluated with CRAM. Second, expected impacts on the secondary industries in each of the prairie provinces as a result of changes at the farm level were evaluated with the use of the input-output models.

5.2 Regional Production and Income

In this policy option, no changes occurred to the base pattern of grain and oilseed production in all crop producing regions of Canada. This was because grain producers received the same price for grains and oilseeds as in the base case.

The most noticeable change from the base is in beef production. The beef breeding herd in Saskatchewan increased by 2.7 percent; in Manitoba the beef breeding herd increased by 1.8 percent (Table 5.1). This response was due to the decrease in the relative price of feed grains in these provinces. There were no changes in size of the beef breeding herds in any other provinces since feed grain were unchanged in all other provinces and it was considered that the relatively small increase in livestock production in Manitoba and Saskatchewan would not result in lower feeder cattle prices anywhere in Canada.

Several changes occurred in the feedlot sectors in this option (Table 5.1). Feedlot animals in Saskatchewan increased by 5.3 percent; those in Manitoba increased by 3.1 percent. All additional calf production in Saskatchewan was retained in the province and fed there. In Manitoba, the feedlot sector increased by a slightly larger percentage than the breeding herd. Since Manitoba traditionally has been an exporter of feeder animals, this meant that some portion of the increase in calf production was exported to other provinces. There was an increase of feedlot cattle in Alberta of one percent, and in Ontario of 0.1 percent (an extra 800 animals) due to the extra calves raised in Saskatchewan and Manitoba.

Net margins in Saskatchewan's and Manitoba's beef sectors increased by more than three percent above the base case (Table 5.2). This was due to the increased production of beef animals in these provinces. However, net margins to the beef sectors in British Columbia, Alberta, Ontario and Quebec decreased slightly from the base situation. This was due to the extra production of low quality beef, which caused price for this commodity to fall from $3,009 to $2,990 per tonne in both eastern and western Canada.

Hog production in Saskatchewan increased by 1.7 percent from the base (Table 5.3). This was due to the lower effective feed prices in that province. There was no change in hog production in any of the

Table 5.1: Beef Herd Size ('000 head) in Base and Option 1 (Crow Offset)

Province*	Category	Base	Option 1	Difference	
				Absolute	Percentage
British Col.	Cows/Heifers	257.0	257.0	0	0
	Feeders	70.5	70.5	0	0
Alberta	Cows/Heifers	1582.0	1582.0	0	0
	Feeders	1421.0	1434.6	13.6	1.0
Saskatchewan	Cows/Heifers	953.0	978.4	25.4	2.7
	Feeders	298.9	314.7	15.8	5.3
Manitoba	Cows/Heifers	439.0	447.5	7.7	1.8
	Feeders	239.4	246.8	7.4	3.1
Ontario	Cows/Heifers	444.0	444.0	0	0
	Feeders	539.0	539.8	0.8	0.1
Quebec	Cows/Heifers	211.0	211.0	0	0
	Feeders	68.1	68.1	0	0

*No changes occurred in other provinces.

Table 5.2: Beef Sector Net Margin ($ million) in Base and Option 1 (Crow Offset)

Province*	Base	Option 1	Difference	
			Absolute	Percentage
British Col.	43.7	42.6	-1.1	-2.5
Alberta	544.7	542.9	-1.8	-0.3
Saskatchewan	238.1	247.2	9.1	3.8
Manitoba	100.6	104.2	3.6	3.6
Ontario	163.1	162.0	-1.1	-0.7
Quebec	99.2	98.6	-0.6	-0.6
Total	1,189.4	1,197.5	8.1	0.7

* No changes occurred in other provinces.

Table 5.3: Hog Herd Size ('000 head) in Base and Option 1 (Crow Offset)

Province*	Category	Base	Option 1	Difference	
				Absolute	Percentage
British Col.	Sows	22.8	22.8	0	0
	Growers	198.4	198.4	0	0
Alberta	Sows	180.0	180.0	0	0
	Growers	1602.0	1602.0	0	0
Saskatchewan	Sows	87.0	88.5	1.5	1.7
	Growers	722.1	734.6	12.5	1.7
Manitoba	Sows	128.0	128.0	0	0
	Growers	1100.8	1100.0	0	0

*No changes occurred in other provinces.

Table 5.4 Hog Sector Net Margin ($ million) in Base and Option 1 (Crow Offset)

Province*	Base	Option 1	Difference	
			Absolute	Percentage
British Col.	22.7	22.7	0	0
Alberta	175.7	175.7	0	0
Saskatchewan	72.1	77.5	5.4	7.5
Manitoba	162.7	162.7	0	0
West. Canada	433.2	438.6	5.4	1.2

* No changes occurred in other provinces.

other provinces (the Crow Offset Program in Manitoba does not apply to feed grains used for hog production). Since there is virtually no movement of feeder hogs among provinces, no changes occurred in the feeding of hogs in any provinces other than Saskatchewan.

Net margin to the hog sector in Saskatchewan increased by 7.5 percent due to the increase in hog production and the lower price of feed grain in that province (Table 5.4). The Crow Offset Program in Saskatchewan did not cause hog production to increase to a level where hog prices would be affected; thus, there was no change in net margins in the hog sectors of other provinces.

5.3 Impacts on Secondary Sectors

5.3.1 Agricultural Production

Under this policy option, secondary impacts are, like the direct changes in enterprise level and mix, relatively small. The prairie provinces as a whole experience a gain in production of $17.4 M, of which most of the change is expected to occur in Saskatchewan (Table 5.5). One of the items where this increase is reflected is in the personal income levels of farmers. Secondary (indirect) impacts, along with changes in the agricultural industry, are estimated at $19.1 M worth of goods and services produced in the Canadian economy. As expected, in Saskatchewan there is a positive impact of $15.8 M: $15.4 M through agriculture, and $0.4 M through non-agricultural industries (Table 5.6). There is also a positive impact of $4 M on the Manitoba economy, and of $0.6 M on economies of other Canadian provinces, particularly Ontario and British Columbia. The latter impacts are due primarily to trade and transportation linkages that exist between them and the prairie provinces.

The changes in the level of goods and services produced bring forth changes in employment as well as provincial economic output measured by gross domestic product at factor cost. In both cases, total impacts are broken down into the agricultural and non-agricultural industries. Changes in

Table 5.5 Change in Direct Requirements of Agriculture* (thousand dollars) Resulting from the Crow Offset Programs in Saskatchewan and Manitoba

Commodities	Manitoba	Sask.	Alberta	Total
Agricultural Products	0	0	0	0
Manufactured Products	78.14	265.80	-10.39	333.55
Construction	0	0	0	0
Utilities	9.37	48.41	-1.09	56.69
Financial Services	53.36	187.52	-5.19	235.69
Other Services	91.17	271.57	-14.00	348.74
Transportation Margin	10.60	31.36	-2.19	39.77
Personal Income	3,614.10	14,550.43	-1,801.74	16,362.79
Indirect Taxes	17.14	52.89	-1.49	68.54
TOTAL	3,873.88	15,407.98	-1,836.09	17,445.79

* In Producers' prices and includes imports.

Table 5.6 Change in Direct and Indirect Gross Production (Thousand Dollars) by Industry and Province, from the Crow Offset Program in Saskatchewan and Manitoba.

Sector	Manitoba	Sask.	Alberta	Rest of Canada	Total
Agriculture	3,875	15,411	-1,834	1	17,453
Forestry & Fishing	0	4	2	7	13
Mining	0	12	138	5	155
Manufacturing	9	42	97	229	377
Construction	3	8	7	7	25
Transportation*	17	29	33	90	169
Utilities	10	53	5	7	75
Trade	6	11	18	43	78
Finance	36	108	96	77	317
Services	51	108	109	187	455
TOTAL**	4,009	15,788	-1,326	647	19,118

* Includes Transportation Margins, Communications and Storage
** May not add due to rounding

Table 5.7 Direct and Indirect Change in Employment (Person-years) Resulting from the Crow Offset Program in Saskatchewan and Manitoba, by Province.

Province	Agriculture	Non-Agriculture	TOTAL
Manitoba	64.3	2.3	66.6
Saskatchewan	218.8	3.7	222.5
Alberta	-29.4	3.8	-25.6
Rest of Canada	0	9.4	9.4
TOTAL	253.7	19.2	272.9

employment levels of non-agricultural industries are estimated to be very small -- 19.2 jobs, of which only 9.8 jobs are in the three prairie provinces (Table 5.7). Agricultural employment in the prairie provinces is expected to increase by 253.7 person-years, of which 218.8 person-years are in Saskatchewan.[1] Although agricultural employment in Alberta is expected to decrease by 29.4 person-years, the extra non-agricultural employment brought the overall decline to 25.6 person-years.

As noted in Chapter 3, the above set of impacts represent those generated through backward linkages between agricultural and other non-agricultural industries, and among these only those which represent industry-support (or indirect) impacts. In addition to these impacts, there will be impacts on the three provincial economies through the re-spending of $16.4 M of personal incomes, as well as impacts through forward linkages of cattle and hog production. Increase of 33,100 cows and heifers, and 36,800 feeder cattle on farms will result in a further multiplier activity through agricultural processing industries. Estimates of the latter type of impacts are provided in the next sub-section.

5.3.2 Agricultural Processing

Increased livestock numbers on farms, as a result of changes under this option, would also create an economic stimulus to the regional economies of the three prairie provinces. To simplify analysis, it was assumed that cattle and hogs were slaughtered in the province of production. This was necessary since no information on excess capacity in slaughtering firms was available, and an assessment of inter-provincial flows was beyond the scope of this investigation.

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[1]These employment levels were estimated using a labour/output ratio of 0.0166 for Manitoba, 0.0142 for Saskatchewan, and 0.016 for Alberta. All output levels were measured in thousands of dollars.

Table 5.8: Impact on Regional Economy (Excluding Agriculture) Resulting from Processing of Beef Cattle and Hogs, Option 1

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Output (Mill. $)	6.95	16.93	0.0	5.52	29.40
Gross Domestic Product (Mill.$)	1.24	3.25	0.0	2.12	6.61
Employment (Person-Years)	42.4	98.6	0.0	55.0	196.0

Under the option of the Crow Offset Program applying to all three prairie provinces, processing activity contributed $29.4 M to the Canadian economy in terms of gross production of various industries (Table 5.8). About 81 percent of this increase is in the provinces of Manitoba remaining 19 percent of gross production is generated in the other Canadian (non-prairie) provinces. The majority of this change is through the production of processed meats (beef and pork along with their by-products). In the case of Saskatchewan, output of the meat processing sector constitutes roughly 74 percent of the total. In Manitoba this proportion is 84 percent. Thus, very little change is experienced in the local non-meat processing, non-agricultural industries.

Additional employment resulting from these processing activities is estimated at 141 person-years in Manitoba and Saskatchewan, and an additional 55 person-years in the rest of Canada (excluding the three prairie provinces). As with output, most of the additional jobs in the prairie provinces are in slaughtering and meat processing, with trade and services sectors benefitting as well. In the rest-of-Canada region, manufacturing and the finance, insurance and real estate sectors were most affected.

5.4 Summary of Financial Impacts

Relatively small changes would occur to net margins in western Canadian agriculture as a result of this policy option (Table 5.9). The beef sectors in British Columbia and Alberta would lose a small amount while the beef sectors in Saskatchewan and Manitoba, as well as the hog sector in Saskatchewan, would experience modest gains in net margins. Overall, net margins to western Canadian farmers would increase by $15.2 M.

The value of the objective function in CRAM was increased by nearly $30 M. Increased government payments for the Crow Offset Programs in Saskatchewan and Manitoba accounted for $13.7 M of this total. Most of the other $16 M was gained by Saskatchewan and Manitoba producers in the form of

Table 5.9 Summary of Farm Level Net Margins in Western Canada from Option 1 (Crow Offset), by Sector and Province ($ million)

Province	Sector	Base	Option 1	Difference	
				Absolute	Percentage
B.C.	Crops	26.0	26.0	0	0
	Beef	43.7	42.6	-1.1	-2.5
	Hogs	22.7	22.7	0	0
	Total	92.4	91.3	-1.1	-1.2
Alta.	Crops	1,419.0	1,419.0	0	0
	Beef	544.7	542.9	-1.8	-0.3
	Hogs	175.7	175.7	0	0
	Total	2,139.4	2,137.6	-1.8	-0.1
Sask.	Crops	2,094.0	2,094.0	0	0
	Beef	238.1	247.2	9.1	3.8
	Hogs	72.1	77.5	5.5	7.5
	Total	2,404.2	2,418.7	14.5	0.6
Man.	Crops	718.0	718.0	0	0
	Beef	100.6	104.2	3.6	3.6
	Hogs	162.7	162.7	0	0
	Total	981.3	984.8	3.6	0.4
West Canada	Total	5,617.3	5,632.5	15.2	0.3

Table 5.10 Impact of the Crow Offset Program in Saskatchewan and Manitoba on the Direct and Indirect Change in Gross Domestic Product at Factor Cost (Million Dollars), by Province.

Province	Agriculture	Non-Agriculture	TOTAL
Manitoba	3.614	0.080	3.694
Saskatchewan	14.551	0.200	14.751
Alberta	-1.801	0.266	-1.535
Rest of Canada	0.002	0.321	0.323
TOTAL	16.365	0.867	17.233

higher net margins. About $1M was gained by consumers in the form of lower beef and pork prices, as a result of the additional livestock production. Overall, the net direct gain to Canadian society from this policy option would be about $16 M. The change in agricultural gross domestic product (GDP) was estimated at $16.4 M under this option (Table 5.10). In addition, another $0.9 M was added to the GDP through the increased sales of the non-agricultural industries. Among the industries that stand to benefit under the option in all three provinces are business services as well as financial services and real estate. In Alberta, crude petroleum and natural gas, as well as the government royalties on natural resources sectors are positively affected under this option.

The processing of cattle and hogs contributes an additional $6.6 M to the Canadian GDP (at factor cost) as shown in Table 5.8. About 68 percent of this is in the two prairie provinces. Most of the additional GDP (48-54 percent of total) in the prairie provinces is generated by the slaughtering and meat processing sector. Thus, the total regional impacts, under this option, are in the neighbourhood of $23.9 M worth of GDP, of which $21.5 M is generated within the prairie region.

6. OPTION 2 - FULL RATES, NO COMPENSATION, NO EFFICIENCY GAINS

The purpose of this analysis was to estimate the impacts on agricultural and related industries in western Canada as a result of requiring grain producers to pay the full cost of transporting their crops to terminal locations, assuming no improvements in efficiency of handling and transporting grains and oilseeds.

6.1 Assumptions and Procedures

In this analysis, crop producers must pay full compensatory freight rates for their grains and oilseeds. They receive no compensation for the loss of the Crow Benefit.

Livestock producers in western Canada benefit from the lower prices of feed grains. The farm level price of feed grain falls in each region of western Canada by the full amount of the increase in freight rates. It was assumed in this policy option that grain handling and transportation activities will remain regulated to the extent they were in early 1990, thus preventing any absorption of the increased freight rates by the market.

In this analysis, all Crow Offset Programs in the prairie provinces were discontinued. Livestock producers pay the new farm level prices for feed grains which were lower than their base levels by the amount of increase in freight rates. Average farm level prices of barley dropped from $104.98/tonne to $85.08/tonne in Alberta, from $106.13 to $87.99 in Saskatchewan and from $105.88 to $91.60 in Manitoba.

It was assumed that government programs, other than the Crow Offset Program in Alberta, would remain in place, although the level of use of some of these programs would depend on production decisions made by crop and livestock producers.

It was assumed that feed grain prices in eastern and central Canada would not be affected in this analysis. Livestock prices in all regions of Canada could be affected with changes in beef and pork production since prices for these products are determined within CRAM.

It was projected that feeder calf prices in Ontario and Quebec would increase by an average of 3.8 percent due to the feeding of more beef animals in western Canada and the consequent smaller movement of feeder calves from western Canada to Ontario. Since the elasticity of retaining the beef breeding herd, with respect to calf prices, was estimated to be 0.5 (Charlebois), this meant an increase in the cow herd in Ontario of 1.9 percent. In Quebec, the increased calf price would not be reflected in higher returns to beef producers; however, government support payments would be reduced. Therefore, no change in beef production would be expected in Quebec.

Other assumptions in this analysis include:

1) no changes in input prices;
2) no changes in dairy and poultry production in any province;
3) Thunder Bay pooling system is in effect; and
4) U.S. border remains closed to imports of grain.

The regional impacts of this option on crop and livestock production as well as on provincial net margins were evaluated with the use of CRAM. Results of the CRAM analysis were then assessed in the interprovincial input-output model to determine expected impacts on the secondary industries in the three prairie provinces.

6.1.1 Sensitivity Analysis

The sensitivity of the solution from CRAM was tested in a further analysis of this policy option where all grain and oilseed prices were lower than in the base. Predicted grain prices for 1990-91 range from 15-20 percent lower than the base levels used in the analysis (National Grains Bureau). The announced initial price for No.1 CWRS wheat in 1990-91 was 20 percent lower than the adjusted initial price for the same wheat in 1988-89. Similarly, the announced initial price for No.1 CW barley in 1990-91 is 25 percent lower than the adjusted initial price for the same barley in 1988-89.

A new base case was constructed where grain prices were 20 percent lower than in the original base. This enabled a comparison to be made between impacts with original grain prices and impacts with 20 percent lower prices. All other parameters in the model were held constant for the sensitivity analysis.

6.2 Regional Production and Income

Due to lower farm level prices, production of most crops in western Canada was lower than in the base (Table 6.1). The area planted to barley declined by 2.4 percent in western Canada. However, the area planted to flax increased by 4.7 percent. Most of the increase in area devoted to flax production occurred in Saskatchewan.

The quantity of wheat and barley produced in the prairie provinces also declined from the base (Table 6.2). Most of the reduction in barley production occurred in Saskatchewan; most of the reduction in wheat production occurred in Alberta. However, production of flax in Saskatchewan and canola in Alberta increased. Although the total area planted to canola in western Canada fell (Table 6.1), more of this oilseed crop was planted on summerfallow in Option 2 (not shown in tables). The higher yields

Table 6.1: Area Planted In Major Crops ('000 ha.) in Base and Option 2 (No Efficiency Gains)

Province	Crop	Base	Option 2	Difference	
				Absolute	Percentage
British Col.	Wheat	40	40	0	0
	Barley/Oats	64	64	0	0
	Flax	0	0	0	0
	Canola	54	54	0	0
Alberta	Wheat	3074	3031	-43	-1.4
	Barley/Oats	2363	2359	-4	-0.2
	Flax	47	46	-1	-2.2
	Canola	1295	1294	-1	0
Saskatchewan	Wheat	7454	7270	-184	-2.5
	Barley/Oats	1446	1364	-82	-5.7
	Flax	221	246	25	11.4
	Canola	1560	1525	-35	-2.2
Manitoba	Wheat	1824	1830	6	0.3
	Barley/Oats	720	697	-23	-3.1
	Flax	285	287	2	0.6
	Canola	506	510	4	0.8
West Canada	Wheat	12391	12171	-220	-1.8
	Barley/Oats	4592	4484	-108	-2.4
	Flax	553	579	26	4.7
	Canola	3415	3383	-32	-1.1

Table 6.2: Production of Major Crops ('000 tonnes) in Base and Option 2 (No Efficiency Gains)

Province	Crop	Base	Option 2	Difference	
				Absolute	Percentage
British Col.	Wheat	95	95	0	0
	Barley/Oats	142	142	0	0
	Flax	0	0	0	0
	Canola	49	49	0	0
Alberta	Wheat	6026	5787	-239	-4.0
	Barley/Oats	6354	6347	-7	-0.2
	Flax	65	63	-2	-3.4
	Canola	1439	1511	72	5.0
Saskatchewan	Wheat	12701	12590	-111	-0.9
	Barley/Oats	3148	2998	-150	-4.8
	Flax	202	227	25	12.2
	Canola	2077	2037	-40	-2.0
Manitoba	Wheat	3551	3567	16	0.4
	Barley/Oats	1863	1810	-53	-2.9
	Flax	285	286	1	0.5
	Canola	551	555	4	0.6
West Canada	Wheat	22372	22039	-333	-1.5
	Barley/Oats	11508	11297	-211	-1.8
	Flax	552	576	24	4.3
	Canola	4115	4151	36	0.9

associated with production on summerfallow permitted an overall increase in canola production of approximately one percent. Therefore, changes in grain and oilseed production in western Canada were in line with expectations; production of lower value per unit commodities like barley and wheat would decline if producers had to pay the entire freight cost for moving these commodities to terminal positions. Production of relatively higher value per unit commodities like flax and canola would increase with a change to full compensatory freight rates.

The area devoted to summerfallow in the prairie provinces increased by over four percent from the base (Table 6.3). Most of the increase occurred in the dark brown soil zone of Saskatchewan. The lower cropping intensity was expected as a result of the lower farm level prices for grains and oilseeds.

Net margins in the crop sectors of the prairie provinces decreased by $786 M (Table 6.4). Reduction in payment of the Crow Benefit of $620 M (86 percent of $720 M) accounted for most of the decline. The remaining $168 M was caused by the decrease in farm level prices of all crops and the decrease in quantity produced of barley and wheat.

The rental value of one extra hectare of cropland declined substantially across the prairie provinces (Table 6.5). The numbers in this table represent the differences in annual rental value of one extra hectare in its best agricultural use between the base and Option 2, and indicates what might happen to land prices. In southern Saskatchewan regions, the annual rental value fell by less than $20 per hectare. In northern Saskatchewan and in most of Manitoba, the drop in rental value of an extra hectare was of a greater magnitude. The drop in rental value was greatest in Alberta.

Total exports of grains and oilseeds out of the prairie region fell three percent (Table 6.6). The reduction in wheat shipments and the increase in flax shipments were in line with the changes in production of these crops. Exports of barley decreased by eleven percent, due to the decrease in

Table 6.3: Summerfallow ('000 ha.) in Base and Option 2 (No Efficiency Gains)

Province	Base	Option 2	Difference	
			Absolute	Percentage
British Col.	38	38	0	0
Alberta	1593	1644	51	3.2
Saskatchewan	5656	5917	261	4.6
Manitoba	676	688	12	1.7
West Canada	7963	8286	323	4.1

Table 6.4: Crop Sector Net Margin ($ million) in Base and Option 2 (No Efficiency Gains)

Province	Base	Option 2	Difference	
			Absolute	Percentage
British Col.	26	20	-6	-23.1
Alberta	1419	1136	-283	-19.9
Saskatchewan	2094	1704	-390	-18.6
Manitoba	718	609	-109	-15.2
West Canada	4257	3469	-788	-18.5

Table 6.6: Crop Exports ('000 tonnes) in Base and Option 2 (No Efficiency Gains)

Crop	Base	Option 2	Difference	
			Absolute	Percentage
Wheat	18690	18348	-342	-1.9
Barley/Oats	3248	2862	-386	-11.9
Flax	552	576	24	4.3
Canola	2186	2163	-23	-1.1
Total	24677	23950	-727	-3.0

Table 6.5: Reductions from Base in Annual Rental Value ($) of One Extra Hectare of Cropland (No Efficiency Gains)

Region	Alberta	Saskatchewan	Manitoba
1	20.39	17.40	24.75
2	29.09	19.86	25.40
3	33.57	16.39	21.99
4	32.48	18.83	21.12
5	55.36	19.68	18.77
6	41.04	23.20	18.87
7	32.43	25.61	
8		26.98	
9		31.77	

production and the increase in feed required for an expanded livestock herd. Shipments of canola from the prairie region declined by 1.1 percent. This happened because, with the extra production of canola, the equilibrium price fell from $316/tonne in the base to a level of $297/tonne in this option. Domestic demand increased as a result of the price fall; thus, exports of canola were at a lower level than in the base, in spite of the extra production in this option.

The beef breeding herds expanded in all regions of Canada except for the Maritime provinces (Table 6.7). The biggest increases occurred in Saskatchewan (3.7 percent) and Manitoba (3.0 percent). Cows and heifers also increased by 22,000 head (1.4 percent) in Alberta. The increase in herd size in British Columbia was relatively small, since only a small proportion of the B.C. herd is located in the Peace River region where feed grain prices were assumed to be reduced by the higher freight rates.

The feedlot sectors in Manitoba and Saskatchewan increased rather dramatically: by 16.7 percent in Manitoba and by 7.4 percent in Saskatchewan. A relatively small increase from the base number of feedlot cattle occurred in Alberta since the present Crow Offset Program in Alberta has provided the incentive for previous expansion of the Alberta feedlot sector. However, some additional feeders moved from British Columbia to Alberta in response to the lower feed costs in Alberta.

The additional incentives for feeding cattle in western Canada caused fewer feeder animals to be shipped to Ontario feedlots. This put upward pressure on feeder prices in eastern Canada. The breeding herd in Ontario increased by 1.9 percent due to the effect of these higher calf prices in eastern Canada. This was based on an expected weighted average increase in calf prices in Ontario of 3.8 percent and a beef cow retention elasticity with respect to calf prices of 0.5.

Table 6.7: Beef Herd Size ('000 head) in Base and Option 2 (No Efficiency Gains)

Province*	Category	Base	Option 2	Difference	
				Absolute	Percentage
British Col.	Cows/Heifers	257.0	258.3	1.3	0.5
	Feeders	70.5	70.3	-0.2	-0.3
Alberta	Cows/Heifers	1582.0	1604.5	22.0	1.4
	Feeders	1421.0	1433.0	9.0	0.6
Saskatchewan	Cows/Heifers	953.0	988.6	35.6	3.7
	Feeders	298.9	320.9	22.0	7.4
Manitoba	Cows/Heifers	439.0	452.1	13.1	3.0
	Feeders	239.4	279.4	40.0	16.7
Ontario	Cows/Heifers	444.0	452.4	8.4	1.9
	Feeders	539.0	507.1	-31.9	-5.9
Quebec	Cows/Heifers	211.0	211.0	0	0
	Feeders	68.1	68.1	0	0

*No changes in other provinces.

Table 6.8: Beef Sector Net Margin ($ million) for Base and Option 2 (No Efficiency Gains)

Province*	Base	Option 2	Difference	
			Absolute	Percentage
British Col.	43.7	42.6	-1.1	-2.5
Alberta	544.7	565.6	20.9	3.9
Saskatchewan	238.1	256.8	18.7	7.9
Manitoba	100.6	117.4	16.8	16.7
Ontario	163.1	153.8	-9.3	-5.7
Quebec	99.2	97.9	-1.3	-1.3
Total	1,189.4	1,234.1	44.7	3.8

*No changes occurred in other provinces.

Net margins to the beef sector increased substantially in the prairie provinces, particularly in Manitoba (Table 6.8). This was the joint result of increases in production and decreases in feed grain prices. Net margins to the beef sector decreased in British Columbia, Ontario and Quebec. The relatively larger decrease in Ontario was partly caused by the reduction in feedlot cattle in that province. Part of the loss in Ontario and all of the loss in British Columbia were a result of a reduction in price of low quality beef that was produced with the larger slaughter of cows.

Hog production increased over the base levels in western Canada (Table 6.9) as a result of the lower feed grain prices. Profitability of the hog enterprise in the prairie provinces increased substantially over the base (Table 6.10), due to the twin effects of higher production and lower feed grain prices.

6.2.1 Sensitivity of Results to Level of Crop Prices

The economic impacts to the crops sector from imposition of full compensatory rates would be greater for lower crop prices than crop prices at their original (1988-89) levels. Planting and production of all crops would be reduced to a greater extent with full compensatory rates if prices were 20 percent below their base levels. Obviously, production of grains and oilseeds were lower than their original levels even in the case of WGTA rates. This occurred because of the lower level of prices. However, imposition of full compensatory rates caused wheat plantings to be reduced by a further 4.6 percent, barley plantings to be reduced by a further 5.8 percent, flax plantings to be reduced by a further 3.3 percent and canola plantings to be reduced by a further 8.5 percent in western Canada. This compared to relatively small reductions of less than two percent in wheat and barley production and small increases in flax and canola production if output prices remained at their 1988-89 level (see Table 6.2).

Shifting from WGTA to full compensatory rates when crop prices are 20 percent lower than in the original base case would cause huge increases in summerfallow area in Saskatchewan (15.2 percent)

Table 6.9: Hog Herd Size ('000 head) in Base and Option 2 (No Efficiency Gains)

Province*	Category	Base	Option 2	Difference	
				Absolute	Percentage
British Col.	Sows	22.8	22.8	0	0
	Growers	198.4	198.8	0.4	0.2
Alberta	Sows	180.0	182.6	2.6	1.4
	Growers	1602.0	1642.8	39.2	2.4
Saskatchewan	Sows	87.0	89.1	2.1	2.4
	Growers	722.1	739.1	17.0	2.4
Manitoba	Sows	128.0	131.4	3.4	3.0
	Growers	1100.8	1130.2	29.4	2.7

*No changes occurred in other provinces.

Table 6.10: Hog Sector Net Margin ($ Million) in Base and Option 2 (No Efficiency Gains)

Province*	Base	Option 2	Difference	
			Absolute	Percentage
British Col.	22.7	22.8	0.1	0.4
Alberta	175.7	197.5	21.8	12.4
Saskatchewan	72.1	85.0	12.9	17.9
Manitoba	162.7	180.7	18.0	11.1
West Canada	433.2	486.0	52.8	12.2

*No changes occurred in other provinces.

and Manitoba (28.4 percent) due to the relatively lower level of profitability when prices are low compared to when prices are at their base levels. Summerfallow area in Alberta would increase by only 2.6 percent. The impact on crop sector net margins of switching to full compensatory freight rates would be greater when crop prices are lower than the base. Across western Canada, crop sector net margins would be reduced by 27.1 percent from this change in the freight rate structure. This compared to the 20.1 percent decrease in the net margin for western Canada when crop prices were at their 1988-89 levels 3(as noted in Table 6.4). Crop sectors in British Columbia and Alberta would suffer larger relative reductions in net margins than would Saskatchewan and Manitoba.

This sensitivity analysis showed that the economic impacts on producers in western Canada of changing from WGTA to full compensatory freight rates can be expected to be greater when crop prices are lower. The lower the level of absolute prices when producers are forced to pay the full freight rates, the greater would be the impacts on the crop sector (greater reductions in production and net margins, greater increases in summerfallow). Conversely, if absolute crop prices are higher when a switch is made to full compensatory rates, the farm level impacts would be smaller.

6.3 Impacts on Secondary Sectors

6.3.1 Agricultural Production

Under this option, the prairie region would be negatively affected in a significant way. Changes in crop production and livestock enterprises in various provinces are not adequate to maintain farmers' current net income levels. As shown in Table 6.11, farmers lose a total of $673 M, , 53 percent of which is in the province of Saskatchewan. The total value of production is expected to decline (relative to the base level) by $74.5 M in Manitoba, $402.1 M in Saskatchewan, and by another $260 M in Alberta, for a total of $736.4 M (Table 6.12). As a direct result of these reduced production levels for crops, output of various goods producing sectors in Canada would decline by $835.6 M. The largest part of this

Table 6.11 Change in the Direct Requirements of Agriculture* (Thousand Dollars) Resulting from Full Compensatory Rate and No Compensation and No Efficiency Gains.

Commodities	Manitoba	Sask.	Alberta	Total
Agricultural Products	-75.4	-4,545.4	-1,925.2	-6,546.0
Manufactured Products	-735.5	-30,254.0	-12,194.0	-43,183.5
Construction	-15.4	-1,614.3	-738.9	-2,368.6
Utilities	41.3	-1,310.9	-1,086.5	-2,356.1
Financial Services	112.4	-4,424.0	-1,399.1	-5,710.7
Other Services	282.5	380.1	267.5	930.1
Transportation Margin	36.5	43.8	30.4	110.7
Personal Income	-74,151.7	-358,814.0	-240,314.5	-673,280.2
Indirect Taxes	-18.3	-1,605.3	-2,407.3	-4,030.9
TOTAL	-74,523.6	-402,144.0	-259,767.6	-736,435.2

* In purchasers' prices, including imports.

Table 6.12 Direct and Indirect Change in Industrial Production (Thousand Dollars) Resulting from Full Compensatory Rates (with no Compensation or Efficiency Gains), by Province.

Sector	Manitoba	Sask.	Alberta	Rest of Canada	Total
Agriculture	-74,983	-406,278	-267,255	-6,242	-754,758
Forestry & Fish	-2	-64	-82	-224	-372
Mining	-66	-2,970	-7,739	-380	-11,155
Manufacturing	-864	-3,580	-8,088	-18,465	-30,997
Construction	-61	-1,800	-1,181	-429	-3,471
Transportation*	-490	-1,687	-2,678	-5,977	-10,832
Utilities	-44	-1,572	-1,500	-749	-3,865
Trade	-287	-1,029	-1,587	-2,661	-5,564
Finance	-414	-3,016	-4,425	-2,501	-10,356
Services	-73	-724	-1,321	-2,000	-4,178
Total**	-77,285	-422,725	-295,853	-39,689	-835,550

* Includes transportation margins and communications
** May not add due to rounding

decline is expected to occur in Saskatchewan. The indirect impacts on the Canadian economy are estimated to be 10.4 percent of the direct change experienced by the agricultural industry. In Manitoba, the industries that would suffer the most are manufacturing and financial services. In Saskatchewan, although financial services and manufacturing industries suffer the most, mining is a 3close third. In Alberta, manufacturing, mining, and financial service industries feel the greatest impact under this option. Impacts are also experienced outside of the prairie region, particularly in Ontario. The manufacturing industries outside the prairie region face a reduction of $18.5 M in sales of their products.

Reduced production levels in various industries yield reduced employment in the Canadian economy, as well as lower gross domestic product. As a result of increased freight rates, the three prairie provinces lose 11,294 person-years of employment in agriculture. Much of this reduction may be through further consolidation of farms, or through retirement of marginal land from production. The non-agricultural industries in the three provinces lose about 270 person-years of employment. In other provinces, such as Quebec, Ontario, and British Columbia, the loss in employment is estimated at 415 person-years, 70 percent of which is in the non-agricultural industries (Table 6.13).

6.3.2 Agricultural Processing

Losses in gross production and employment levels resulting from decreased crop production would be partially compensated by increased agricultural processing activity. There would be 22,000 extra cows/heifers, 9,000 extra feeders, and 41,800 extra hogs produced in Alberta under this option. Similarly, in Saskatchewan there would be 35,600 more cows/heifers, 22,000 more feeders, and 19,100 more hogs produced on farms. It is assumed that these animals are slaughtered in the province of production. The impact of this activity is shown in Table 6.14.

Table 6.13 Direct and Indirect Impact of Full Compensatory Rates (with No Compensation or Efficiency Gains) on Employment (Person-Years), by Province.

Region	Agriculture Employment	Non-Agriculture Employment	Total Employment
Manitoba	-1,241.5	-21.0	-1,262.5
Saskatchewan	-5,768.9	-107.9	-5,876.8
Alberta	-4,283.5	-141.2	-4,424.7
Rest of Canada	-123.0	-291.7	-414.7
Total	-11,416.9	-561.8	-11,978.7

Table 6.14: Impact on Regional Economy (excluding Agriculture) Resulting from Processing of Beef Cattle and Hogs, Option 2

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Output (Mill.$)	19.76	23.03	50.78	19.43	113.50
Gross Domestic Product at Factor Cost (Mill.$)	3.53	4.54	10.13	7.44	25.64
Employment (Person-Years)	120.5	137.7	187.0	191.1	636.3

The increased livestock numbers led to an increase of $113 M worth of goods and services produced by non-agricultural sectors. The largest increase, at $50.8 M, is in the province of Alberta, followed by Saskatchewan and Manitoba. The majority of this increase is due to increased output of the slaughtering and meat processing sectors.

The above additional gross production translates into 636 person-years of employment in Canada. Of this, 445 person-years are generated in the three prairie provinces, while the remaining 191 person-years are in the rest of Canada. Most of the jobs in the non-prairie region are in sectors such as manufacturing and financial services.

6.4 Summary of Financial Impacts

Net margins to the western Canadian crops sector would be severely reduced in this option, with relatively small gains in net margins to the livestock sectors in western Canada (Table 6.15). Overall, agricultural net margins in western Canada would be reduced by about $680 M. More than half of this loss would occur in Saskatchewan; another 35 percent of this loss would occur in Alberta.

The value of the objective function in CRAM was reduced from the base by $556 M. However, there was a reduction in government expenditures (a saving to taxpayers) of about $659 M. The reduction in government expenditures was due mostly to the elimination of the Crow Benefit of $620 M and the elimination of the Crow Offset Program in Alberta (a further saving of about $40 M). The overall direct gain to Canadian society from this option would be $103 M ($659 M minus $556 M).

In terms of gross domestic product, this option results in a loss of $716 M: $681 M in agriculture, and another $35 M in the non-agricultural industries (Table 6.16). The largest loss is realized in

Table 6.15 Summary of Farm Level Net Margins in Western Canada from Option 2 (No Efficiency Gains), by Sector and Province ($ million)

Province	Sector	Base	Option 2	Difference	
				Absolute	Percentage
B.C.	Crops	26.0	20.0	-6.0	-23.1
	Beef	43.7	42.6	-1.1	-2.5
	Hogs	22.7	22.8	0.1	0.4
	Total	92.4	85.4	-7.0	-7.6
Alta.	Crops	1,419.0	1,136.0	-283.0	-19.9
	Beef	544.7	565.6	20.9	3.9
	Hogs	175.7	197.5	21.8	12.4
	Total	2,139.4	1,899.1	-240.3	-11.2
Sask.	Crops	2,094.0	1,704.0	-390.0	-18.6
	Beef	238.1	256.8	18.7	7.9
	Hogs	72.1	85.0	12.9	17.9
	Total	2,404.2	2,045.8	-358.4	-14.9
Man.	Crops	718.0	609.0	-109.0	-15.2
	Beef	100.6	117.4	16.8	16.7
	Hogs	162.7	180.7	18.0	11.1
	Total	981.3	907.1	-74.2	-7.6
West Canada	Total	5,617.3	4,937.4	-679.9	-12.1

Table 6.16 Direct and Indirect Change in Gross Domestic Product at Factor Cost (Thousand Dollars) of Full Compensatory Rates (with no Compensation or Efficiency Gains), by Province.

Province	G.D.P. in		Total G.D.P
	Agriculture	Non-Agriculture	
Manitoba	-74,339	-1,005	-75,344
Saskatchewan	-360,812	-7,302	-368,114
Alberta	-243,306	-13,721	-257,027
Rest of Canada	-2,769	-12,718	-15,487
Total	-681,226	-34,746	-715,972

Saskatchewan, where a drop of $368 M is estimated in the gross regional product at factor cost. In Alberta the drop is $257 M, followed by Manitoba where $75 M is the value of lost GDP. A total of $25.6 M worth of GDP is generated by livestock slaughtering and meat processing. Alberta ranks the highest at $10.1 M, followed by Saskatchewan at $4.5 M and Manitoba at $3.5 M (Table 6.14). Thus, the total change in the GDP of the three prairie provinces is a loss of $690 M. In addition to these changes there may be further losses in terms of GDP through other value-added industries in the region. One such industry may be Dehydrated Alfalfa Products, which would become particularly vulnerable under this option. This is because the industry is very dependent upon exports and these markets are located in the Pacific Rim countries. As freight rates from prairie points to the port of Vancouver increase, this industry may have problems surviving in the provinces of Manitoba and Saskatchewan.

7. OPTION 3 - THE AGRICULTURAL DIVERSIFICATION ALLIANCE PROPOSAL

The purpose of this analysis was to estimate the impacts on provincial production patterns and income from producers having to pay full compensatory freight rates but receive compensation in the form of a production-neutral annuity. Improvements in efficiencies of grain handling and transportation were assumed to occur in this option; they were reflected in lower real rates for these services. This policy option thus includes the most important source of market absorption of increased freight rates: that of increasing the efficiency of the grain handling and transportation system.

7.1 Assumptions and Procedures

In this analysis, the Crow Offset Program in Alberta was removed and the Crow Offset Programs in the other prairie provinces were also assumed not to be operational.

Producers of grains and oilseeds were required to pay full compensatory freight rates for their products but received compensation for the loss of the Crow Benefit in the form of a 15-year annuity. However, assumed changes to the grain handling and transportation system permitted efficiencies in these services to be realized. The estimated gains in efficiencies resulted in reduced real costs of handling grain of 1.19 percent per year and in reduced real costs of transporting grain of 1.5 percent per year.

Farm level grain prices were reduced by the amount of real increase in the costs of handling and transporting grains. It was assumed that the period over which the full compensatory rates would be phased-in would be ten years. Average farm level prices of barley in the three prairie provinces after one, five and ten years would then be:

Province	Base	1 Yr	5 Yrs	10 Yrs
	($)	($)	($)	($)
Alberta	104.98	103.28	97.03	90.40
Saskatchewan	106.13	104.59	99.10	92.91
Manitoba	105.88	104.71	100.46	95.99

After ten years, producers would be paying full compensatory rates for transporting their crops to terminal locations. However, full compensatory rates after a ten year phase-in period would be $4-$5/tonne lower (i.e., grain prices $4-$5/tonne higher) than those in Option 2, where no increases in efficiency were assumed.

The analysis was conducted to estimate impacts in the short run (defined as after one year), intermediate run (five years) and long run (ten years).

Due to biological constraints in expanding livestock herds, it was assumed that no changes in opening stock numbers would occur in the short run. In western Canada, it was assumed that half the total expected response in herd expansion would occur by five years and that the total adjustment would occur by ten years. In eastern Canada, it was assumed that the entire response by livestock producers would occur by the fifth year; (the only livestock retention elasticity available for eastern Canada was for the intermediate run).

Other assumptions in this analysis were the same as in the second policy option:

1) no changes in input prices;

2) no changes in dairy and poultry production in any province;

3) Thunder Bay pooling system in effect; and

4) Canadian border remains closed to imports of barley.

7.1.1 The Compensation Package (ADA Proposal)

The capitalized value of the $720 M Crow Benefit over a 25 year period at a 10 percent discount rate is about $7.0 B. If this was to be paid out over a 15 year period, annual payments would average $859.25 M. Since activities in CRAM account for only 86 percent of the Crow Benefit, the average annual payment to producers for each of the 15 years would be $739 M. Although the actual ADA proposal was for a declining compensation payment each year, the average annual compensation payment of $739 M was used in this analysis. The compensation was paid on the basis of entitled tonnes of grains and oilseeds times the increased real rate from each region times a dilution factor of 0.80.

The ADA proposal suggested two ways to calculate entitled tonnes: the greater of average annual gross marketings over an historical period or 80 percent of calculated potential production of eligible crops. Entitled tonnes would be calculated for each producer; the amount of compensation to each producer would be based on that individual's entitled tonnes.

In this analysis, historical marketings were taken from the base case; in a sense, the base case represents historical marketings because all crop yields were averaged over the 1982-88 period. On a provincial basis, 80 percent of total calculated production was greater than total shipments for each of the prairie provinces. Therefore, producer compensation in this policy analysis was based on 80 percent of calculated potential production in each of the prairie provinces. This is equivalent to treating each province as though it was one large farm. This is a simplification of the ADA proposal where entitled tonnes would be calculated for each individual producer.

It is somewhat difficult to interpret the "80 percent of calculated potential production" in the ADA proposal. How would the potential production be calculated? In this analysis, the method chosen to calculate potential production was to let CRAM determine the optimal production pattern for each region and province. The amount of compensation received by every province (in effect, by every producer in the province) was determined by dividing the total compensation available by the total of 80 percent of tonnes of grains and oilseeds that were potentially produced times the increased rail rate times the dilution factor of 0.80. Total calculated entitlements were divided among the prairie provinces, with British Columbia producers receiving less than one percent, Alberta producers receiving nearly 38 percent, Saskatchewan producers receiving 51 percent and Manitoba producers receiving 11 percent of the compensation payments, which is close to the historical division of Crow Benefit payments.

It was assumed that the amount of compensation provided would not affect production since it is based on historical marketings or calculated production potential of each farm. Producers would respond strictly on the basis of profit opportunities existent with the new, lower prices for grains and oilseeds.

Since the compensation is based on past crop production, the annual annuity payments were attributed to the crop sector in this study. However, the annuity payments would probably have to be paid to the owners of land at the time the policy was instituted. Thus, only market place returns represent true returns to the crop sector.

7.2 Regional Production and Income

Grain production patterns in western Canada changed slightly as a result of the different price ratios for grains and oilseeds in this policy option (Tables 7.1 and 7.2). The area devoted to production of flax increased by 4.1 percent over the base; total production of flax increased by 5.3 percent, reflecting more planting of this oilseed crop on summerfallow than in the base. Wheat and feed grain production

Table 7.1: Area Planted In Major Crops ('000 ha.) in Base and Option 3 (ADA Proposal)

Province	Crop	Base	Short Run	Int. Run	Long Run	Long Run Difference	
						Absolute	Percent
B.C.	Wheat	40	40	40	40	0	0
	Barley/Oats	64	64	64	64	0	0
	Flax	0	0	0	0	0	0
	Canola	54	54	54	54	0	0
Alberta	Wheat	3074	3074	3074	3031	-43	-1.4
	Barley/Oats	2363	2363	2363	2360	-3	-0.2
	Flax	47	47	47	46	-1	-2.2
	Canola	1295	1295	1295	1294	-1	-0.1
Sask.	Wheat	7454	7467	7464	7462	8	0.1
	Barley/Oats	1446	1403	1402	1390	-56	-3.9
	Flax	221	240	240	249	28	12.7
	Canola	1560	1556	1554	1552	-8	-0.5
Manitoba	Wheat	1824	1827	1827	1827	3	0.2
	Barley/Oats	720	705	705	705	-15	-2.0
	Flax	285	290	290	290	5	1.5
	Canola	506	505	505	505	-1	-0.1
W.Canada	Wheat	12391	12409	12405	12405	14	0.1
	Barley/Oats	4592	4535	4533	4533	-59	-1.3
	Flax	553	576	576	576	23	4.1
	Canola	3415	3410	3408	3408	-7	-0.2

Table 7.2: Production of Major Crops ('000 tonnes) in Base and Option 3 (ADA Proposal)

Province	Crop	Base	Short Run	Int. Run	Long Run	Long Run Difference	
						Absolute	Percent
B.C.	Wheat	95	95	95	95	0	0
	Barley/Oats	142	142	142	142	0	0
	Flax	0	0	0	0	0	0
	Canola	49	49	49	49	0	0
Alberta	Wheat	6026	6026	5800	5787	-239	-4.0
	Barley/Oats	6354	6354	6354	6347	-7	-0.1
	Flax	65	65	65	63	-2	-3.4
	Canola	1439	1439	1512	1511	72	5
Sask.	Wheat	12701	12723	12717	12708	7	0.1
	Barley/Oats	3148	3041	3075	3053	-95	-3.0
	Flax	202	222	222	229	27	13.5
	Canola	2077	2070	2067	2064	-13	-0.6
Manitoba	Wheat	3551	3560	3560	3560	9	0.3
	Barley/Oats	1863	1829	1829	1829	-34	-1.8
	Flax	285	289	289	289	4	1.5
	Canola	551	550	550	550	-1	-0.1
W.Canada	Wheat	22372	22403	22172	22150	-222	-1.0
	Barley/Oats	11508	11367	11400	11372	-136	-1.2
	Flax	552	576	576	581	29	5.3
	Canola	4115	4108	4178	4174	59	1.4

decreased by about one percent; canola production increased by 1.4 percent. As was noted in the analysis of the second option, production of high volume, low value crops (wheat and barley) were lower than the base while the production of low volume, high value crops (flax and canola) were higher than the base. However, the magnitudes of the changes were less in this than in the second option due to the relatively smaller change in farm level prices for grains and oilseeds (as a result of the increased efficiency in grain handling and transportation).

Interesting changes in crop production occurred in each of the prairie provinces during the time this option was phased-in. In Alberta, no changes occurred in planted area in the short or intermediate runs; however, wheat production decreased by 3.7 percent and canola production increased by 5.1 percent in the intermediate run. This reflects a switch in the use of summerfallow: more canola was planted on summerfallow, more wheat was planted on stubble in comparison to the base (Table 7.2). In the long run, the area planted to all crops in Alberta decreased, as did the production of all crops except canola.

In Saskatchewan, wheat production increased slightly above the base. Barley production decreased by about three percent from the base. The production of flax increased by ten percent over the base in the short and intermediate runs, and by 13.5 percent in the long run (Table 7.2). A small reduction occurred in canola production in the short run. Progressively larger reductions in canola production occurred in the intermediate and long runs.

In Manitoba, full adjustment to increased production of wheat and flax, and decreased production of feed grains and canola, occurred in the short run (Tables 7.1 and 7.2). No further adjustments in Manitoba cropping patterns occurred in the intermediate and long runs.

Summerfallow increased by 68,000 hectares in western Canada (Table 7.3), due to the relatively lower profit potential of crop production in this option. Most of the extra summerfallow occurred in Alberta; however, it was only in the long run when this adjustment was made. Small amounts of extra summerfallow in Saskatchewan and Manitoba occurred in the short run.

Returns in the western Canadian crops sector were increased after ten years by an average of 3.8 percent if annual annuity payments are added to annual market returns (Table 7.4). However, net margins from the market place alone would be reduced by 1.5 percent, 7.1 percent and 13.5 percent in the short, intermediate and long runs, respectively. British Columbia's crop producers suffered the largest percentage reduction in net margins from the market place (19.2 percent); Manitoba's crop producers had the smallest percentage reduction in net margins from the market place (10.9 percent). The reduction in market returns was caused mainly by the phased increase of freight rates for grains and oilseeds. In addition, domestic canola prices fell in this policy option due to the overall increase in canola production.

It should be noted that compensation would not represent income to the crops sector of western Canada. Net margins, which are provided by the market place, would be significantly reduced from present levels. Annuity payments would probably go to owners of the land resource at the time the policy was put in place. However, since many land owners would probably continue to farm, they would receive the two sources of income for 15 years.

Table 7.3: Summerfallow ('000 ha.) in Base and Option 3 (ADA Proposal)

Province	Base	Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
British Col.	38	38	38	38	0	0
Alberta	1593	1593	1593	1644	51	3.2
Saskatchewan	5656	5671	5668	5666	10	0.2
Manitoba	676	683	683	683	7	1.1
West Canada	7963	7985	7982	8031	68	0.9

Table 7.4: Crop Sector Net Margins and Annuity Payments ($ million) in Base and Option 3 (ADA Proposal)

Prov.	Source	Base	Short Run	Int. Run	Long Run	Long Run Difference	
						Absolute	Percent
B.C.	Market	26	25	23	21	-5	-19.2
	Annuity	0	5.5	5.5	5.5	5.5	
	Total	26	30.5	28.5	26.5	0.5	1.9
Alta.	Market	1419	1395	1307	1212	-207	-14.6
	Annuity	0	262	262	262	262	
	Total	1419	1657	1569	1474	55	3.9
Sask.	Market	2094	2065	1952	1808	-286	-13.7
	Annuity	0	350	350	350	350	
	Total	2094	2415	2302	2158	64	3.1
Man.	Market	718	709	675	640	-78	-10.9
	Annuity	0	121	121	121	121	
	Total	718	830	796	761	43	6.0
W.Can.	Market	4257	4194	3954	3681	-576	-13.5
	Annuity	0	739	739	739	739	
	Total	4257	4933	4693	4420	163	3.8

Rental values of an additional hectare of cropland were reduced gradually with the phasing-in of the higher freight rates (Table 7.5). In Alberta, the long run reductions in rental value of an extra hectare ranged from a low of $15.28 in the brown soil zone of Region 1 around Medicine Hat to a high of $40.71 in Region 5 around Red Deer. Long run reductions in rental value of an extra hectare of cropland in Saskatchewan ranged from a low of $12.20 in Region 3 around Moose Jaw to a high of $23.66 in Region 9 around Prince Albert. In Manitoba, long run reductions in rental value of an extra hectare of cropland were all less than $18.50.

It should be noted that changes in rental value of an extra hectare do not necessarily lead to corresponding changes in land prices. The rental values shown in Table 7.5 were calculated on the basis of earning power from an extra hectare of land. Thus, when costs to producers rise, as they would with higher freight rates, rental values of land will decrease if everything else is held constant. Land prices, on the other hand, may not follow directly the reductions in productive values of land. The ADA compensation proposal would put extra money in the hands of grain and oilseed producers during the first 15 years after instituting such a policy change. With the extra available funds, many farmers may increase their bids on available land, or, at least, not reduce their bids to the full extent shown by the reduction in productive value of the land.

Crop exports from the prairie provinces fell by 117,000 tonnes in the short run, 336,000 tonnes in the intermediate run and 434,000 tonnes in the long run (Table 7.6). Exports of both wheat and barley declined by about one-quarter of a million tonnes each. Relatively small increases occurred in exports of flax and canola.

The beef herd was not permitted to adjust in the short run, reflecting the biological lags in beef production. The beef breeding herds in Saskatchewan and Manitoba increased by over one percent in

Table 7.5: Reductions from Base in Annual Rental Value ($) of One Extra Hectare of Cropland (ADA Proposal)

Province	Region	Short Run	Intermediate Run	Long Run
Alberta	1	1.79	8.39	15.28
	2	2.52	11.67	21.50
	3	2.88	13.55	24.69
	4	2.92	13.17	23.95
	5	4.73	22.40	40.71
	6	3.58	16.94	30.66
	7	2.81	13.37	23.98
Saskatchewan	1	1.50	5.81	12.83
	2	1.73	6.87	14.73
	3	1.42	6.24	12.20
	4	1.75	7.46	14.22
	5	2.17	4.23	13.20
	6	2.01	8.60	17.36
	7	2.24	9.60	19.16
	8	2.39	10.44	20.00
	9	2.79	12.15	23.66
Manitoba	1	2.10	9.78	17.80
	2	2.17	10.11	18.36
	3	1.86	8.59	15.66
	4	1.79	8.24	15.07
	5	1.57	7.32	13.27
	6	1.80	7.20	13.41

Table 7.6: Crop Exports ('000 tonnes) in Base and Option 3 (ADA Proposal)

Crop	Base	Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
Wheat	18690	18713	18481	18460	-230	-1.2
Barley/Oats	3248	3099	3059	3000	-248	-7.6
Flax	552	576	576	581	29	5.3
Canola	2186	2172	2224	2203	17	0.8
Total	24677	24560	24341	24243	-434	-1.8

the intermediate run and by over two percent in the long run (Table 7.7). This expansion occurred in response to the lower farm level prices of feed grains. The Alberta beef herd responded to a much smaller extent (only 0.3 percent in the long run) since the higher freight rates for grain were almost balanced by removal of the Crow Offset subsidy in that province. The beef breeding herd in Ontario increased by 1.9 percent in response to the projected higher feeder cattle prices in Ontario, since fewer western produced feeders moved to Ontario feedlots.

Feedlot production in Saskatchewan increased by more than five percent in the long run (Table 7.7). However, the largest increase in feedlot production occurred in Manitoba where production increased by 15.7 percent. It was projected that, relative to the base, nearly 32,000 fewer feeders would be shipped to Ontario feedlots.

Net margins accruing to the beef sector increased markedly in Manitoba (14.5 percent in the long run) and in Saskatchewan (6.4 percent in the long run). See Table 7.8. This was due partly to the increase in size of the beef herds in those provinces and partly to the decrease in feed grain prices. Ontario beef producers suffered a reduction in net margins of 4.4 percent, mostly as a result of a smaller beef feedlot sector. Small reductions in net margins occurred in the British Columbia and Quebec beef sectors due to the falling price of low quality beef that accompanied its expanded production.

As in the beef enterprise, the hog enterprise was not permitted to adjust in the short run. In the long run, the hog herd increased by 1.7 percent in Saskatchewan and 1.0 percent in Manitoba in response to the lower prices for feed grains (Table 7.9). A relatively small increase in the size of the hog herd occurred in Alberta, since removal of the Crow Offset subsidy blunted the effects of the increased freight rates.

Table 7.7: Beef Herd Size ('000 head) in Base and Option 3 (ADA Proposal)

Province*	Category	Base/ Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
B.C.	Cows/Heifers	257.0	257.5	258.0	1	0.4
	Feeders	70.5	70.4	70.3	-0.2	-0.3
Alberta	Cows/Heifers	1582.0	1585.1	1586.8	4.8	0.3
	Feeders	1421.0	1421.8	1421.3	0.3	0
Sask.	Cows/Heifers	953.0	967.5	979.4	26.4	2.8
	Feeders	298.9	307.8	315.1	16.2	5.4
Manitoba	Cows/Heifers	439.0	443.9	448.0	9	2.1
	Feeders	239.4	274.8	277.1	37.7	15.7
Ontario	Cows/Heifers	444.0	452.4	452.4	8.4	1.9
	Feeders	539.0	507.1	507.1	-31.9	-5.9
Quebec	Cows/Heifers	211.0	211.0	211.0	0	0
	Feeders	68.1	68.1	68.1	0	0

* No changes occurred in other provinces.

Table 7.8: Beef Sector Net Margin ($ million) in Base and Option 3 (ADA Proposal)

Province*	Base	Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
British Col.	43.7	43.7	43.8	43.3	-0.4	-0.9
Alberta	544.7	555.5	557.8	552.6	7.9	1.5
Saskatchewan	238.1	239.1	247.8	253.4	15.3	6.4
Manitoba	100.6	109.6	112.7	115.2	14.6	14.5
Ontario	163.1	158.5	156.4	156.0	-7.1	-4.4
Quebec	99.2	100.4	98.9	98.6	-0.6	-0.6
Total	1189.4	1206.8	1217.4	1219.1	29.7	2.5

* No changes occurred in other provinces.

Table 7.9: Hog Herd Size ('000 head) in Base and Option 3 (ADA Proposal)

Province*	Category	Base/ Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
B.C.	Sows	22.8	22.8	22.8	0	0
	Growers	198.4	198.6	198.6	0.2	0.1
Alberta	Sows	180.0	180.4	180.5	0.5	0.3
	Growers	1602.0	1605.2	1606.8	4.8	0.3
Sask.	Sows	87.0	87.8	88.5	1.5	1.7
	Growers	722.1	728.7	734.6	12.5	1.7
Manitoba	Sows	128.0	129.3	129.3	1.3	1.0
	Growers	1100.8	1111.9	1111.9	11.1	1.0

* No changes in other provinces.

Table 7.10: Hog Sector Net Margin ($ million) in Base and Option 3 (ADA Proposal)

Province*	Base	Short Run	Int. Run	Long Run	Long Run Difference	
					Absolute	Percent
British Col.	22.7	22.7	22.8	22.8	0.1	0.4
Alberta	175.7	177.2	182.9	188.2	12.5	7.1
Saskatchewan	72.1	73.0	77.0	81.4	9.3	12.9
Manitoba	162.7	163.8	169.4	175.0	12.3	7.6
West Canada	433.2	436.7	452.1	467.4	34.2	7.9

* No changes occurred in other provinces.

Net margins in the hog sector increased markedly from the base (Table 7.10). Long run net margins increased by nearly 13 percent in Manitoba and by over 7 percent in both Alberta and Saskatchewan.

7.3 Impacts on Secondary Industries

7.3.1 Agricultural Production

Secondary impacts of full compensatory rates with efficiency gains were estimated only for the long run (defined as ten years). Including compensation, the value of production increased by $264.5 M (Table 7.11). Value of production was higher for Alberta ($122 M) followed by Saskatchewan ($112.3 M) and Manitoba ($30.2 M).

Direct and indirect increases in the gross production of various industries is estimated to be $310.9 M, of which $148.5 M is realized by Alberta industries. Major Alberta industries that are affected under this option are manufacturing, mining, and construction. In Saskatchewan, construction and utilities industries experience a decline in production, whereas manufacturing has a slightly higher value of goods produced (Table 7.12).

The increased sales of goods and services translate into 4,893 extra person-years of employment (Table 7.13). A major part of employment gains are in Alberta, where 2,581 person-year equivalent jobs are created under the option. In the Canadian economy as a whole, 332 person-year equivalent jobs are created in the non-agricultural industries. Besides the three prairie provinces, there are indirect impacts on other Canadian provinces creating 159 jobs.

Table 7.11 Change in Direct Requirements of Agriculture* (Thousand Dollars) Under Full Compensatory Rates with Efficiency Gains, and Compensation, by Provincial Commodities.

Commodities	Manitoba	Saskatchewan	Alberta	Total
Agriculture	-37.92	-192.46	-1,925.17	-2,155.54
Manufactured Prod.	-423.25	-2,812.70	24,573.39	21,337.44
Construction	-9.76	-252.27	3,715.19	3,453.16
Utilities	35.78	-205.66	833.79	663.91
Financial Services	105.04	3.82	2,351.79	2.460.65
Other Services	262.67	280.81	48.79	592.27
Trans. Margins	33.80	32.39	5.17	71.36
Personal Income	30,233.30	115,520.19	88,351.96	234,105.45
Indirect Taxes	2.94	-84.14	4,059.11	3,977.91
Total	30,202.61	112,289.98	122,014.02	264,506.61

* In purchasers' price, including imports.

Table 7.12 Direct and Indirect Change in Gross Production (Thousand Dollars), by Industry and Province, Under Option 3.

Sector	Manitoba	Saskatchewan	Alberta	Rest of Canada	Total
Agriculture	30,225	112,486	124,647	156	267,315
Forestry & Fish.	1	4	125	200	330
Mining	22	137	4,745	151	5,055
Manufacturing	279	1,103	7,421	9,855	18,658
Construction	-1	-242	3,966	175	3,898
Transportation*	123	156	1,361	1,974	3,614
Utilities	51	-168	1,104	433	1,420
Trade	82	158	1,367	1,481	3,088
Finance	64	141	2,481	1,663	4,349
Services	166	173	1,330	1,466	3,135
Total**	30,815	113,950	148,546	17,555	310,866

* Including transportation margins, communications, and storage.

** May not add due to rounding.

Table 7.13 Direct and Indirect Change in Employment (Person-Years) Under Option 3, by Province.

Province	Agriculture	Non-Agriculture	Total
Manitoba	508.5	9.7	518.2
Saskatchewan	1,622.6	8.7	1,631.3
Alberta	2,425.9	155.3	2,581.2
Rest of Canada	4.2	158.6	162.8
Total	4,561.2	332.3	4,893.5

Table 7.14 Impact on Regional Economy (Excluding Agriculture) Resulting from Processing of Beef Cattle and Hogs, Option 3

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Output (Mill.$)	18.13	17.51	5.18	9.13	49.95
Gross Domestic Product at Factor Cost (Mill.$)	3.24	3.36	1.03	3.44	11.07
Employment (Person-Years)	110.6	102.0	19.1	90.5	322.2

7.3.2 Agricultural Processing

Secondary impacts of full compensatory rates with efficiency gains through agricultural processing activities are relatively smaller than those under Option 2. For Canada as a whole, non-agricultural sectors realize a gain of $50 M (Table 7.14) in terms of gross value of production. About 18 percent of this gain is in the non-prairie region, particularly Ontario and British Columbia. The largest increase in the GDP, within the prairie region, is estimated for the province of Manitoba at $18.1 M with Saskatchewan close behind at $17.5 M.

The increased economic activity resulting from agricultural processing translates into 322 jobs for the Canadian economy. Almost one-third of these are in Manitoba and Saskatchewan. In the rest-of-Canada region a total of 91 person-years of employment is created by this additional economic activity.

7.4 Summary of Financial Impacts

All major sectors of western Canadian agriculture (except beef in British Columbia) would gain in the long run (defined as 10 to 15 years) from the ADA proposal (Table 7.15). Overall, the total gain in net margins would be about $234 M of which producers in Saskatchewan, Alberta and Manitoba would receive about 38, 32 and 30 percent, respectively. However, it should be recalled that these net margins would be sharply negative when payment of compensation ends after 15 years.

In the short run, the value of the objective function in CRAM increased by $706 M. However, $672 M of that total was accounted for by extra government payments ($739 M for annuity, less $62 M for reduced Crow Benefits, less $5 M for reductions in other government programs). This left a short run increase in direct economic gain to Canadian society of $34 M.

Table 7.15 Summary of Farm Level Net Margins in Western Canada from Option 3 (ADA Proposal), by Sector and Province ($ million)

Province	Sector	Base	Option 3	Difference	
				Absolute	Percentage
B.C.	Crops	26.0	26.5	0.5	1.9
	Beef	43.7	43.3	-0.4	-0.9
	Hogs	22.7	22.8	0.1	0.4
	Total	92.4	92.6	0.2	0.2
Alta.	Crops	1,419.0	1,474.0	55.0	3.9
	Beef	544.7	552.6	7.9	1.5
	Hogs	175.7	188.2	12.5	7.1
	Total	2,139.4	2,214.8	75.4	3.5
Sask.	Crops	2,094.0	2,158.0	64.0	3.1
	Beef	238.1	253.4	15.3	6.4
	Hogs	72.1	81.4	9.3	12.9
	Total	2,404.2	2,492.8	88.6	3.7
Man.	Crops	718.0	761.0	43.0	6.0
	Beef	100.6	115.2	14.6	14.5
	Hogs	162.7	175.0	12.3	7.6
	Total	981.3	1,051.2	69.9	7.1
West Canada	Total	5,617.3	5,851.4	234.1	4.2

In the intermediate run, the value of the objective function was $534 M higher than in the base. However, government spending was $413 M higher than in the base ($739 M for annuity, less $310 M for reduction in the Crow Benefit, less $16 M from reductions in other programs). This left an intermediate term gain in direct benefits to Canadian society of $121 M.

In the long run, the value of the objective function in CRAM was $315 M higher than in the base. But government spending was also $82 M higher than in the base ($739 M for annuity, less $620 M from ending the Crow Benefit, less $37 M for reductions in other programs). This left a long run net direct gain to Canadian society of $233 M. All of this gain would accrue to western Canadian agricultural producers (their net margins were increased by $234 M - see Table 7.15).

The increased sales of goods and services generate $253.6 M worth of gross domestic product at factor cost (Table 7.16). The largest increase in GDP is in Saskatchewan ($116 M) of which $115.5 M is in the agricultural industry. Total indirect impacts of this option are estimated at $19 M in terms of regional gross domestic product. About $7.1 M worth of GDP is generated in the rest of Canada.

Changes in the GDP resulting from agricultural processing are shown in Table 7.14. In total, the GDP increases by $11.1 M in all Canadian provinces. The three prairie provinces would have a gain of $8.6 M, with Manitoba and Saskatchewan receiving relatively large increases.

Combining the regional impacts of agricultural production and agricultural processing, the prairie GDP increases by $254 M. Impact on the non-prairie region is estimated at $10.5 M. Furthermore, under agricultural production impacts, most of the change in the GDP is in terms of personal incomes. Therefore, income-induced impacts may be significant under this option and may provide a further boost to the regional and Canadian economies.

Table 7.16 Change in Direct and Indirect Gross Domestic Product (at Factor Cost in Thousand Dollars) Under Option 3, by Province

	Agriculture	Non-Agriculture	Total
Manitoba	30,164	407	30,571
Saskatchewan	115,507	463	115,970
Alberta	88,828	11,071	99,899
Rest of Canada	68	7,084	7,152
Total	234,567	19,025	253,592

8. OPTION 4 - THE GILSON PROPOSAL

The purpose of this analysis was to assess the effects of the Gilson proposal for freight rate changes on the agricultural industry in Canada. Gilson recommended that 81 percent of the Crow Benefit be paid directly to producers and 19 percent be paid to the railways, after a phase-in period.

8.1 Assumptions and Procedures

Although one of the parts of the original Gilson proposal was a $300 M fund to be paid over the first five years to cover some of the dilution and adjustment costs, this was not included in the present analysis. The analysis of this policy option was conducted for the long run only. It was considered that the effects of Gilson's proposal of $60 M/year for five years would have been fully dissipated and would have no effects on production decisions in the long run.

As mentioned earlier, crop movements in CRAM account for only 86 percent of the actual $720 M spent by the federal government on the WGTA in 1988-89. In this analysis, producers received 81 percent of $620 M (which is 86 percent of $720 M) as a direct payment from the federal government. The railways received 19 percent of $620 M.

Freight rates to producers increased to 81 percent of their full compensatory levels, after allowances for gains in efficiency of 12.4 percent for handling grain and 14.1 percent (1.5 percent per year for ten years) for transporting grain. Farm level prices for barley were reduced by the effective amount of the freight rate increases in each region in western Canada. Average barley prices were $94.46/tonne in Alberta, $96.52/tonne in Saskatchewan and $98.85/tonne in Manitoba.

All other assumptions regarding feed prices in eastern Canada, input prices, supply controlled sectors, pooling method and Canadian border were the same as in Options 2 and 3.

8.2 Regional Production and Income

Very minor changes occurred to crop production patterns in western Canada as a result of implementing this policy option (Tables 8.1 and 8.2). No crop production changes occurred in British Columbia or Alberta. In Saskatchewan, barley production declined and flax production increased substantially over the base levels. A slight increase in wheat production and a slight decrease in canola production also occurred in Saskatchewan. The optimal changes in planting and production of major grains in Manitoba were similar to those in Saskatchewan. However, the decrease in barley production and the increase in flax production were both of a smaller magnitude than what occurred in Saskatchewan. Overall, in western Canada, flax production increased by over four percent and barley production decreased by almost one percent compared to the base. Production of wheat and canola were almost the same as in the base.

The optimal area devoted to summerfallow increased in by 0.2 percent in western Canada (Table 8.3). A small additional area was summerfallowed in both Saskatchewan and Manitoba.

Net margins accruing to the crop sector increased over the base by nearly three percent in western Canada (Table 8.4). Payment of 81 percent of the Crow Benefit to producers as well as the decreased real costs of handling and transporting grains and oilseeds more than offset the extra costs producers had to pay to ship their crops to terminal locations. All provinces in western Canada experienced an increase over the base in net margins to the crop sector.

Table 8.1: Area Planted In Major Crops ('000 ha.) in Base and Option 4 (Gilson Proposal)

Province	Crop	Base	Option 4	Difference	
				Absolute	Percentage
British Col.	Wheat	40	40	0	0
	Barley/Oats	64	64	0	0
	Flax	0	0	0	0
	Canola	54	54	0	0
Alberta	Wheat	3074	3074	0	0
	Barley/Oats	2363	2363	0	0
	Flax	47	47	0	0
	Canola	1295	1295	0	0
Saskatchewan	Wheat	7454	7463	9	0.1
	Barley/Oats	1446	1401	-45	-3.1
	Flax	221	239	18	8.2
	Canola	1560	1553	-7	-0.4
Manitoba	Wheat	1824	1827	3	0.2
	Barley/Oats	720	705	-15	-2.0
	Flax	285	290	5	1.5
	Canola	506	505	-1	-0.4
West Canada	Wheat	12391	12404	12	0.1
	Barley/Oats	4592	4533	-59	-1.3
	Flax	553	576	23	4.1
	Canola	3415	3407	-8	-0.2

Table 8.2: Production of Major Crops ('000 tonnes) in Base Case and Option 4 (Gilson Proposal)

Province	Crop	Base	Option 4	Difference	
				Absolute	Percentage
British Col.	Wheat	95	95	0	0
	Barley/Oats	142	142	0	0
	Flax	0	0	0	0
	Canola	49	49	0	0
Alberta	Wheat	6026	6026	0	0
	Barley/Oats	6354	6354	0	0
	Flax	65	65	0	0
	Canola	1439	1439	0	0
Saskatchewan	Wheat	12701	12716	15	0.1
	Barley/Oats	3148	3074	-74	-2.4
	Flax	202	221	19	9.7
	Canola	2077	2066	-11	-0.3
Manitoba	Wheat	3551	3560	9	0.3
	Barley/Oats	1863	1829	-34	-1.8
	Flax	285	289	4	1.5
	Canola	551	550	-1	-0.1
West Canada	Wheat	22372	22397	25	0.1
	Barley/Oats	11508	11400	-108	-0.9
	Flax	552	576	24	4.3
	Canola	4115	4104	-11	-0.3

Table 8.3: Summerfallow ('000 ha.) in Base and Option 4 (Gilson Proposal)

Province	Base	Option 4	Difference	
			Absolute	Percentage
British Col.	38	38	0	0
Alberta	1593	1593	0	0
Saskatchewan	5656	5667	11	0.2
Manitoba	676	683	7	1.0
West Canada	7963	7981	18	0.2

Table 8.4: Crop Sector Net Margin ($ milion) in Base and Option 4 (Gilson Proposal)

Province	Base	Option 4	Difference	
			Absolute	Percentage
British Col.	26	26.9	0.9	3.5
Alberta	1419	1442	23	1.6
Saskatchewan	2094	2162	68	3.2
Manitoba	718	750	32	4.5
West Canada	4257	4371	124	2.9

Relatively small changes occurred in the annual rental value of an extra hectare of crop land (Table 8.5). Only in Region 5 of Saskatchewan (Foam Lake area) did the reduction in annual rental value exceed $10 per hectare. In four regions of Alberta, the rental value of an extra hectare of crop land actually increased over the base levels.

Exports of major crops from the prairie region declined from the base levels by 191,000 tonnes in total (Table 8.6). Small increases in exports of wheat and flax were overwhelmed by the decrease in exports of barley and canola.

The beef breeding herd expanded over the base in all provinces except Alberta and Quebec, with this option (Table 8.7). The largest increase occurred in Saskatchewan. As in previous options, the beef breeding herd in Ontario increased in reaction to projected higher prices for feeder calves in Ontario. CRAM projected nearly a six percent reduction in feeder animals in Ontario feedlots. Major increases in feedlot animals were projected in Manitoba and Saskatchewan (Table 8.7).

Net margins in the beef sector increased for all provinces except Ontario and Quebec (Table 8.8). The biggest increases in net margins occurred in Manitoba and Saskatchewan. The increases were caused by increases in the number of animals on farms and by decreases in the price of feed grains. The reduction in net margin in the Ontario beef sector reflects the decrease in number of feedlot animals being transferred from western Canada.

Hog production increased over the base level in Manitoba and Saskatchewan by a little more than one percent (Table 8.9). No change in hog production occurred in Alberta. However, net margins to hog producers increased for all provinces in western Canada (Table 8.10). This was due partly to the larger herd sizes in Manitoba and Saskatchewan and partly to the reduced prices for feed grains.

Table 8.5: Reductions (Increases) from Base in Annual Rental Value ($) of One Extra Hectare of Cropland (Gilson Proposal)

Region	Alberta	Saskatchewan	Manitoba
1	2.42	5.32	4.86
2	3.18	4.11	5.06
3	(1.35)	4.00	7.81
4	(0.14)	2.21	9.10
5	(7.35)	11.34	9.23
6	(2.18)	2.84	9.72
7	(0.11)	2.61	
8		2.12	
9		0.10	

Table 8.6: Crop Shipments ('000 tonnes) in Base and Option 4 (Gilson Proposal)

Crop	Base	Option 4	Difference	
			Absolute	Percentage
Wheat	18690	18706	16	0.1
Barley/Oats	3248	3054	-194	-6.0
Flax	552	576	24	4.3
Canola	2186	2150	-36	-1.6
Total	24677	24486	-191	-0.8

Table 8.7: Beef Herd Size ('000 head) in Base And Option 4 (Gilson Proposal)

Province*	Category	Base	Option 4	Difference	
				Absolute	Percentage
British Col.	Cows/Heifers	257.0	257.8	0.8	0.3
	Feeders	70.5	70.4	-0.1	-0.1
Alberta	Cows/Heifers	1582.0	1582.0	0	0
	Feeders	1421.0	1419.5	-1.5	-0.1
Saskatchewan	Cows/Heifers	953.0	971.4	18.4	1.9
	Feeders	298.9	310.9	12.0	4.0
Manitoba	Cows/Heifers	439.0	445.3	6.3	1.4
	Feeders	239.4	275.7	36.3	15.2
Ontario	Cows/Heifers	444.0	452.4	8.4	1.9
	Feeders	539.0	507.1	-31.9	-5.9
Quebec	Cows/Heifers	211.0	211.0	0	0
	Feeders	68.1	68.1	0	0

* No changes occurred in other provinces.

Table 8.8 Beef Sector Net Margin ($ million)in Base and Option 4 (Gilson Proposal)

Province*	Base	Option 4	Difference	
			Absolute	Percentage
British Col.	43.7	43.8	0.1	0.2
Alberta	544.7	546.1	1.4	0.3
Saskatchewan	238.1	250.8	12.7	5.3
Manitoba	100.6	113.9	13.3	13.2
Ontario	163.1	156.4	-6.7	-4.1
Quebec	99.2	98.8	-0.4	-0.4
Total	1,189.4	1,209.8	20.4	1.7

* No changes occurred in other provinces.

Table 8.9 Hog Herd Size ('000 head) in Base and Option 4 (Gilson Proposal)

Province*	Category	Base	Option 4	Difference	
				Absolute	Percentage
British Col.	Sows	22.8	22.8	0	0
	Growers	198.4	198.6	0.2	0.1
Alberta	Sows	180.0	180.0	0	0
	Growers	1602.0	1602.0	0	0
Saskatchewan	Sows	87.0	88.1	1.1	1.3
	Growers	722.1	730.9	8.8	1.2
Manitoba	Sows	128.0	129.7	1.7	1.3
	Growers	1100.8	1115.3	14.5	1.3

* No changes occurred in other provinces.

Table 8.10: Hog Sector Net Margin ($ million) in Base and Option 4 (Gilson Proposal)

Province*	Base	Option 4	Difference	
			Absolute	Percentage
British Col.	22.7	22.8	0.1	0.4
Alberta	175.7	182.3	6.6	3.8
Saskatchewan	72.1	78.8	6.7	9.3
Manitoba	162.7	171.5	8.8	5.4
West Canada	433.2	455.4	22.2	5.1

* No changes occurred in other provinces.

8.3 Impacts on Secondary Industries

8.3.1 Agricultural Production

Under the Gilson Proposal, the increase in the value of production of the agricultural industry in the three prairie provinces is estimated at $134.7 M (Table 8.11). As under other options, the major part of this change occurs in the level of personal incomes, which increase by $137.9 M. At the same time, purchases of goods and services by farmers are reduced by $3.2 M. In Alberta, reduction in the purchases of intermediate goods is very small (less than $16,000). However, in Saskatchewan there is a reduction of almost $3 M in the agricultural purchases of goods and services and reflects relatively larger adjustments that would follow in the province.

The increase in the value of agricultural production of $134.7 M translates into an increase of $129.7 M worth of goods and services produced in Canada. In fact, agriculture and business services are the two industries that experience increased sales, whereas the other industries show a decline in the value of production. In total, the non-agricultural industries lose about $4.1 M worth of gross production (Table 8.12). Only very small reductions in these industries occur in Manitoba ($0.1 M). Saskatchewan and Alberta show a reduction of approximately $1 M each in the gross output of non-agricultural industries.

As a direct consequence of changes in gross production, employment losses in the non-agricultural industries are very small (21.9 person-years). In the Canadian economy as a whole, 1,988 person-years of employment are generated; however over 2,000 person-years are due to increased value of output in the agricultural industry, leaving a reduction of 21.9 person-years in total (Table 8.13).

Table 8.11: Change in the Direct Requirements of Agriculture* (Thousand Dollars) Under Option 4, by Province.

Commodities	Manitoba	Saskatchewan	Alberta	Total
Agricultural Prod.	-36.96	-176.41	0	-213.37
Manufactured Prod.	-504.88	-2,447.01	-4.83	-2,956.72
Construction	-9.61	-211.14	0	-220.75
Utilities	18.65	-187.48	-0.51	-169.34
Financial Services	45.49	-60.84	-2.41	-17.76
Other Services	182.38	197.22	-6.50	373.10
Transp. Margins	24.79	22.78	-1.02	46.55
Personal Income	45,527.05	87,414.91	7,999.19	137,941.15
Indirect Taxes	-12.47	-63.89	-0.69	-77.05
Total	42,234.44	84,488.14	7,983.23	134,705.81

* In purchaser's prices, including imports.

Table 8.12: Change in the Direct and Indirect Sectoral Gross Output (Thousand Dollars) Under Option 4, by Province

Sector	Manitoba	Sask.	Alberta	Rest of Canada	Total
Agriculture	42,032	84,452	7,959	-551	133,892
Forestry & Fish	0	-1	0	-5	-6
Mining	-4	-263	-420	-36	-723
Manufacturing	-78	-180	-298	-1,308	-1,864
Construction	-12	-223	-11	-26	-272
Transportation*	-51	-109	-77	-372	-609
Utilities	9	-194	-15	-40	-240
Trade	-28	-62	-53	-154	-297
Financial Services	4	-99	-125	-61	-281
Other Services	62	28	37	16	143
Total**	41,934	83,349	6,997	-2,537	129,743

* Including transportation margins, communications and storage.

**May not add due to rounding.

Table 8.13: Change in Direct and Indirect Employment (Person-Year) Under Option 4, by Province

Province	Agriculture	Non-Agriculture	Total
Manitoba	694.3	0.6	694.9
Saskatchewan	1,199.6	-6.3	1,193.3
Alberta	127.0	-2.5	124.5
Rest of Canada	-10.6	-13.7	-24.3
Total	2,010.3	-21.9	1,988.4

8.3.2 Agricultural Processing

Under the Gilson proposal, increase in the number of livestock on farms is not as large as under other options. For example, beef cattle and hog number increases in the province of Alberta were nil. For Saskatchewan, these changes were at 18.4 and 8.8 thousand head of beef cattle and hogs, respectively. As a direct result of the smaller changes, impacts of agricultural processing activity were estimated to be small under this option.

Gross production of all sectors (except agriculture) was estimated at $20.2 M for all regions of Canada (Table 8.14). Of this total, the largest gain was in the province of Saskatchewan at $12.2 M. In this province, 74 percent of this total is generated by the slaughtering and meat processing sector itself. Other sectors that seem to be positively impacted in the province are manufacturing, trade, and services.

The employment generated under this option is estimated at 96.7 person-years in Manitoba and Saskatchewan, and 38 person-years in non-prairie Canada. In non-prairie Canada employment was generated in the manufacturing, transportation, and financial services sectors.

8.4 Summary of Financial Impacts

Annual farm level net margins would be increased from the base by about $173 M after the Gilson Proposal was fully implemented (Table 8.15). Producers in Saskatchewan would receive about half, those in Manitoba would receive nearly one-third, and those in Alberta would receive only about 18 percent of the gain.

The value of the objective function in CRAM increased from the base by $189 M. Furthermore, annual government payments to the agricultural industry were reduced from the base by $36 M, leaving an

Table 8.14 Impact on Regional Economy (Excluding Agriculture) Resulting from Processing of Beef Cattle and Hogs, Option 4

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Output (Mill.$)	4.19	12.22	0	3.80	20.21
Gross Domestic Product at Factor Cost (Mill.$)	0.75	2.35	0	1.46	4.56
Employment (Person-Years)	25.5	71.2	0	37.9	134.6

Table 8.15 Summary of Farm Level Net Margins in Western Canada from Option 4 (Gilson Proposal), by Sector and Province ($ million)

Province	Sector	Base	Option 4	Difference	
				Absolute	Percentage
B.C.	Crops	26.0	26.9	0.9	3.5
	Beef	43.7	43.8	0.1	0.2
	Hogs	22.7	22.8	0.1	0.4
	Total	92.4	93.5	1.1	1.2
Alta.	Crops	1,419.0	1,442.0	23.0	1.6
	Beef	544.7	546.1	1.4	0.3
	Hogs	175.7	182.3	6.6	3.8
	Total	2,139.4	2,170.3	30.9	1.4
Sask.	Crops	2,094.0	2,162.0	68.0	3.2
	Beef	238.1	250.8	12.7	5.3
	Hogs	72.1	78.8	6.7	9.3
	Total	2,404.2	2,491.6	87.4	3.6
Man.	Crops	718.0	750.0	32.0	4.5
	Beef	100.6	113.9	13.3	13.2
	Hogs	162.7	171.5	8.8	5.4
	Total	981.3	1,035.4	54.1	5.5
West Canada	Total	5,617.3	5,790.8	173.5	3.1

overall direct gain to Canadian society from this policy option of $225 M. About three-quarters of this direct gain would accrue to western Canadian farmers. Most of the remainder would accrue to Canadian consumers in the form of lower prices for food.

Direct and indirect changes in the GDP in Canada, and in the three prairie provinces are also overshadowed by changes in personal incomes in agriculture. The contribution of non-agricultural industries to the provincial GDP in Manitoba is almost nil, whereas in the other two provinces these non-agricultural industries show a loss of about $0.5 M each (Table 8.16).

Contributions of the agricultural processing activities to the regional GDP are small under this option. For the three prairie provinces, these activities add only $3 M worth of gross domestic product (Table 8.14). An additional $1.5 M is added to the GDP level in other Canadian provinces. The total contribution to the GDP (from both agricultural production and processing) under this option is about $140 M for the Prairie region, and less than $1 M for the rest of Canada.

Table 8.16: Change in Direct and Indirect Gross Domestic Product (Thousand Dollars) at Factor Cost, Under Option 4, by Province

Province	Agriculture	Non-Agriculture	Total
Manitoba	42,447	-4	42,443
Saskatchewan	87,343	-512	86,831
Alberta	7,980	-448	7,532
Rest of Canada	-245	-646	-891
Total	137,525	-1,610	135,915

9. OPTION 5 - THE ST. LAWRENCE POOLING OPTION

The purpose of conducting this analysis was to assess the likely impacts on the agricultural industry of a change in the basis for pooling CWB marketed grains, under both WGTA (Option 5A) and full compensatory (Option 5B) freight rate regimes.

9.1 Assumptions and Procedures

Three separate analyses were conducted using the lower St. Lawrence River terminal location as the basis for pooling eastbound Canadian Wheat Board grains:

1) WGTA freight rates,
2) full compensatory freight rates with no compensation, and
3) full compensatory freight rates with a 15 year annuity paid to producers as compensation for losing the Crow Benefit.

Producers are required to pay freight to the least expensive terminal location; all other costs are pooled. WGTA freight rates to terminal locations under the St. Lawrence pooling method were presented in Table 4.1.

9.1.1 St. Lawrence Pool With WGTA Rates

It cost an average of $19.22 more per tonne in 1988-89 to move grain through the St. Lawrence than through the Vancouver terminals (i.e., costs were $6.14/tonne over and above rail at Vancouver and $25.36/tonne over and above rail at Thunder Bay). With the St. Lawrence pooling system in effect, an estimated maximum of 19 M tonnes of grains and oilseeds can flow out of west coast ports. If less grain would be exported through Thunder Bay and the St. Lawrence River system than with the present

pooling basis, lower trans-shipment costs from Thunder Bay to the lower St. Lawrence River terminals would be included in the CWB accounts for each grade of grain. This would increase the final payments (and, thus, final realized farm level prices) for each grain by the following estimated amounts in all regions of the prairie provinces, if the WGTA rates remained in effect:

wheat	$5.42/tonne
barley	$4.48/tonne
oats	$4.30/tonne

These estimates of increases in realized farm level prices are close to those reported by Dunlop and Lerohl (1989). They estimated $2 - $3 decrease in barley prices in Manitoba, $1.77 decrease in barley prices east of Scott, Saskatchewan and $1.90 increase in barley prices west of Scott with the St. Lawrence pooling method.

In all but one instance, farm level prices in Manitoba would be lower than in the Thunder Bay pool (original base) because transportation costs from Manitoba regions would increase more than the increase in final realized price of grains and oilseeds. The per tonne increases in shipping costs from each of the six regions in Manitoba, using the WGTA rate structure would be:

Region 1 (Brandon)	$6.18
Region 2 (Grandview)	$5.05
Region 3 (Portage La Prairie)	$7.24
Region 4 (Elm Creek)	$7.71
Region 5 (Winnipeg)	$8.01
Region 6 (Arborg)	$8.47

For example, in Region 6 of Manitoba, farm level wheat prices would be reduced from the original base (Thunder Bay pool) by $3.05/tonne ($8.47 - $5.42). In Region 2 of Manitoba, wheat prices would be increased by $.37/tonne in the St. Lawrence pooling system.

In this policy option, the Alberta Crow Offset Program was assumed to still be in place. All other assumptions regarding input prices, supply managed commodities and closed Canadian border used in previous analyses were in effect in this analysis.

CRAM and the input-output models were used to estimate the quantitative impacts of this St. Lawrence pooling system with the WGTA freight rate structure still in place.

9.1.2 St. Lawrence Pool With Full Compensatory Rates

Analysis of the St. Lawrence pool with full compensatory rates was compared to the original base (Thunder Bay pool with WGTA rates). A comparison could also be made between the WGTA and full compensatory rates, both with the St. Lawrence pool in effect.

In this policy option, all freight rates for grains and oilseeds increased to their full compensatory levels, assuming ten year efficiency gains of 14.1 percent in transportation and 12.4 percent in grain handling. Full compensatory freight rates under the St. Lawrence pooling system are in Table 4.2. The higher freight rates, relative to the WGTA rates, cause less grain to be produced, and thus less grain to be transported through Thunder Bay and the St. Lawrence River system. This means that lower total pooled costs would be required to transship grain from Thunder Bay to the lower St. Lawrence River terminals. The lower pooled cost means that CWB final payments to producers (and, hence, final realized farm level prices) would be higher than when WGTA rates were used in the St. Lawrence

pooling method. The projected increases in final realized prices of grains and flax on the prairies (calculations based on levels of production and exports) were:

wheat - an extra $2.95/tonne over the WGTA base,

barley - an extra $2.14/tonne over the WGTA base, and

flax - an extra $5.70/tonne over the WGTA base.

All other assumptions remain the same as in Option 3 for the CRAM and input-output analysis.

9.1.3 The Compensation Package (Manitoba - 3 Proposal)

In this option, producers would receive compensation in the form of a 15 year annuity of the Crow Benefit capitalized over a 25 year period. The average annual compensation from this scheme is the same as in Option 3 (i.e., 86 percent of $859.25 M). However, payment is made on the basis of eligible shipments rather than 80 percent of production which was the case in the analysis of Option 3.

It is assumed that the compensation scheme is designed to be production neutral, i.e., it would not influence future planting of crops.

All other assumptions remain the same for the CRAM and input-output model analyses.

9.2 Regional Production and Income

The St. Lawrence pooling method would have very minor effects on the cropping patterns in western Canada, if the WGTA rate structure was retained (Table 9.1). The largest impact would be in Manitoba where area planted to barley would decline by 3.2 percent. Manitoba could expect a slightly larger

Table 9.1: Area Planted In Major Crops ('000 ha.) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Crop	Base	St. Lawrence Pool		Change From Base (%)	
			WGTA	FCR*	WGTA	FCR*
B.C.	Wheat	40	40	40	0	0
	Barley/Oats	64	64	64	0	0
	Flax	0	0	0	0	0
	Canola	54	54	54	0	0
Alta.	Wheat	3074	3074	3074	0	0
	Barley/Oats	2363	2363	2363	0	0
	Flax	47	47	47	0	0
	Canola	1295	1295	1295	0	0
Sask.	Wheat	7454	7454	7462	0	0.1
	Barley/Oats	1446	1446	1390	0	-3.9
	Flax	221	221	249	0	12.7
	Canola	1560	1560	1552	0	-0.5
Man.	Wheat	1824	1830	1830	0.3	0.3
	Barley/Oats	720	697	697	-3.2	-3.2
	Flax	285	287	287	0.7	0.7
	Canola	506	510	510	0.8	0.8
W.Can.	Wheat	12391	12398	12405	0	0.1
	Barley/Oats	4592	4570	4514	-0.5	-1.7
	Flax	553	555	583	0.4	5.4
	Canola	3415	3419	3410	0.1	0.1

* Full compensatory rates.

area planted to wheat, flax and canola. With full compensatory rates, the area planted to barley in Saskatchewan would decrease by nearly four percent, while the area planted to canola would increase by nearly 13 percent.

Barley production would increase slightly in Saskatchewan if WGTA rates applied (Table 9.2), due to planting a larger proportion of the barley crop on summerfallow. With full compensatory rates, barley production would decrease in western Canada by 1.3 percent, while canola production would increase by more than five percent. Almost no change would occur in production of wheat and flax.

Summerfallow area would increase only slightly (mainly in Manitoba) with the St. Lawrence pooling option (Table 9.3).

Despite only small changes in cropping patterns across the prairies, the St. Lawrence pooling option would create quite a different distribution of income in the crop sector (Table 9.4). In Alberta, net margins in the crop sector were 4.5 percent higher than the base with WGTA and 7.3 percent higher than the base with full compensatory rates; this includes annuity payments in the case of full rates. In Saskatchewan and British Columbia, net margins increased from the base by more than two percent with WGTA and at least eight percent with full compensatory rates. On the other hand, net margins in Manitoba were reduced by more than one percent with WGTA rates and by more than six percent with full compensatory rates. The change in distribution of net margins of the crops sector reflects the changes in transportation costs for grains and oilseeds across the prairie provinces.

Corresponding to the changes in net margins, values of an extra hectare of cropland were affected differently in the three prairie provinces (Table 9.5). With WGTA rates, the value of one extra hectare was slightly lower than for the present method of pooling (base case) in Manitoba, and slightly higher than the base case in Saskatchewan. Significant increases in value over the base occurred in Alberta,

Table 9.2: Production of Major Crops ('000 tonnes) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Crop	Base	St. Lawrence Pool		Change From Base (%)	
			WGTA	FCR*	WGTA	FCR*
B.C.	Wheat	95	95	95	0	0
	Barley/Oats	142	142	142	0	0
	Flax	0	0	0	0	0
	Canola	49	49	49	0	0
Alta.	Wheat	6026	6026	6026	0	0
	Barley/Oats	6354	6354	6354	0	0
	Flax	65	65	65	0	0
	Canola	1439	1439	1439	0	0
Sask.	Wheat	12701	12702	12708	0	0.1
	Barley/Oats	3148	3187	3053	1.2	-3.0
	Flax	202	202	229	0	13.4
	Canola	2077	2077	2064	0	-0.6
Man.	Wheat	3551	3567	3567	0.5	0.5
	Barley/Oats	1863	1810	1810	-2.8	-2.8
	Flax	285	286	286	0.4	0.4
	Canola	551	555	555	0.7	0.7
W.Can.	Wheat	22372	22389	22395	0	0.1
	Barley/Oats	11508	11493	11359	-0.1	-1.3
	Flax	552	554	581	0.3	5.3
	Canola	4115	4120	4107	0.1	-0.2

* Full compensatory rates.

Table 9.3: Summerfallow ('000 ha.) in Base and Option 5 (St Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Base	St. Lawrence Pool		Change From Base (%)	
		WGTA	FCR*	WGTA	FCR*
B.C.	38	38	38	0	0
Alta.	1593	1593	1593	0	0
Sask.	5656	5657	5666	0	0.2
Man.	676	688	688	1.8	1.8
W.Can.	7962	7975	7984	0.2	0.3

* Full compensatory rates.

Table 9.4: Crop Sector Net Margins and Annuity Payments ($ million) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Base	St. Lawrence Pool		Change From Base (%)	
		WGTA	FCR*	WGTA	FCR*
B.C.	26	26.7	28.3	+2.7	8.8
Alta.	1419	1483	1523	+4.5	7.3
Sask.	2094	2144	2261	+2.4	8.0
Man.	718	708	674	-1.4	-6.1
W.Can.	4257	4362	4486	+2.5	5.4

* Full compensatory rates.

Table 9.5: Increases (Decreases) From Base in Annual Rental Value ($) of One Extra Hectare of Cropland Between Base and Option 5 (St. Lawrence Pool) With WGTA Rates

Region	Alberta	Saskatchewan	Manitoba
1	4.66	0.69	(1.48)
2	6.36	1.53	(0.02)
3	7.08	2.34	(2.65)
4	6.72	3.99	(3.07)
5	10.57	3.78	(3.60)
6	7.84	3.77	(3.47)
7	5.45	3.98	
8		1.56	
9		3.05	

due to the overall increase in prices of grains and oilseeds in that province. It is important to recall that these are estimates of changes in productive value of farm land, not changes in prices of farm land.

With full compensatory rates, the annual rental value of an extra hectare of land was much lower than the base for all regions in western Canada (Table 9.6). The reduction was especially significant for Manitoba, where land rental values were reduced by approximately $30 per hectare. However, even Alberta would expect reductions in rental value of farm land from imposition of full compensatory rates under the St. Lawrence pool.

Crop exports from the prairie region were only marginally affected with WGTA rates (Table 9.7). Exports of barley were slightly lower due to the decrease in production of that crop in Manitoba. Exports of wheat, canola and flax were slightly higher than with the present basis for pooling. With full compensatory rates, exports of barley from western Canada were reduced by almost eight percent, while exports of flax were increased.

Major changes occurred in Manitoba's beef sector with a St. Lawrence based pool. With WGTA rates, production of feeder cattle increased by 14 percent due to the large reduction in farm level price of feed grains in Manitoba (Table 9.8). Small decreases from the base occurred in Alberta and Saskatchewan under WGTA rates. In Alberta's case, the decrease from the base was due to the higher effective farm level price of barley in Alberta in this option ($4.48/tonne higher than the base). Feedlot production in Ontario fell by over six percent under the WGTA rate regime. The large increase in feedlot production in Manitoba reduced the eastward movement of feeder calves.

It appears that a major restructuring of the beef enterprise would occur if the St. Lawrence pooling option was combined with full compensatory rates (Table 9.8). Feedlot production increased substantially (by over 60 percent) in this situation in both British Columbia and Manitoba. Feedlot

Table 9.6: Decreases From the Base in Annual Value of One Extra Hectare of Cropland in St. Lawrence Pooling Option, Full Compensatory Rates

Region	Alberta	Saskatchewan	Manitoba
1	7.53	16.48	32.70
2	12.82	16.87	30.17
3	12.98	10.67	29.89
4	13.22	7.35	29.28
5	23.06	20.87	29.36
6	17.24	12.60	28.13
7	14.12	14.14	
8		19.31	
9		19.52	

Table 9.7: Crop Exports ('000 tonnes) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Crop	Base	St. Lawrence Pool		Change From Base (%)	
		WGTA	FCR*	WGTA	FCR*
Wheat	18690	18699	18705	0	0.1
Barley/Oats	3248	3215	2994	-1.0	-7.8
Flax	552	554	581	0.4	5.3
Canola	2186	2201	2136	0.7	-2.3
Total	24677	24669	24415	0	-1.1

* Full compensatory rates.

Table 9.8: Beef Herd Size ('000 head) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Category	Base	St. Lawrence Pool		Change From Base (%)	
			WGTA	FCR*	WGTA	FCR*
B.C.	Cows/Heifers	257.0	256.8	257.5	0	0.3
	Feeders	70.5	70.5	114.9	0	62.9
Alta.	Cows/Heifers	1582.0	1564.7	1564.7	-1.1	-1.1
	Feeders	1421.0	1408.0	1220.7	-0.9	-14.1
Sask.	Cows/Heifers	953.0	949.2	978.4	-0.4	2.7
	Feeders	298.9	298.9	315.2	0	5.5
Man.	Cows/Heifers	439.0	440.7	460.2	0.4	4.8
	Feeders	239.4	273.2	415.5	14.1	73.6
Ont.	Cows/Heifers	444.0	444.0	452.4	0	1.9
	Feeders	539.0	506.3	511.9	-6.1	-5.0
Que.	Cows/Heifers	211.0	211.0	211.0	0	0
	Feeders	68.1	68.1	68.1	0	0

* No changes occurred in other provinces.

Table 9.9: Beef Sector Net Margin ($ million) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Base	St. Lawrence Pool		Change From Base (%)	
		WGTA	FCR*	WGTA	FCR*
B.C.	43.7	43.4	43.7	-0.7	0
Alta.	544.7	541.4	511.4	-0.6	-6.1
Sask.	238.1	238.2	259.5	0	9.0
Man.	100.6	111.3	166.9	+10.6	65.9
Ont.	163.1	156.0	158.6	-4.4	-2.8
Que.	99.2	100.5	99.3	+1.3	0.1
Total	1189.4	1190.8	1239.7	0.1	4.2

* No changes occurred in other provinces.

production was also increased in Saskatchewan with the full compensatory rates and the St. Lawrence pooling option. Of great interest was the large drop (14.1 percent) in feedlot production in Alberta, due to the higher price of barley in the St. Lawrence pooling system. Ontario's feedlot production was also lower than in the base case with WGTA rates and the Thunder Bay pool.

With WGTA rates and the St. Lawrence pool, beef sector margins increased over the base by more than ten percent in Manitoba (Table 9.9). Small decreases in beef sector net margins occurred in British Columbia and Alberta. The net margin to Ontario's beef sector declined by 4.4 percent, due mostly to the decrease in feedlot activity. Quebec beef producers had a 1.3 percent increase in beef sector net margins, due to an increase in the price of low quality beef that was caused by the reduction in cow herds in western Canada.

With full compensatory rates, net margins in the beef sector showed the same startling patterns as did the production of beef. The net margin to the beef sector in Manitoba increased by 66 percent from the base case (Table 9.9). This was a result of the greatly increased production of feedlot beef and the substantially lower cost of feed grain in that province. The beef sector net margin was nine percent higher than the base in Saskatchewan with the full compensatory rates and the St. Lawrence pool. The net margins were lower in Alberta and Ontario, the latter in spite of the larger provincial breeding herd.

Hog production increased by a modest amount in Manitoba whereas it decreased slightly in Alberta and Saskatchewan with WGTA rates and the St. Lawrence pooling option (Table 9.10). With full compensatory rates, hog production in both Manitoba and Saskatchewan increased substantially, while it decreased by about one percent in Alberta. Changes in hog herd sizes in the various provinces reflect the differences in feed grain prices with the St. Lawrence pooling option.

Table 9.10: Hog Herd Size ('000 head) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Category	Base	St. Lawrence Pool		Change From Base (%)	
			WGTA	FCR*	WGTA	FCR*
B.C.	Sows	22.8	22.8	22.8	0	0
	Growers	198.4	198.4	198.6	0	0.1
Alta.	Sows	180.0	178.0	178.0	-1.1	-1.1
	Growers	1602.0	1584.6	1584.6	-1.1	-1.1
Sask.	Sows	87.0	86.7	88.5	-0.3	1.7
	Growers	722.1	719.9	734.6	-0.3	1.7
Man.	Sows	128.0	128.5	133.6	0.4	4.4
	Growers	1100.8	1105.2	1149.1	0.4	4.4

* No changes occurred in other provinces.

Table 9.11: Hog Sector Net Margin ($ million) in Base and Option 5 (St. Lawrence Pool) With WGTA and Full Compensatory Rates

Prov.	Base	St. Lawrence Pool		Change From Base (%)	
		WGTA	FCR*	WGTA	FCR*
B.C.	22.7	22.0	22.1	-3.1	-2.6
Alta.	175.7	171.2	172.9	-2.6	-1.6
Sask.	72.1	70.7	81.3	-1.9	12.8
Man.	162.7	165.1	192.2	1.5	18.1
W.Can.	433.2	429.0	468.5	-1.0	8.1

* No changes occurred in other provinces.

With WGTA rates, hog sector margins were lower than the base in British Columbia, Alberta and Saskatchewan; they were higher than the base in Manitoba (Table 9.11). Part of the difference in net margins can be explained by changes in hog production activities; the other part can be explained by changes in feed grain prices which were higher than the base in the three western provinces and lower than the base in Manitoba. With full compensatory rates, hog sector net margins increased substantially from the base in Manitoba and Saskatchewan.

9.3 Impacts on Secondary Industries

Impacts of the change in pooling on regional production were examined for two situations. First, the change in pooling base was compared with the current situation. No adjustments in the freight rates were made here. Second, freight rates were adjusted to reflect full compensatory rates along with the change in the pooling base. Results in both cases were compared with the basic situation of WGTA rates and Thunder Bay basis for pooling.

9.3.1 St. Lawrence Pool With WGTA Rates

The change in pooling base affected agricultural production and enterprise mix in the three prairie provinces differently. In aggregate, changes in value of agricultural production were positive for all three provinces, although the province of Alberta was favoured the most. As shown in Table 9.12, value of agricultural production in Alberta was improved by $59 M, most of which came through improved personal incomes. In Saskatchewan, the change was estimated at $49 M, with a very small change in the purchases of non-agricultural products. In Manitoba a change of $2.2 million was estimated, with changes occurring both in input purchases as well as personal income levels.

Table 9.12 Change in Direct Requirements* of Agriculture (Thousand Dollars) in Base and Pooling Option (WGTA Rates)

(Pooling Minus Base)

Commodities	Manitoba	Saskatchewan	Alberta	Total
Agricultural Prod.	-73.19	26.67	66.88	20.36
Manufactured Prod.	-935.88	136.91	375.59	-423.38
Construction	-14.93	17.60	23.00	25.67
Utilities	-15.35	5.12	-232.05	-242.28
Financial Services	-36.62	-0.32	-627.86	-664.80
Other Services	114.69	-38.76	18.85	94.78
Transfer Margins	16.87	-4.19	0.20	12.88
Personal Income	3,197.29	49,070.84	60,029.50	112,297.63
Indirect Taxes	-49.50	14.99	-630.68	-665.19
Total	2,203.38	49,228.86	59,023.43	110.455.67

* In purchasers' prices, including imports.

Table 9.13 Change in Direct and Indirect Gross Production (Thousand Dollars) in Base and Pooling Option (WGTA Rates), by Province and Industry

(Pooling Minus Base)

Sector	Manitoba	Saskatchewan	Alberta	Rest of Canada	Total
Agriculture	1,879	49,107	59,212	-12	110,186
Forestry & Fish.	0	-2	-21	-33	-56
Mining	1	25	59	-9	76
Manufacturing	-66	-122	3	-438	-623
Construction	-19	14	2	-9	-12
Transportation*	-56	-10	163	-16	81
Utilities	-24	2	-221	-33	-276
Trade	-29	-18	31	-55	-71
Fin. Services	-20	-35	-305	-285	-645
Other Services	22	-16	3	-42	-33
Total	1,688	48,945	58,926	-932	108,627

* Includes transportation margins, communications and storage.

All the changes in input demand by agriculture produced an output effect of $108.6 M, with Alberta leading among the Canadian provinces (Table 9.13). Among the industries most adversely affected were financial services and manufacturing in virtually all the provinces. However, even these changes were not large, in relative terms.

Employment impacts resulting from the changes in pooling base were mainly in the form of agricultural employment. Reduction in non-agricultural employment in the three prairie provinces was estimated at 4.2 person-years (Table 9.14). In fact, these industries outside the prairie provinces (particularly those in Ontario and Quebec) had a relatively larger loss in employment (7.7 person-years) compared to the three prairie provinces.

The situation for some prairie provinces is worsened when one takes into account losses in processing of live animals. For Canada as a whole, there is a loss of $22 M in the level of gross production, $18.7 M in the prairies and $3.5 M in the rest of Canada (Table 9.15). Most of the losses occur in Alberta, with Manitoba and Saskatchewan virtually balancing each other; as Manitoba gains and Saskatchewan loses in almost equal magnitude.

Changes in employment parallel those in gross output. For Canada as a whole, this loss is estimated at 101 person-years, most of which occurs in Alberta. The rest-of-Canada region also registers a loss of 34 person-years, primarily due to lower inter-regional trade with the prairie provinces.

9.3.2 St. Lawrence Pool With Full Rates and Compensation

In this situation, farmers pay full compensatory rates with the St. Lawrence pooling base and receive compensation in the form of an annuity. The net result of all these changes considered together was to increase the value of agricultural production in the three prairie provinces by $429.2 M. The largest

Table 9.14 Change in Direct and Indirect Employment (Person-Years) in Base and Pooling Option (WGTA Rates), by Province

(Pooling Minus Base)

Province	Agriculture	Non-Agriculture	Total
Manitoba	31.2	-0.8	30.4
Saskatchewan	697.0	-1.1	695.9
Alberta	945.4	-2.2	943.2
Rest of Canada	-1.2	-7.7	-8.9
Total	1,672.4	-11.8	1,660.6

Table 9.15 Impact on Regional Economy (Excluding Agriculture) of Processing Beef Cattle and Hogs, Option 5A

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Production (Mill.$)	2.72	-2.59	-18.69	-3.47	-22.03
Gross Domestic Product at Factor Cost (Mill.$)	0.49	-0.50	-3.73	-1.37	-5.21
Employment (Person-Years)	16.6	-15.1	-68.8	-33.9	-101.2

part of this increase was experienced in Saskatchewan, where personal incomes changed by $204.5 M, and intermediate input purchases decreased by $4.8 M (Table 9.16). Decreases in utilities, and manufactured product purchases were noted for all the three provinces.

The overall (direct plus indirect) change in gross output for Canada was estimated to be $419.2 M (Table 9.16). Industries that seem to be adversely affected in this situation are manufacturing and utilities. Estimates show that gross output in Saskatchewan increased by $196 M, which includes a loss of $3.6 M in non-agricultural industries. In Alberta, the value of output was estimated at $142.7 million, followed by Manitoba at $82.3 million. The non-agriculture sectors in the three prairie provinces as well as in other Canadian provinces showed a decline.

The above change in gross output translates into an increase of 6,508 person-years of employment. The non-agricultural employment was reduced by 48 person-years (Table 9.17).

With agricultural processing, the prairie provinces are impacted even more favourably. Under the option of St. Lawrence pooling with full compensatory rates and compensation to farmers, both Manitoba and Saskatchewan gain in terms of increased economic activity. Value of gross production is increased in these two provinces by $49 M and employment by 293 person-years (Table 9.18). Relatively larger gains are recorded in Manitoba. The value of production here rose by $29.5 M and employment by 180 person-years. In contrast, under this option, agricultural processing levels in Alberta remain unchanged.

9.4 Summary of Financial Impacts

Net margins in agriculture were increased above the base by $108 M with WGTA rates and by $319 M with full compensatory rates (Table 9.19). Gains were experienced in all western provinces, except

Table 9.16 Change in Direct and Indirect Gross Production (Thousand Dollars) in Pooling Option With Full Compensatory Rates

(Pooling Minus Base)

Sector	Manitoba	Saskatchewan	Alberta	Rest of Canada	Total
Agriculture	82,856	199,732	146,699	-98	429,189
Forestry & Fish.	0	1	-25	-33	-57
Mining	-4	-308	-1,537	-32	-1,881
Manufacturing	-100	-545	-1,032	-1,299	-2,976
Construction	-216	-481	-32	-17	-746
Transportation*	-54	-106	23	-124	-261
Utilities	-553	-1,787	-256	-56	-2,652
Trade	-43	-114	-136	-203	-496
Fin. Services	95	-317	-760	-249	-1,241
Other Services	304	31	-177	118	276
Total	82,275	196,106	142,767	-1,993	419,155

* Includes transportation margins, communications and storage.

Table 9.17 Change in Direct and Indirect Employment (Person-Years) in Pooling Option with Full Compensatory Rates

(Pooling Minus Base)

Province	Agriculture	Non-Agriculture	Total
Manitoba	1,375.5	1.2	1,376.7
Saskatchewan	2,837.7	-20.5	2,817.2
Alberta	2,345.3	-15.0	2,330.3
Rest of Canada	-2.9	-13.6	-16.5
Total	6,555.6	-47.9	6,507.7

Table 9.18: Impact on Regional Economy (Excluding Agriculture) of Processing Beef Cattle and Hogs, Option 5B

Particulars	Manitoba	Sask.	Alberta	Other Canada	Total
Gross Production (Mill.$)	29.45	19.52	0	11.18	60.15
Gross Domestic Product at Factor Cost (Mill.$)	5.26	3.75	0	4.16	13.17
Employment (Person-Years)	179.6	113.7	0	110.7	404.0

Table 9.19 Summary of Farm Level Net Margins in Western Canada from St. Lawrence Pool Option, WGTA and Full Compensatory Rates, by Sector and Province ($ million)

Province	Sector	Base	WGTA	Change (%)	Full Rates	Change (%)
B.C.	Crops	26.0	26.7	2.7	28.3	8.8
	Beef	43.7	43.4	-0.6	43.7	0
	Hogs	22.7	22.0	-3.1	22.1	-2.6
	Total	92.4	92.1	-0.3	94.1	1.8
Alta.	Crops	1,419.0	1,483.0	4.5	1,523.0	7.3
	Beef	544.7	541.4	-0.6	511.4	-6.1
	Hogs	175.7	171.2	-2.6	172.9	-1.6
	Total	2,139.4	2,195.6	2.6	2,207.3	3.2
Sask.	Crops	2,094.0	2,144.0	2.4	2,261.0	8.0
	Beef	238.1	238.2	0	259.5	9.0
	Hogs	72.1	70.7	-1.9	81.3	12.8
	Total	2,404.2	2,452.9	2.0	2,601.8	8.2
Man.	Crops	718.0	708.0	-1.4	674.0	-6.1
	Beef	100.6	111.3	10.6	166.9	65.9
	Hogs	162.7	165.1	1.5	192.2	18.1
	Total	981.3	984.4	0.3	1,033.1	5.3
West Canada	Total	5,617.3	5,725.0	1.9	5,936.3	5.7

British Columbia under the WGTA regime. Crop sector net margins were increased in the three western provinces whereas net margin in Manitoba's crop sector was reduced. Net margins to the livestock sectors in British Columbia and Alberta were lower than the base, but net margins to Manitoba's livestock sectors were substantially increased.

With WGTA rates, the value of the objective function in CRAM was $105 M higher than in the base. Combined with a reduction in government payments of $2 M, the direct economic gain to Canadian society was $107 M. All of it went to agricultural producers in western Canada.

With full compensatory rates, the value of the objective function in CRAM was $422 M higher than in the base. However, government payments were $71 M higher than in the base ($739 M for annuity, less $620 M for Crow benefit, less $48 M for reductions in other government programs). The combined effect was an increase in direct economic welfare to Canadian society of $343 M, most of which went to western Canadian agricultural producers.

The secondary impacts under WGTA rates were relatively small in terms of GDP, as shown in Table 9.13. The non-agricultural GDP was reduced under this option by $0.8 M, almost half of which was in the rest of Canada. The major part of the increase in agricultural GDP was the result of increased personal incomes to producers.

When agricultural processing industries and their indirect impacts are included, there is a loss of $5.2 M in terms of Canada's GDP (Table 9.15). All regions, except Manitoba, register a decline. Even in Manitoba the gains are very small - approximately $500,000.

With full compensatory rates a major change in provincial GDP was experienced in Saskatchewan ($202.5 M), followed by that in Alberta ($146.7 M) and Manitoba ($82.8 M). Non agricultural GDP was reduced by $5.1 M (Table 9.20).

When one includes agricultural processing industries, the gain to various regions (as measured by GDP) under this option is estimated at $13 M. Manitoba and Saskatchewan stand to gain $5.3 and $3.8 M respectively, whereas an additional $4 M worth of GDP is created in other non-prairie provinces, particularly Ontario and Quebec.

As noted in previous analyses, income-induced effects of this situation are not included here. Given the relatively large change in personal incomes, these impacts are expected to be large.

Table 9.20 Change in Direct and Indirect Gross Domestic Product at Factor Cost (Thousand Dollars) in Pooling Option with Full Compensatory Rates

Province	Agriculture	Non-Agriculture	Total
Manitoba	83,199	-400	82,793
Saskatchewan	204,445	-1,901	202,544
Alberta	148,734	-2,058	146,676
Rest of Canada	-43	-701	-744
Total	436,335	-5,066	431,269

10. ANALYSIS OF IMPACTS FROM POLICY OPTIONS

10.1 Impacts on the Crops Sector

Relatively small impacts could be expected on cropping patterns in the prairie provinces from shifting from WGTA to full compensatory freight rates for grains and oilseeds. A summary of expected plantings and production of grains and oilseeds in western Canada for the various policy options analyzed in this study are presented in Table 10.1.

In general, production of the high volume, low value crops (wheat and barley) would decrease and production of the low volume, high value crops (flax and canola) would increase if freight rates were raised to compensatory or 81 percent of compensatory levels. Summerfallow would generally increase with the higher freight rates and lower farm level prices of grains and oilseeds. However, all of these changes were relatively small, reflecting the limited opportunities for most crop land in western Canada.

Exports of barley from western Canada would decline to a greater extent than the reduction in production of this crop with most higher freight rate policies. This is due to the higher requirements for barley to feed the larger number of beef animals and hogs that accompany the lower prices of feed grains. Changes in exports of canola and flax would be of similar magnitude to the changes in production of these crops.

A summary of expected financial impacts on the crop sectors of western provinces from implementation of the various policy options is provided in Table 10.2. No impacts on the crop sectors would occur in Option 1 - establishment of Crow Offset Programs in Saskatchewan and Manitoba. Net margins in the crop sectors would be significantly decreased in Option 2 where producers face the payment of full compensatory freight rates but receive no compensation for loss of the Crow Benefits.

Table 10.1 Summary of Expected Impacts on the Crops Sector in Western Canada From Adoption of Alternative Policies on Freight Rates for Prairie Grains and Oilseeds (Changes from Base Case)

	Option 1 Offsets	Option 2 No Effic. No. Comp.	Option 3 ADA	Option 4 Gilson	Option 5A Pooling WGTA	Option 5B Pooling FCR1
			PLANTINGS (%)			
Wheat	0	-1.8	0.1	0.1	0	0.1
Barley	0	-2.4	-1.3	-1.3	-0.5	-1.7
Flax	0	4.7	4.1	4.1	0.4	5.4
Canola	0	-1.1	-0.2	-0.2	0.1	0.1
			PRODUCTION (%)			
Wheat	0	-1.5	-1.0	0.1	0	0.1
Barley	0	-1.8	-1.2	-0.9	-0.1	-1.3
Flax	0	4.3	5.3	4.3	0.3	5.3
Canola	0	0.9	1.4	-0.3	0.1	-0.2
			SUMMERFALLOW (%)			
Alta	0	3.2	3.2	0	0	0
Sask.	0	4.6	0.2	0.2	0	0.2
Man.	0	1.7	1.1	1.0	1.8	1.8
			EXPORTS (%)			
Wheat	0	-1.9	-1.2	0.1	0	0.1
Barley	0	-11.9	-7.6	-6.0	-1.0	-7.8
Flax	0	4.3	5.3	4.3	0.4	5.3
Canola	0	-1.1	0.8	-1.6	0.7	-2.3

[1] This comparison is between full compensatory rates, with the St. Lawrence pool and WGTA rates with the Thunder Bay pool.

Table 10.2 Expected Financial Impacts on the Western Canadian Crops Sector From Alternative Freight Rate Policies for Grains and Oilseeds (Changes from Base Case).

	Option 1 Offsets	Option 2 No Effic. No. Comp.	Option 3 ADA	Option 4 Gilson	Option 5A Pooling WGTA	Option 5B Pooling FCR1
			NET MARGINS ($M)[2]			
B.C.	0	-6	0.5	0.9	0.7	2.3
Alta.	0	-283	55.0	23.0	64.0	104.0
Sask.	0	-390	64.0	68.0	50.0	167.0
Man.	0	-109	43.0	32.0	-10.0	-44.0
			AVERAGE VALUE OF LAND ($/Ha.)			
ALTA						
Black	0	-40.60	-30.01	-2.75	7.74	-16.85
Dk.Br.	0	-30.79	-22.73	1.52	6.54	-13.02
Br.	0	-20.39	-15.28	2.42	4.66	-7.53
SASK						
Black	0	-23.96	-17.42	4.72	2.27	-19.04
Dk.Br.	0	-22.89	-17.08	3.19	3.09	-14.53
Br.	0	-17.61	-13.21	3.11	3.17	-9.01
MAN						
Black	0	-21.82	-15.60	7.63	-2.38	-29.92

[1] This comparison is between full compensatory rates, with the St. Lawrence pool and WGTA rates with the Thunder Bay pool.

[2] Net margins include the annuity payments of Options 3 and 5B.

A very interesting result in this study is the extent to which net margins (and annuity payments) in the crop sectors were improved in Options 3 and 4 where crop producers had to pay all or most of the full cost of transporting their grains and oilseeds but received all of their Crow Benefits either in the form of an annuity (Option 3 - ADA Proposal) or most of their Crow Benefits directly from the government in Option 4 (Gilson Proposal). Net margins in the crop sectors of Alberta and Saskatchewan were also vastly improved in the St. Lawrence pooling option (Option 5). However, Manitoba's crop sector suffered a decline in net margins with a switch to the St. Lawrence pooling method, due to the higher freight rates that would be charged Manitoba crop producers.

It should be kept in mind that Options 3 and 5B involve compensation for only a fixed time period (suggested to be 15 years). At the end of this time period, compensation to producers would end and total returns in the crop sector would fall substantially.

Crop producers in the prairie provinces would lose substantial equity in Policy Options 2, 3 and 5B (Table 10.2). However, in Options 3 and 5B, they were compensated for loss of the Crow Benefits. The largest negative impact on land values would be in the black soil zone, especially in Alberta, where the productive potential of the land is the highest. Smaller, but significant, losses in land values would occur in Option 3 where improvements are made in efficiencies of handling and transporting grains and oilseeds. Except for the black soil zone in Alberta, all other regions in the prairie provinces may experience a small rise in the value of land with the Gilson Proposal (Option 4). This would happen because the economic benefits accruing from the increases in efficiency of handling and transporting grains and oilseeds, as well as from changes in cropping patterns, offset the increase in producer costs of transportation. Land values may increase in a minor way in Alberta and Saskatchewan with St. Lawrence pool and WGTA rates (Option 5A). In this option, land values in Manitoba were declined modestly. However in Option 5B (St. Lawrence pool with full compensatory rates) land values fell significantly in Manitoba and the black soil zones of Saskatchewan.

The changes in land values calculated in this study represent the differences from the base in annual net margins. Though it is tempting to calculate the capitalized value of these differences in net margins and predict the changes in land prices, this should be avoided. Many factors affect the price of land; productive value is only one of these factors. Compensation payments received by producers for loss of the Crow Benefit may partly be used to expand operations or to consolidate farms, thus reducing the downward pressure on land prices.

10.2 Impacts on the Beef Sector

Expansion of the beef herd is closely associated with reductions in the farm level price of feed grains. The lower the farm level feed grain prices, the larger the expansion in the beef herd.

A summary of expected impacts on the beef sector in each of the affected provinces, by policy option, is presented in Table 10.3. With the Thunder Bay pooling method, the largest expansion in the beef breeding herd came in Option 2, where grain producers had to pay full compensatory rates and no efficiency gains occurred in the grain handling and transportation system. In Option 3, grain producers faced full compensatory rates, but the grain handling and transportation system experienced reductions in real unit costs. In this policy option, beef herds expanded by over two percent in Saskatchewan and Manitoba as well as by a small percentage in British Columbia and Alberta. Under the Gilson proposal, grain producers pay 81 percent of total freight costs. Expansion of the beef herds in Saskatchewan and Manitoba, while substantial, was less than in Option 3. Introduction of a Crow Offset Program in Manitoba and Saskatchewan (Option 1) contributed to about a two percent increase in size of the beef breeding herds in those two provinces.

The largest increase in the Manitoba beef breeding herds occurred with a change in the pooling basis from Thunder Bay to St. Lawrence in the case where grain producers were required to pay full

Table 10.3 Summary of Expected Impacts on the Beef Sector in Canada from Adoption of Alternative Freight Rate Policies for Prairie Grains and Oilseeds (Changes from Base Case).

Province	Option 1 Offsets	Option 2 No Effic. No. Comp.	Option 3 ADA	Option 4 Gilson	Option 5A Pooling WGTA	Option 5B Pooling FCR[1]
			BEEF COW HERDS (%)			
B.C.	0	0.5	0.4	0.3	0	0.3
Alta.	0	1.4	0.3	0	-1.1	-1.1
Sask.	2.7	3.7	2.8	1.9	-0.4	2.7
Man.	1.8	3.0	2.1	1.4	0.4	4.8
Ont.	0	1.9	1.9	1.9	0	1.9
Quebec	0	0	0	0	0	0
			BEEF FEEDERS (%)			
B.C.	0	-0.3	-0.3	-0.1	0	62.9
Alta.	1.0	0.6	0	-0.1	-0.9	-14.1
Sask.	5.3	7.4	5.4	4.0	0	5.5
Man.	3.1	16.7	15.7	15.2	14.1	73.6
Ont.	0.1	-5.9	-5.9	-5.9	-6.1	-5.0
Quebec	0	0	0	0	0	0
			NET MARGINS ($M)			
B.C.	-1.1	-1.1	-0.4	0.1	-0.3	0
Alta.	-1.8	20.9	7.9	1.4	-3.3	-33.3
Sask.	9.1	18.7	15.3	12.7	0.1	21.4
Man.	3.6	16.8	14.6	13.3	10.7	66.3
Ont.	-1.1	-9.3	-7.1	-6.7	-7.1	-4.5
Quebec	-0.6	-1.3	-0.6	-0.4	1.3	0.1

[1] This comparison is between full compensatory rates, with the St. Lawrence pool and WGTA rates with the Thunder Bay pool.

compensatory rates. The large increase in Manitoba was caused by the substantial reduction in the farm level price of barley.

The 1.9 percent increase in the size of beef breeding herd in Ontario, in policy options where western feed grain prices declined, was caused by expected increases in the price of feeder calves in that province. In western Canada, herd changes were based on changes in feed grain prices. However, in eastern Canada, feed grain prices in recent years have been based mostly on a corn import basis. Thus changes in farm level prices for grain in western Canada would not be expected to have a direct effect on feed grain prices in eastern Canada. However, lower feed grain prices in western Canada would stimulate feedlot activity in the prairie provinces, leading to fewer feeder animals shipped eastward to fill Ontario feedlots. It was considered that feedlot operators in Ontario would bid higher prices for feeder animals under this situation. This was a problem for the CRAM analysis, since prices of intermediate products are not made explicit in the model. CRAM works on the basis of prices for final products; all production is arranged on the basis of minimizing opportunity costs of production. The amount of increase in bid prices of feeder animals in eastern Canada was estimated on the basis of differences in "shadow prices" (value of an extra feeder animal) in Ontario between situations of WGTA and full compensatory freight rates in western Canada. The change in shadow price of a feeder animal was estimated from preliminary computer runs and, when combined with an estimated response elasticity coefficient, produced the estimate of a 1.9 percent increase in herd size in Ontario.

Large increases can be expected in the feedlot sectors of Manitoba and Saskatchewan if farm level prices for feed grains decline. The increase would be especially large in Manitoba if the pooling system was changed as well. With the St. Lawrence pooling system and full compensatory rates, Alberta would suffer a large (14.1 percent) reduction in its feedlot sector. In all policy options tested (except Option 1 - Crow Offsets in all prairie provinces) excess capacity would emerge in Ontario feedlots.

Associated with increases in beef production and lower costs of feed grains in Manitoba and Saskatchewan from full compensatory rates would be large increases in net margins to the beef sectors of those provinces. The increase was more than 10 percent in Manitoba for all policy options except Option 1; the estimated increase was nearly 66 percent for the option with full compensatory rates and St. Lawrence pooling. Alberta had more modest increases in beef sector net margins for most policy options except where the St. Lawrence pooling system was implemented. Ontario producers experienced about a four percent reduction in net margins for most policy options, due mostly to the reduction in size of the feedlot sector. The net margin to the beef sector in Quebec was largely unaffected by changes in western grain transportation policies.

10.3 Impacts on the Hog Sector

A summary of expected impacts of the various policy options on the hog sector is presented in Table 10.4. The increase in hog numbers with the higher freight rates for grains and oilseeds was relatively modest. The largest increase in hog production with the Thunder Bay pool occurred in the second option where no efficiency gains accompanied the higher freight rates. Hog production increased more in Manitoba and Saskatchewan than in Alberta because of the adjustment that occurred in hog production in Alberta in the late 1980s , partly in response to the Crow-Offset Program.

Table 10.4 Summary of Expected Impacts on the Hog Sector in Western Canada from Adoption of Alternative Freight Rate Policies for Prairie Grains & Oilseeds (Changes from Base Case)

Province	Option 1 Offsets	Option 2 No Effic. No. Comp.	Option 3 ADA	Option 4 Gilson	Option 5A Pooling WGTA	Option 5B Pooling FCR[1]
			SOWS (%)			
B.C.	0	0	0	0	0	0
Alta.	0	1.4	0.3	0	-1.1	-1.1
Sask.	1.7	2.4	1.7	1.3	-0.3	1.7
Man.	0	3.0	1.0	1.3	0.4	4.4
			GROWERS (%)			
B.C .	0	0.2	0.1	0.1	0	0.1
Alta.	0	2.4	0.3	0	-1.1	-1.1
Sask.	1.7	2.4	1.7	1.2	-0.3	1.7
Man.	0	2.7	1.0	1.3	0.4	4.4
			NET MARGINS ($M)			
B.C.	0	0.1	0.1	0.1	-0.7	-0.6
Alta.	0	21.8	12.5	6.6	-4.5	-2.8
Sask.	5.4	12.9	12.9	6.7	-1.4	9.2
Man.	0	18.0	7.6	8.8	2.4	29.5

[1] This comparison is between full compensatory rates, with the St. Lawrence pool and WGTA rates with the Thunder Bay pool.

Net margins to the hog sectors in all three prairie provinces increased substantially for all policy options where full compensatory rates were charged for transporting grain and the Thunder Bay pool was in effect (Options 2, 3 and 4). The increased net margins were a result of increased hog production and lower feed costs for producing them. In Option 1, the only impact on hog production came in Saskatchewan where that province's Crow Offset Program would reduce grain prices and stimulate a hog supply response.

Expected impacts on the hog sector of changing the pooling basis from Thunder Bay to the lower St. Lawrence River are shown in the last two columns of Table 10.4. With the WGTA rate structure in place, the Manitoba hog sector experienced small gains. Net margins in the three western provinces were reduced by 2-3 percent as a result of higher feed prices and, in the cases of Alberta and Saskatchewan, by a reduction in hog output. With the St. Lawrence pool in place, switching from WGTA to full compensatory freight rates greatly benefitted the hog sectors of Manitoba and Saskatchewan, but had slight negative impacts on the hog sectors of the two western provinces. This happened in response to the much higher freight rates (and consequently lower feed grain prices) in Manitoba and eastern Saskatchewan.

In conclusion, hog producers in the four western provinces would gain substantially from changing the freight rate structure from WGTA to full compensatory rates if the Thunder Bay pool remained in effect. With the St. Lawrence pool in effect, hog producers in the three western provinces would lose a small amount under the WGTA freight rate structure. Hog producers in Manitoba and Saskatchewan stand to make tremendous gains if full compensatory rates are instituted under the CWB proposal for a St. Lawrence pooling system.

10.4 Impacts on Government Programs and Total Economic Welfare

A summary of expected direct financial impacts of the policy options that were analyzed in this study is provided in Table 10.5.

Corrections of distortions in the agricultural economy of western Canada provided economic gains to the country. All policy options would result in an improvement over the base case in overall economic benefits to the country; (see the bottom line of Table 10.5). The largest gain in economic welfare would come from Option 5B, where full compensatory rates were used in conjunction with the St. Lawrence pool; the net economic gain in this option was $351 M. Two distortions were corrected in this policy option: producers of grains and oilseeds in western Canada were required to pay full costs of transporting their crops to terminal locations and the distribution of total costs of transporting grains and oilseeds to terminals more closely represented the true costs from various regions in western Canada. Policy options 3 and 4 resulted in approximately the same amount of benefits to the Canadian economy: about $225 M. Even Option 1, institution of Crow Offset Programs in Saskatchewan and Manitoba were beneficial to the total economy. That policy would correct some of the distortions caused by the WGTA in those two provinces.

Although the economy gained in overall terms from all of the policy options, the distributions of income among individual provinces or between crop and livestock sectors differed among the various options. In Option 2 (full compensatory rates with no compensation for loss of the Crow Benefit), Alberta producers of crops, beef and hogs lost a combined $240 M in net margins; Saskatchewan producers lost $358 M in net margins. The big winners in Option 2 would be the taxpayers through greatly reduced government expenditures. In Option 3 (ADA proposal), producers in Alberta, Saskatchewan and

Table 10.5 Summary of Expected Financial Impacts in Western Canada from Adoption of Alternative Freight Rate Policies for Grains and Oilseeds (Change from Base Case).

Province	Option 1 Offsets	Option 2 No Effic. No.Comp.	Option 3 ADA	Option 4 Gilson	Option 5A Pooling WGTA	Option 5B Pooling FCR[1]
TOTAL NET MARGINS ($M)						
B.C.	-1.1	-7.0	0.2	1.1	-0.3	1.7
Alta.	-1.8	-240.3	75.4	31.0	56.2	67.9
Sask.	14.5	-358.4	88.6	87.4	48.7	197.6
Man.	3.6	-74.2	69.9	54.1	3.1	51.8
GOV'T PAYMENT TO CROPS ($M)						
B.C.	0.0	-4.3	1.2	0.5	0.0	0.8
Alta.	0.0	-198.4	63.5	-5.5	8.6	37.2
Sask.	10.5	-325.6	28.6	0.9	19.2	59.7
Man.	3.2	-92.9	28.0	8.4	-27.8	17.3
GOV'T PAYMENT TO LIVESTOCK ($M)						
B.C.	0.0	0.1	0.1	0.0	0.0	0.0
Alta.	0.0	-40.1	-41.6	-41.8	-1.1	-46.9
Sask.	0.0	3.0	2.5	1.8	-0.2	2.5
Man.	0.0	1.0	0.9	0.7	0.1	1.3
Ont.	0.0	-0.4	-0.4	0.3	-0.3	-0.1
Que.	0.0	-1.1	-1.1	-1.1	0	-1.1
OBJECT. FUNCT.[2]	30.0	-556.0	315.0	189.0	105.0	422.0
GAINS TO SOCIETY[3]	16.3	103.0	233.0	225.0	107.0	351.0

[1]This comparison is between full compensatory rates with the St. Lawrence pool and WGTA rates with the Thunder Bay pool.
[2]This includes gains to producers and consumers in all regions of Canada.
[3]Total gains include changes in value of objective function in CRAM adjusted for differences in government payments.

Manitoba gained $75 M, $89 M and $70 M, respectively. In Option 4 (Gilson proposal), producers in Alberta gained less than half what they would in Option 3, whereas producers in Saskatchewan gained approximately the same as in Option 3. Thus, even though gains in total economic welfare between Options 3 and 4 were similar, the distribution of these gains differed greatly.

10.5 Impacts on Secondary Industries

It was expected that different freight rate policies for western grains and oilseeds would lead to different levels of impacts on various regions. Results of this study support this. Not only were the level of impacts different under different options, but the regional distribution of incidence was different as well. For example, institution of Crow Offset Programs in Saskatchewan and Manitoba benefitted these two provincial economies, with negligible impacts on the non-prairie region. Since this policy would effectively represent a countervail of the present Crow Offset Program in Alberta, the results suggest that the two provinces would gain about $18.2 M of agricultural GDP, and another $0.3 M of non-agricultural GDP.

The worst case scenario is represented in Option 2, where producers pay full compensatory rates, receive no compensation, and no gains in the efficiency of moving grains are reflected in freight rates. All three prairie provinces as well as the other Canadian provinces, notably Ontario and British Columbia, would experience large decreases in the level of agricultural GDP. Under this option, there was an increase in the production of beef cattle and hogs. However, changes in these sectors were not large enough, particularly in the province of Saskatchewan, to appreciably change the regional results. Under this option, there were some positive impacts on the non-agricultural GDP, through increased agricultural processing activity related to livestock slaughtering and meat processing. However, other types of agricultural processing, such as dehydrated alfalfa products, may be adversely affected under

this option. This is because under the full compensatory rates, higher freight costs to Vancouver may change the competitive position of regions such as Manitoba and northwestern Saskatchewan.

Under the other two options where producers receive compensation, value-added impacts would primarily occur through increases in producers' income levels. Changes in the enterprise mix and level were small, yielding very small changes in secondary impacts on the non-agricultural sectors. A summary of impacts measured in terms of GDP levels under the various policy options is presented in Table 10.6.

When additional processing activity resulting from the changes in livestock numbers is included, regional impacts improve under most policy options except 5A--change to St. Lawrence Pool with WGTA rates. The largest impacts are under option 2, where farmers pay full compensatory rates and receive no compensation (Table 10.7). However, even these impacts are not large enough to compensate some regions, in terms of non-agricultural activity, for the loss in regional GDP resulting from changes in agricultural production (Table 10.8).

It should be noted that this analysis does not include any possible impacts from changes in the level of taxes to support the government programs. In those options where total government payments are reduced, the savings to government could be reflected either in reduced levels of taxation or increased government expenditures in other areas. In either case, some additional economic impacts could be expected.

Table 10.6 Summary of Secondary Impacts on Regional Economies of Agricultural Production for Various Policy Options

	CHANGE IN GDP AT FACTOR COST ($M)							
	Manitoba		Saskatchewan		Alberta		Rest of Canada	
Option	Ag	Non Ag	Ag	Non Ag	Ag	Non Ag	Ag	Non Ag
1	3.6	0.1	14.6	0.2	-1.8	0.3	-	-0.3
2	-74.3	-1.0	-360.8	-7.3	-243.3	-13.7	-2.7	-12.7
3	30.2	0.4	115.5	0.5	88.8	11.1	0.1	7.1
4	42.4	-	87.3	-0.5	8.0	-0.4	-0.2	-0.6
5A	3.1	-0.1	49.0	-	60.3	-0.3	-	-0.4
5B	83.2	-0.4	204.4	-1.9	148.7	-2.1	-	-0.7

Table 10.7 Summary of Secondary Impacts of Agricultural Processing Under Policy Options on Regional Economies

	CHANGE IN GDP AT FACTOR COST ($m)			
Option	Manitoba	Sask.	Alberta	Rest of Canada
1	1.2	3.3	0.0	2.1
2	3.5	4.5	10.1	7.4
3	3.2	3.4	1.0	3.4
4	0.8	2.4	0.0	1.5
5A	0.5	-0.5	-3.7	-1.4
5B	5.3	3.8	0.0	4.2

Table 10.8 **Summary of Total Secondary Impacts (Agricultural Production Plus Processing) Under Policy Options on Regional Economies**

Option	CHANGE IN GDP AT FACTOR COST ($M)							
	Manitoba		Saskatchewan		Alberta		Rest of Canada	
	Ag	NonAg	Ag	NonAg	Ag	NonAg	Ag	NonAg
1	3.6	1.3	14.6	3.5	-1.8	0.3	0.0	1.8
2	-74.3	2.5	-360.8	-2.8	-243.3	-3.6	-2.7	5.3
3	30.2	3.6	115.5	3.9	88.8	12.1	0.1	10.5
4	42.4	0.8	87.3	1.9	8.0	-0.4	-0.2	0.9
5A	3.1	0.4	49.0	-0.5	60.3	-4.0	0.0	-1.8
5B	83.2	4.9	204.4	1.9	148.7	-2.1	0.0	3.5

11. IMPLICATIONS OF POLICY OPTIONS

11.1 On Primary Agriculture

Changes in the WGTA freight rate structure for prairie grains and oilseeds would have direct impacts on the primary agricultural industry in Canada. Obviously, farm incomes and incentives for production would be affected the most in western Canada. However, other areas of Canada could be affected as well if production levels are changed in western Canada. In the following two subsections, the major implications of changes to the WGTA on primary agriculture in all areas of Canada are examined.

11.1.1 Western Canada

Increasing the effective freight rates for transporting grains and oilseeds out of the prairie region would change the incentives for production of all agricultural commodities in western Canada. In particular, there is little doubt that there would be in western Canada:

1) less production of wheat and barley,
2) more production of canola and flax,
3) more summerfallow,
4) lower total exports of grains and oilseeds,
5) more production of beef and pork, and,
6) more opportunities for diversification into high value, low volume specialty crops.

A major finding in this study is that the magnitudes of these changes would not be large. Most regions in the prairie provinces have only limited opportunities to shift into alternative forms of agricultural

production. On the other hand, the results are somewhat sensitive to overall price levels for grains and oilseeds. As discussed in Chapter 6, price levels lower than those in existence in 1988-89, would have greater impacts on the crops sector in western Canada, in terms of both production patterns and net margins, than impacts shown in the results sections of this study.

The production of beef and pork in western Canada would be stimulated by a decrease in the farm level price of feed grains. If crop producers were required to pay a higher proportion, or all, of the real cost of transporting their products to market, farm level prices of grains would be reduced. Yet, it is likely that if an increase occurred in the producer cost of transporting grains to export terminals, the farm level prices of the grains may not be reduced by the full extent of the increase in freight rates and expansion of the western Canadian livestock industry would be blunted.

Part of the additional costs may be absorbed by the market. There are a number of reasons why this may occur. First, any decrease in the farm level price of feed grains will provide an incentive to produce less feed grains and more livestock that will consume feed grains. The reduced quantity supplied and increased quantity demanded would put upward pressure on grain prices and, perhaps, keep them from falling to the full extent of the increase. Second, competitive forces in the transportation industry may provide downward pressure on railway freight rates. Trucking grain for longer distances than at present may be an attractive alternative for many producers if they are forced to pay the entire cost of transporting the grains by railway. Third, the railways may be encouraged to increase the efficiency at which they transport grain to the terminals, especially if the transportation industry is deregulated at a faster rate than has been occurring. Presumably, some of the increased efficiency will be passed to the grain producers, who are the consumers of the transportation service. This would keep the farm level grain price from decreasing as much since the increase in freight rates would not be as high as would appear with the current configuration of the grain transportation system. Fourth, if producers had an incentive to haul their crops by truck over longer distances, elevator companies would see an

advantage to rationalize their grain handling systems at a faster pace than has been occurring. Larger elevators with increased turnover may result in substantial cost efficiencies for the elevator companies. If some of these reductions in real costs of operation are passed to the grain producers, the increase in total costs of handling grain would be reduced; therefore, the drop in the farm level price of grains would be mitigated. Fifth, the Canada-U.S. Trade Agreement provides for the possibility of an open border with the United States for the importation of grains. If this were to happen, the landed price of U.S. grains would effectively set limits on the range over which prices of Canadian grains could move.

Removing the Crow Benefit subsidy would have substantial income effects on the primary agricultural industry of western Canada. Crops sectors in western Canada would be severely affected in terms of both net margins from cropping operations and value of the land base. Livestock sectors in western Canada would gain from the availability of less expensive feed grains; however, gains to the livestock sector would be much less than losses to the crops sector in the absence of the Crow Benefit subsidy.

In the public debate over changes to the WGTA, much attention has been paid to the issue of compensating grain and oilseed producers if they were to lose the Crow Benefit. Two proposals for a buy-out of the capitalized value of the Crow Benefit were analyzed in this study: one by the Agricultural Diversification Alliance and one by the Manitoba Advisory Council. Both proposals were for a 15-year annuity and were intended to be production neutral; they differed in the basis on which the compensation would be calculated for each producer. Each of these schemes would have slightly different results for individual producers in the various regions of western Canada.

The issue of dilution of the Crow Benefit was not addressed in this study. Dilution refers to the situation where compensation is paid on land which has not previously been used to grow export crops, thus diluting the amount of compensation available for land that has been used for production of these crops. However, the elimination of distortions in price signals for grains and oilseeds, as a result of

charging producers full compensatory rates, would likely result in significant gains in efficiency of production and transportation, thus offsetting much of the concern over dilution. This was shown most clearly in the analysis of the Gilson Proposal, which would not change the amount of subsidy in the WGTA, but would pay 81 percent of the subsidy directly to producers. The analysis showed that an extra $124 M could accrue to the crops sector in western Canada with this arrangement. The gains come from the increases in efficiency associated with exposure to the true market price signals by farmers, railway companies and grain handling companies.

Modification of the Canadian Wheat Board pooling system to better reflect the true costs of transporting grains and oilseeds to west and east coast terminal locations would create significant overall gains to primary agriculture in western Canada. However, the profit incentives could create quite different patterns of production than have bene observed in the past. Livestock production in Manitoba and eastern Saskatchewan would likely be substantially expanded, due to the lower farm level prices of feed grains. Higher farm level grain prices in Alberta could cause a major reduction in the feedlot industry of that province. On the other hand, the existing livestick processing infrastructure on the prairies would probably mitigate (at least partially) these predicted changes in patterns of livestock production.

11.1.2 Central and Eastern Canada

Quebec producers, especially those represented by Union des Producteurs Agricole (UPA), the umbrella farm organization in the province, have been especially outspoken in their opposition to changes in the WGTA freight rate structure. Indeed, the UPA has been widely credited for forcing the federal government in 1983 to change from its previously announced intention of following Gilson's recommendation to pay the largest proportion of the Crow Benefit directly to producers, to the WGTA method which was eventually passed by Parliament (Ewins, 1990).

It is the contention of Quebec producers that, just as the existence of the former Crow rate and the subsequent WGTA rate structure have caused distortions in the agricultural industry in the prairie provinces, so too have they caused distortions in Quebec. They feel that change to the existing freight rate structure could have negative impacts on Quebec.

Quebec would not like to see the Crow Benefit paid directly to western producers, as it would in the Gilson Proposal. It is felt that the lower grain prices on the prairies would stimulate livestock production in western Canada, which would give western livestock producers an unfair advantage. It has been argued that the increased livestock production would cause lower prices for everyone. This has been shown to be true in this study for low quality beef, but not for high quality beef and pork.

Quebec producers are also concerned that payment of the Crow Benefit directly to grain producers would be interpreted as a subsidy to livestock producers by the U.S. government. The possibility that the U.S. may impose countervailing duties on beef exported to the U.S. and that they may increase the level of countervailing duties on hog and pork exports as a result of paying the subsidy directly to western producers puts the Quebec producers in double jeopardy, according to the UPA.

A large part of the opposition to changes in the WGTA is caused by Quebec's perception of equity. Quebec producers regard any direct payment to western producers, regardless of whether or not it is a perpetual payment, an annuity, or a one-time buyout of the capitalized value of subsidy, as an unfair advantage to western producers (Ewins 1990). The UPA insists that, on equity grounds, all other producers in Canada should receive an equivalent payment. The possibility that compensation would be given to western producers only and that the funds would come from federal coffers (to which Quebec contributes), is seen by Quebec producers to be a provocation and a boost to unfair advantage.

The current position by Quebec is that only two options meet with their approval: status quo and a phase-out of the program without compensation. It is felt that lower land values in the western provinces with an end to the subsidized freight rates will have repercussions in Quebec where the value of livestock production may decline. Compensating western producers would give western Canadian producers an additional advantage.

Quebec was treated as a separate region in this study; this permitted an analysis of effects on Quebec (as well as on other provinces) from any changes to the WGTA rate structure. Downward sloping demand functions for livestock products in CRAM captured the general equilibrium effects of any increases in livestock production in the western provinces.

It was determined in the study that Quebec and Ontario would suffer modest reductions in net margins to their livestock sectors if prairie grain prices were reduced. As such, these provinces may have some claim for compensation from the federal government if changes are made to the WGTA freight rate regime. It is not possible to tell whether or not any increased livestock production in western Canada, due to different methods of paying the Crow Benefit to western grain producers, would lead to increased trade sanctions by the United States.

11.2 On Regional Development in the Prairie Provinces

Development of the prairie provinces would be dependent on the type of policy that was used to change freight rates for grains and oilseeds. Without any compensation to producers, there would be an immediate reduction in the income levels of farmers. This would have an immediate effect on the regional economies in western Canada in terms of new investment in agriculture, adoption of new technologies, survival of rural communities, and the general pattern of migration of people from regions or provinces, such as Saskatchewan. More mature and diversified economies such as the one in Alberta,

may be able to withstand such income changes without showing an appreciable impact on rural communities. In the long run, if these profitability levels continue, there would be a major realignment of input prices, particularly for land, until the agricultural industry reaches a new state of equilibrium. Even then, during the interim period there would be a large social cost of making adjustments, and a major transfer of wealth away from existing farmers.

Under options where producers receive compensation, changes in income levels would be positive (at least to the end of the annuity payout period), which would result in positive impacts on the rest of the regional economy. However, the magnitudes of income changes are relatively small so that major changes in community viability and out-migration would not occur.

11.3 On Canada-U.S. Trade Agreement

Any policy review which is examining a major agricultural subsidy, such as the WGTA, must be conducted within the context of the pressure which is being put on the institutions which govern international trade in agricultural commodities. This must be done whether the subsidy in question is going to be retained or significantly altered. Even if abandonment of the subsidy is being considered, careful consideration should be given to the possible role of the subsidy as a bargaining "chip" in international negotiations. Two major international changes may have ramifications for the WGTA: (1) the Uruguay Round of the GATT negotiations and (2) the implementation of the Canada-U.S. Trade Agreement (CUSTA).

While the CUSTA makes provision for the negotiation of bilateral definitions of trade distorting subsidies, little progress has, as yet, been made. As a result, Canadian subsidies are judged according to U.S. trade law. Over the last decade U.S. commercial policy procedures, while loosely conforming to the GATT, have become much more favourable to those who wish to bring countervail actions. As

currently constituted, the WGTA has not been formally challenged by the U.S. If the method of payment were to be changed so that prairie grain farmers were to receive payments directly, such as in the Gilson Proposal (Option 4), then the new subsidy would likely come under more scrutiny in the U.S. The U.S. uses a specificity test to determine whether domestic subsidies are trade distorting. If a subsidy is "provided to a specific industry or enterprise or group of industries or enterprises", i.e., it is not generally available, then it can be countervailable. While it is true that the WGTA is not generally available, either geographically or to all agricultural products, if payments were made directly to farmers then this would be much more obvious. The U.S. law also has very "soft" provisions on proving injury so that if the WGTA was paid to the producers it might well fail the test and become subject to countervail.

Traditionally, there has been little trade between the two countries in the major grains covered by the WGTA. This is because the Canadian Wheat Board felt that in order to facilitate its management of the Canadian grain system, U.S. imports should be excluded from the Wheat Board Area. This is accomplished via the licensing of imports of Canadian Wheat Board commodities. In effect, this has meant that imports from the U.S. have been virtually prohibited. In return, it appears that the Canadian Wheat Board has voluntarily restricted exports of grains to the U.S.

Under the provisions of the CUSTA, Canada will permanently discontinue its licensing requirements if subsidy levels in the U.S. and Canada are adjudged equal. The CUSTA has laid out a very detailed method of how the subsidy calculations will be made. The subsidies for wheat and barley have not been calculated as being equivalent thus far, although wheat was close in 1989. If Canadian producers were directly receiving the WGTA subsidy following the discontinuance of import licensing requirements, and it was directly tied to offshore exports, then one might expect countervail actions by U.S. producers.

In the intermediate run, a phase out of the WGTA paid directly to producers would probably be safe from countervail so long as the licences are in effect. Compensation for loss of the Crow Benefit in the form of an annuity which was not tied to export performance such as the ADA and Manitoba-3 Proposals (Options 3 and 5B), could be acceptable as compensation would be based on past production and hence, would not lead to direct supply responses. If the border was open, having the annuity might considerably reduce administration and enforcement costs because there would be no incentive for U.S. producers to move grain to Canadian rail points to take advantage of the transportation subsidies.

11.4 On GATT

At the time this study was conducted, the GATT negotiations were in the final stages of the Uruguay Round and no firm indications were available on the eventual outcome of the negotiations. This section outlines possible GATT results and their implications. Agricultural protection has been a contentious issue among the negotiating countries.

Canada has tabled the WGTA as an input subsidy in the negotiations. The Cairns Group, of which Canada is a member, the United States, and many other countries have sought ways to reduce the levels of subsidization of agricultural products because they may lead to increased production, and as a result, a lower market share for competitors. The subsidies can also enable countries to sell their agricultural products in the international market place at prices lower than they would be able to otherwise.

This analysis showed that the size of the supply response to the WGTA subsidy to be relatively small. However, the WGTA is highly visible internationally. In particular, as it means that farmers realize a higher price for exported commodities, it may be the type of policy that the GATT negotiators believe is trade distorting. If the current round of trade negotiations are successful, allowable subsidies may have to be "decoupled" so as not to provide an incentive to increase production. Options 3 (ADA

Proposal) and 5B (St. Lawrence Pool with Full Compensatory Rates) represent "decoupled" methods of providing the benefits of the subsidy. Also, Option 4 (Gilson Proposal) would result in very small distortions in western Canadian crop production. This suggests that a "buy out" of the Crow Benefit, through either a lump sum payment or an annuity, might be more acceptable in the GATT. As the determination of the size of the payment individual farmers would receive would be determined on the basis of past rather than future production, it could not be considered as having provided an incentive to increase production.

The evolution of the international trading system may to call into question a large number of existing Canadian agri-food sector policies and programs. The size and visibility of the WGTA clearly makes it a concern to other countries. As a result, if a change to the WGTA is contemplated, then it could represent a powerful bargaining chip at the negotiations. By altering the WGTA to remove any trade distorting features, a strong message could be sent to trading partners that Canada is serious about reform.

11.5 On the Environment

Soil degradation problems on the prairies are affected by many grain marketing policies and institutional arrangements. Subsidizing the transportation of export grains from the prairie provinces encourages the cropping of marginal land. This is the kind of land that, if left in its natural state, could be used as a pasture resource for the beef sector. This is especially serious in the brown soil zone, an area characterized by frequent shortages of moisture. The degradation of organic matter, increased salinity and erosion of soil in the marginal areas of crop production is an unhappy consequence of subsidized freight rates for grains.

The environmental ledger from a particular government program seldom has debits without credits however. Because of the higher farm level grain prices from subsidized freight rates, producers have had an incentive to use longer rotations and to summerfallow less. It is well known that a reduction in summerfallow has beneficial effects on soil tilth and organic matter, which makes erosion from wind and water less likely. Of course, higher levels of cropping on stubble land requires the use of additional inorganic fertilizers, herbicides and insecticides, many of which can have undesirable environmental effects.

Replacement of WGTA rates with any of the policy options analyzed in this study could have environmental impacts. Policy Options 2, 3, 4 and 5B decrease farm level prices of grain and can be expected to cause some marginal land to shift from cereal or oilseed production to forage production, to feed the expected larger herds of beef cattle in western Canada. This would be beneficial for conservation of the land resources. The return of marginal land to forage production may also be helpful in maintaining wildlife populations. However, some areas in the prairie provinces, particularly in the brown soil zone, have limited opportunities for substitution of crops.

Lower farm level prices can also be expected to shorten rotations. This would have undesirable implications for soil conservation, particularly for soil salinity.

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