

Transportation Issues in Canadian Agriculture II: Analysis of the Western Grain Transportation and Feed Freight Assistance Acts

K.K. Klein
Department of Economics
University of Lethbridge
Lethbridge, AB T1K 3M4

S.N. Kulshreshtha
Dept. of Agricultural Economics
University of Saskatchewan
Saskatoon, SK S7N 0W0

B. Stennes
Private Consultant
White Rock, BC

G. Fox
Dept. of Agricultural Economics
and Business
University of Guelph
Guelph, ON N1G 2W1

W.A. Kerr
Department of Economics
University of Calgary
Calgary, AB T2N 1N4

J. Corman
Policy Branch
Agriculture Canada
Ottawa, ON K1A 0C5

The two most important government transportation programs affecting Canadian agriculture are the Western Grain Transportation Act (WGTA) and the Feed Freight Assistance Act (FFA). The WGTA provides an annual subsidy for the movement of grains and oilseeds from the prairie provinces to export terminal locations. The FFA subsidizes the transportation of feed grains from feed surplus provinces to feed deficit provinces.

The initial purpose of these subsidy programs was to assist particular groups of producers: prairie crop producers who must sustain high transportation costs moving their products to market and livestock producers in feed

Funding for this study was provided by Agriculture Canada. The authors wish to thank an Agriculture Canada Advisory Committee for their helpful comments.

deficit regions who face large transportation costs when purchasing one of their most important inputs. However, in recent years, these programs have faced increased scrutiny, partly because of their cost to the federal treasury and partly because of a worry that they are creating economic distortions in Canadian agriculture.

Agriculture Canada began a major review of all its policies and programs that affect agriculture in December 1989. One of the most controversial parts of that review was the transportation programs. A government appointed Transportation Committee considered in a qualitative way a number of alternatives to the present programs (Agriculture Canada 1990). This paper reports on a comprehensive economic study of many of the alternatives to the present WGTA and FFA programs that were suggested by the Transportation Committee.

The economic analysis was conducted on linear programming and input-output models described in Klein et al. (1993) using the Canadian Regional Agriculture Model (CRAM). No repeat of the models' structure is provided in this paper. Instead, the focus of this paper is the estimated economic impacts of alternatives to the WGTA and FFA programs.

The two sets of analyses are presented separately. For each of the analyses, the presentation is organized as follows: some background is provided on the issue, the policy alternatives are described in detail, the economic results are presented and, finally, the implications are described. Some concluding thoughts are provided in the final section of the paper.

The Western Grain Transportation Debate: Background

The Government of Canada passed the Crow's Nest Pass Act in 1897. Under terms of this Agreement, the Canadian Pacific Railway committed itself to transport prairie grains to the Lakehead at "a reduction in the Company's present rates and tolls on grains and flour from all points ... west of Fort William to Fort William and Port Arthur and all points east ...; and that no higher rates than such reduced rates or tolls shall be charged after the dates mentioned..." (Government of Canada 1897). The Railway Act of 1925 extended the "Crow" rates to the Canadian National Railway. In 1927, legislation extended the coverage of statutory rates to the export of grains and flour through west coast ports (Vancouver and Prince Rupert) as well as Churchill. These statutory rates were later extended to cover dozens of other products, ranging from oilseeds to dehydrated alfalfa.

Initially designed to stimulate the growth of western Canadian agriculture, the statutory freight rates have more recently been identified as a factor inhibiting diversification and growth in the region due to inflation in real costs of moving grains. Producers of export grains on the prairies have not paid the full costs of transporting products to export locations. This has increased the on-

farm price of these grains and, therefore, the costs of one of livestock producers' most important inputs (feed grains). This price distortion has led to lower livestock production in the prairie provinces, which in turn has discouraged activities like feed processing, livestock transportation and meat processing in the region. Critics of the statutory rates for grain have also argued that the lower freight rates do not increase the net incomes of prairie grain producers in the long run, since the value of the subsidy becomes capitalized in land prices.

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 that the transportation system would be able to meet the requirements of anticipated increases in grain exports. Changes to the Railway Act were proposed following studies by the Hall Royal Commission (1977), the Snively Royal Commission (1977) and Gilson (1982). The proposals generated a great deal of controversy. Livestock producers, anticipating lower feed grain prices, supported increases in producer costs for grain transportation. If the freight rate subsidy was not to be dismantled, livestock producers preferred that payments be made directly to the grain producers who would then pay the entire cost of transporting grain. This would lower farm level grain prices. The Prairie Pools, however, 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 and perpetuate the transportation of grain by rail.

Farm organizations in Quebec supported the continuation of the transportation subsidy for western grain if it was paid directly to the railways (Ewins 1990). They argued that producers in both eastern and western Canada had made investment decisions on the basis of the Crow freight rate structure and that any change in relative grain prices between the two parts of Canada would injure producers who had made these investments. They also argued that a subsidy paid directly to western grain 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 the Parliament of Canada. This Act institutionalized the payment of a Crow Benefit to the railways.¹ The WGTA provided funds for the railways to maintain and upgrade investments in the grain transportation system. 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 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.

1. The payment was initially \$658 million per annum, but increased in nominal terms to \$720 million by 1989-90.

Following the passage of the WGTA, several producer 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 introduced in 1985 the Alberta Feed Grain Market Adjustment Program (AFGMAP), a subsidy for the use of feed grains by livestock producers designed to offset the damage that low freight rates were inflicting on Alberta's livestock industry. In the fall of 1989, the Saskatchewan and Manitoba governments introduced their own Crow Offset subsidies, partly to offset the negative impacts on their livestock sectors from the Alberta offset subsidy.

Description of Western Grain Transportation Options

Three alternatives to the present WGTA freight rates regime are analyzed in this paper.

Option 1. Full Compensatory Rates, No Compensation, No Efficiency Gains

In this option, producers pay full compensatory rates to transport grain and oilseeds to terminal locations. These rates are based on estimated costs of transportation as determined by the National Transportation Agency. It is assumed in this analysis that no changes would occur in the regulatory framework for grain handling and transportation and, therefore, no efficiency gains would occur. Producers were assumed to receive no compensation for the loss of the Crow benefit. Crow offset programs in the three Prairie provinces were removed.

As unrealistic as the specified conditions for this option may be, they provide a useful benchmark. This option provides an estimation of the maximum economic impact that could be expected for the livestock sector in western Canada, since farm level grain prices decrease by the full amount of the increase in freight rates and crop producers receive no compensation for loss of the subsidy.

Option 2. The Agricultural Diversification Alliance (ADA) Proposal

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 might not fall by the full difference between WGTA and full compensatory freight rates. If producers faced full compensatory rates for transporting grains, farmers along high traffic lines would be less inclined to support high cross subsidies to the low volume lines and 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. 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 with about half of the gain retained by the railways; the other half reflected in lower shipping rates.

In this option, it was assumed that efficiency gains from deregulation of grain transport would lead to cost reductions for transportation of 1.5 percent per year for a ten year time period.² It was further assumed (based on Askin 1988) that real costs of operating the average primary elevator in western Canada would decrease by 12.5 percent over a 10 year period.

In this option, producers would be compensated for loss of the Crow benefit in the form of a bond that is based on the capitalized value of the Crow Benefit. The present value of 25 years of Crow Benefit, based on an interest rate of 10 percent,³ is \$7.5 B; it would be paid out as an annuity over 15 years. Individual 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.⁴

Option 3. The Gilson Proposal

The Gilson proposal was based on a government commitment to pay the 1982 grain transportation revenue shortfall (defined as the difference between the Crow and full compensatory rates), as well as half of the inflationary cost increases for grain transportation in excess of three percent and all of the inflationary cost increases over six percent, in perpetuity. The payment would initially go entirely to the railways, but eventually would be shifted to producers. After eight years 81 percent would be paid directly to producers and 19 percent would be paid to the railways. The Gilson proposal called for the

-
2. This neglects any increased trucking and road maintenance costs which may be incurred if additional rail lines are abandoned.
 3. This is the interest rate suggested for use by Treasury Board when calculating the present value of a future stream of benefits.
 4. Compensation to producers is calculated as the product of the Entitled Tonnes, the Increased Rail Rate, and the 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 the WGTA divided by the total tonnes of eligible grains applied for by producers. The ADA estimated the dilution factor to be approximately 0.80.

payment to producers to be made on the basis of their cultivated acreage, adjusted for productivity.

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

Estimated Impacts of WGTA Options

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 are presented in Table 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. Summer fallow 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 2. Gross margins (the difference between gross income and variable costs of production) in the crop sector decreased considerably in Option 1 where producers faced the payment of full compensatory freight rates but received no compensation for loss of the Crow Benefit.

The extent to which gross margins (plus annuity payments) in the crop sector improved in Options 2 and 3 is an important result. It should be kept in mind that Option 2 involves compensation for a fixed time period, here assumed 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 by the amount of the annuity.

Crop producers in the prairie provinces would lose substantial equity through a reduction in land values under Options 2 and 3 (Table 2). 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.

TABLE 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	Option 2	Option 3
	Full Rates No Compensation	ADA Proposal	Gilson Proposal
PLANTINGS (%)			
Wheat	-1.8	0.1	0.1
Barley	-2.4	-1.3	-1.3
Flax	4.7	4.1	4.1
Canola	-1.1	-0.2	-0.2
PRODUCTION (%)			
Wheat	-1.5	-1.0	0.1
Barley	-1.8	-1.2	-0.9
Flax	4.3	5.3	4.3
Canola	0.9	1.4	-0.3
SUMMER FALLOW (%)			
Alberta	3.2	3.2	0.0
Saskatchewan	4.6	0.2	0.2
Manitoba	1.7	1.1	1.0
EXPORTS (%)			
Wheat	-1.9	-1.2	0.1
Barley	-11.9	-7.6	-6.0
Flax	4.3	5.3	4.3
Canola	-1.1	0.8	-1.6

Smaller, but significant, losses in land values would occur in Option 2, which allows for improvements in efficiencies of handling and transporting grains and oilseeds. In this option, crop producers would receive an annuity to compensate them for loss of the subsidy. 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 3). 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.

The changes in land values calculated in this study represent the capitalized differences from the base in annual gross margins. Although it is tempting to take these changes in capitalized values and use them to predict 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 oper-

TABLE 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 Full Rates No Compensation	Option 2 ADA Proposal	Option 3 Gilson Proposal
GROSS MARGIN (\$M) ^a			
British Columbia	-6.0	0.5	0.9
Alberta	-283.0	55.0	23.0
Saskatchewan	-390.0	64.0	68.0
Manitoba	-109.0	43.0	32.0
AVERAGE VALUE OF LAND (\$/Ha.)			
Alberta			
Black	-40.60	-30.01	-2.75
Dark Brown	-30.79	-22.73	1.52
Brown	-20.39	-15.28	2.42
Saskatchewan			
Black	-23.96	-17.42	4.72
Dark Brown	-22.89	-17.08	3.19
Brown	-17.61	-13.21	3.11
Manitoba			
Black	-21.82	-15.60	7.63

a. Gross margins include the annuity payments of Option 3.

ations or to consolidate farms, thus reducing the downward pressure on land prices.

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 prices of feed grain, 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 3. The largest expansion in the beef breeding herd occurred in Option 1, where grain producers had to pay full compensatory rates and there were no efficiency gains in the grain handling and transportation system. In Option 2, grain producers faced full compensatory rates, but the grain handling and transportation system had 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

TABLE 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 Full Rates No Compensation	Option 2 ADA Proposal	Option 3 Gilson Proposal
BEEF COW HERDS (%)			
British Columbia	0.5	0.4	0.3
Alberta	1.4	0.3	0.0
Saskatchewan	3.7	2.8	1.9
Manitoba	3.0	2.1	1.4
Ontario	1.9	1.9	1.9
Quebec	0.0	0.0	0.0
BEEF FEEDERS (%)			
British Columbia	-0.3	-0.3	-0.1
Alberta	0.6	0.0	-0.1
Saskatchewan	7.4	5.4	4.0
Manitoba	16.7	15.7	15.2
Ontario	-5.9	-5.9	-5.9
Quebec	0.0	0.0	0.0
GROSS MARGINS (\$M)			
British Columbia	-1.1	-0.4	0.1
Alberta	20.9	7.9	1.4
Saskatchewan	18.7	15.3	12.7
Manitoba	16.8	14.6	13.3
Ontario	-9.3	-7.1	-6.7
Quebec	-1.3	-0.6	-0.4

less than in Option 2.

The 1.9 percent increase in the size of the beef breeding herd in Ontario was caused by expected increases in the price of feeder calves in that province. In central 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 central 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 estimated that feedlot operators in Ontario would bid higher prices for feeder animals under this situation.

Relatively large increases can be expected in the feedlot sectors of Manitoba and Saskatchewan if farm level prices for feed grains decline. In all policy options considered 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 gross margins to the beef sectors of those provinces. The increase was more than 10 percent in Manitoba for all policy options. Alberta had more modest increases in beef sector gross margins for Options 2 and 3. Ontario beef producers had about a seven percent reduction in gross margins due mostly to the reduction in size of the feedlot sector. The gross margin to the beef sector in Quebec was largely unaffected by changes in western grain transportation policies.

Impacts on the Hog Sector

A summary of expected impacts of the various policy options on the hog sector is presented in Table 4. The increase in hog numbers with the higher freight rates for grains and oilseeds was relatively modest. As expected, the largest increase in hog production occurred in the first 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 had already occurred in hog production in Alberta in the late 1980s, partly in response to the Crow-Offset Program.

Gross margins to the hog sectors in all three prairie provinces increased substantially for all policy options. The increased gross margins were a result of increased hog production and lower feed costs for producing them.

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 5. All policy options would result in an improvement over the base case in overall economic benefits (see the bottom line of Table 5). The largest gains in economic welfare, about \$225 million annually, would come from Options 2 and 3, where producers were required to pay either full or 81 percent of compensatory rates. About \$100 million was added to total economic welfare from Option 1, where producers were required to pay full compensatory rates but no efficiencies were realized in the handling and transporting of grains and oilseeds.

The distribution of income among individual provinces and between crop and livestock sectors differed among the various options. In Option 1 (full compensatory rates with no compensation for loss of the Crow Benefit), Alberta producers of crops, beef and hogs lost a combined \$240 million in gross margins, while Saskatchewan producers lost \$358 million. The big winners in Option 1 were the taxpayers, through greatly reduced government expenditures. In Option 2 (ADA proposal), producers in Alberta, Saskatchewan

TABLE 4 Summary of Expected Impacts on the Hog Sector in Western Canada from Adoption of Alternative Freight Rate Policies for Prairie Grains and Oilseeds (Changes from Base Case)

Province	Option 1	Option 2	Option 3
	Full Rates No Compensation	ADA Proposal	Gilson Proposal
SOWS (%)			
British Columbia	0.0	0.0	0.0
Alberta	1.4	0.3	0.0
Saskatchewan	2.4	1.7	1.3
Manitoba	3.0	1.0	1.3
GROWERS (%)			
British Columbia	0.2	0.1	0.1
Alberta	2.4	0.3	0.0
Saskatchewan	2.4	1.7	1.2
Manitoba	2.7	1.0	1.3
GROSS MARGINS (\$M)			
British Columbia	0.1	0.1	0.1
Alberta	21.8	12.5	6.6
Saskatchewan	12.9	12.9	6.7
Manitoba	18.0	7.6	8.8

and Manitoba gained \$75 million, \$89 million and \$70 million, respectively. In Option 3 (Gilson proposal), producers in Alberta gained less than half what they would in Option 2, whereas producers in Saskatchewan gained approximately the same as in Option 2. Thus, even though gains in total economic welfare in Options 2 and 3 were similar, the distribution of these gains differed greatly.

Impacts on Secondary Industries

Farm level impacts of various policy options on grain and livestock production would have several spin-off effects on the prairie economies. Increased production of livestock (both beef cattle and hogs) lead to more meat processing within the prairie region. In addition, changes in income levels of producers and others employed by agricultural processing firms would contribute to increased economic activity in the region. Expected impacts of the policy options are shown in Table 6.

The worst case is Option 1, where producers pay full compensatory rates, receive no compensation, and no gains are realized in the efficiency of moving

TABLE 5 Summary of Expected Financial Impacts in Western Canada from Adoption of Alternative Freight Rate Policies for Prairie Grains and Oilseeds (Changes from Base Case)

Province	Option 1	Option 2	Option 3
	Full Rates No Compensation	ADA Proposal	Gilson Proposal
TOTAL GROSS MARGINS (\$M)			
British Columbia	-7.0	0.2	1.1
Alberta	-240.3	75.4	31.0
Saskatchewan	-358.4	88.6	87.4
Manitoba	-74.2	69.9	54.1
GOVERNMENT PAYMENT TO CROPS (\$M)			
British Columbia	-4.3	1.2	0.5
Alberta	-198.4	63.5	-5.5
Saskatchewan	-325.6	28.6	0.9
Manitoba	-92.9	28.0	8.4
GOVERNMENT PAYMENT TO LIVESTOCK (\$M)			
British Columbia	0.1	0.1	0.0
Alberta	-40.1	-41.6	-41.8
Saskatchewan	3.0	2.5	1.8
Manitoba	1.0	0.9	0.7
Ontario	-0.4	-0.4	0.3
Quebec	-1.1	-1.1	-1.1
Objective Function ^a	-556.0	315.0	189.0
Gains to Society ^b	103.0	233.0	225.0

a. This includes gains to producers and consumers in all regions of Canada.

b. Total gains include changes in the value of the objective function in CRAM adjusted for differences in government payments.

grains. 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 Gross Domestic Product (GDP). Under this option, there was an increase in 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 activities 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 change the competitive position of regions such as Manitoba and northwestern

TABLE 6 Summary of Secondary Impacts on Regional Economies of Agricultural Production for Various Policy Options

Province/Option	CHANGE IN GDP AT FACTOR COST (\$M)		
	Agriculture	Process	Non-Agriculture
Manitoba			
Option			
1	-74.3	3.5	-1.0
2	30.2	3.2	0.4
3	42.4	0.8	n.a.
Saskatchewan			
Option			
1	-360.8	4.5	-7.3
2	115.5	3.4	0.5
3	87.3	2.4	-0.5
Alberta			
Option			
1	-243.3	10.1	-13.7
2	88.8	1.0	11.1
3	8.0	0.0	-0.4
Rest of Canada			
Option			
1	-2.7	7.4	-12.7
2	0.1	3.4	7.1
3	-0.2	1.5	-0.6

Saskatchewan.

Under Options 2 and 3, value-added impacts would occur primarily through increases in producers' income levels. Changes in the level and composition of enterprises were small, yielding very small secondary impacts on the non-agricultural sectors.

When additional processing activity resulting from the changes in livestock numbers is included, regional impacts improve under most policy options. The largest impacts are with Option 1, where farmers pay full compensatory rates and receive no compensation. However, even these impacts in non-agricultural activity are not large enough to compensate some regions for the loss in regional GDP resulting from changes in agricultural production.

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.

Implications of WGTA Policy Options

Primary Agriculture

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 in western Canada, there would be:

1. less production of wheat and barley;
2. more production of canola and flax;
3. more summer fallow;
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 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.

The production of beef and pork in western Canada would rise in response to 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 fall. It is likely that if the producer cost of transporting grains to export terminals increased, the farm level prices of the grains may not fall by the full extent of the increase in freight rates. This would moderate the expansion of the western Canadian livestock production.

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

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. One of the proposals which has received much discussion in the prairie provinces is for a buy-out of the capitalized value of the Crow Benefit, as recommended by the Agricultural Diversification Alliance (1989). This proposal, which calls for a 15-year annuity is designed to be production neutral. The second option analyzed in this paper included this type of a buy-out provision. It generated positive, though modest, economic impacts in the prairie provinces while compensating present landowners for the drop in asset values that would occur with removal of the subsidy.

The issue of dilution of the Crow Benefit was not addressed here. Dilution refers to the situation where compensation is paid on land which has not been used previously 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 (Option 3), 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 million 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.

Regional Development in the Prairie Provinces

Our results indicate that different freight rate policies for western grains and oilseeds would lead to different levels of impacts on various regions. Without any compensation to producers, removal of the subsidy would lead to an immediate reduction in the income levels of farmers. This would have a negative effect on new investment in agriculture, adoption of new technologies, and survival of rural communities. More mature and diversified economies, such as Alberta, may be able to withstand such income changes without showing an appreciable impact on rural communities. In the long run, if these income levels persist, there would be a major realignment of input prices, particularly for land, until the agricultural industry reaches a new state of equilibrium. During the interim, there could be large adjustment costs and a major transfer of wealth away from existing farmers.

Under the option where producers receive compensation, incomes would be increased (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 would be relatively small.

Environmental Impacts

Subsidizing the transportation of export grains from the prairie provinces has encouraged the cropping of marginal land. The degradation of organic matter, increased salinity and soil erosion in marginal crop production areas are unhappy consequences of subsidized freight rates for grains. This is especially serious in the brown soil zone, an area characterized by frequent shortages of moisture. However, higher farm level grain prices from subsidized freight

rates have encouraged producers to use longer rotations and to summerfallow less. 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 have required 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 some beneficial environmental impacts. The decrease in farm level prices of grain could 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. The return of marginal land to forage production could also be helpful in maintaining wildlife populations. Unfortunately, some areas in the prairie provinces, particularly in the brown soil zone, have limited opportunities for substitution of crops; changes in freight rates would not greatly affect farming practices in these areas.

The Feed Freight Assistance Act: Background

The Feed Freight Assistance (FFA) Program was instituted in 1941 to enable livestock producers outside the prairie region to purchase prairie feed grains at prices comparable to those on the prairies and to provide an additional market for grain from the Canadian prairies. At that time, all provinces except the prairies had feed grain deficits, reflecting the fact that more feed grains were fed than were produced in each of the other seven provinces.

Producer organizations outside the prairies generally gave strong support to the FFA program because it provided a less expensive source of feed grain to the livestock producers in these provinces. Grain producer organizations in the prairies also welcomed the program because it provided an expanded domestic market for prairie feed grains. Prairie-based livestock organizations, however, were against the program since it removed the natural locational advantage of cheaper feed grains for prairie livestock production.

Subsidization of transportation costs for feed grains discouraged feed grain production in many of the feed deficit provinces. In the maritime provinces, for example, the area planted to feed grains plunged by nearly half, from 206,000 Ha. to 113,000 Ha. during the 35 year period 1941 to 1976. Although this decrease cannot all be attributed to the Feed Freight Assistance program, the subsidization of feed grains imported from other provinces undoubtedly provided an incentive for the reduction in area planted. On the other hand, feed grain production increased in Ontario to the point where, by 1976, Ontario became a surplus producer of feed grains.

In 1976, important changes were made to the FFA program. Most of Ontario and the St. Lawrence region of Quebec were removed entirely from the program. The level of subsidization was reduced so that end users of

prairie feed grains had to pay a greater proportion of the total transportation costs. By 1990, only about 25 percent of the transportation costs beyond Thunder Bay were paid by the FFA program. An absolute maximum subsidy of \$50/tonne was placed on grain shipments to any region.

The Yukon and Northwest Territories were added to the program in 1980. In 1984, locally grown grains became eligible for FFA payments. Since that time, the feed grain area in the Atlantic provinces of Prince Edward Island, Nova Scotia and Newfoundland has increased.

Periodic adjustments continue to be made to FFA rates to reflect changes in the cost of transportation. In general, transportation costs from Thunder Bay to the lower St. Lawrence River are paid by the end users in the eastern provinces. Costs beyond the St. Lawrence to each of the Atlantic provinces are then used to set the FFA rates for western Canadian grains. Since Ontario has become a surplus producer of corn, shipments of corn from Ontario to the Atlantic provinces have also been made eligible for the FFA subsidy. End users pay the transportation costs from Chatham to the edge of the eligible zone; incremental costs beyond the lower St. Lawrence River are then paid by the FFA program, subject to the \$50/tonne limit on the subsidy.

According to a report by a Committee of Experts (1990), British Columbia is the largest provincial beneficiary from the FFA program; more than 30 percent of total payments go to that province. Nova Scotia, Newfoundland, New Brunswick and Quebec each receive about the same total amount of FFA payments (from \$2.2 - \$2.7 m). Prince Edward Island receives less than nine percent of the total payments. On a commodity basis, the supply controlled sectors of dairy and poultry receive about two-thirds of the total FFA subsidies. Hogs receive about 25 percent and beef cattle receive less than nine percent of the total payments of FFA subsidies.

Description of Feed Freight Assistance: Policy Options

Four alternatives to the present FFA program were analyzed in this paper.

1. Complete Removal of FFA and No Compensation

In this option, it was assumed that the FFA subsidy has been phased-out over a ten-year time period. The analysis compared the resulting long term situation of no FFA subsidies in the affected provinces to the 1990 base. Live-stock producers would have to pay higher prices for their feed grains but would receive no compensation for loss of the FFA subsidy.

It was assumed that no changes were made to production quotas in the dairy and poultry sectors. This is a bit of a simplification since future alloca-

tions of additional production quotas would be affected by changes in relative costs of production in each province. However, the present allocation of production quotas to each province is unlikely to change. Therefore, an increase in feed grain prices to dairy and poultry producers in FFA eligible regions would not affect their rights to produce at present levels. A further assumption of this option was that fluid milk prices in the affected provinces would increase to keep gross margins in the fluid milk enterprise at the same level as with the FFA subsidy. It was assumed that the slightly higher fluid milk prices would not affect consumption of milk. On the other hand, it was assumed that prices of industrial milk and poultry would not be increased since industrial milk and poultry production in these provinces is small relative to total Canadian production. Producers of industrial milk and poultry would therefore suffer reduced gross margins if the FFA subsidy was removed.

2. Complete Removal of FFA with Compensation

This is similar to the first option in that the entire FFA subsidy is removed, except that the subsidy is stopped suddenly and compensation paid to current beneficiaries of the program. The compensation is calculated on the basis of capitalized benefits of the subsidy over a 15-year period and paid out as an annuity over a ten-year period. The discount rate is assumed to be ten percent. The compensation is assumed to be paid on the basis of historical, not current, production and thus should not directly affect resource allocation or production in the future. The estimated annual compensation (for a 15-year period) for each sector in each of the affected provinces is in Table 7.

3. Direct Producer Payments (Current Proportions)

In this option, each of the livestock sectors (hogs, beef, dairy, poultry) in each province receive the same total amount of FFA subsidy as they do currently, but the subsidy is not tied to the amount of actual feed grain purchased. The subsidy is calculated and paid on a per animal basis.

The linear programming model which is used for the analysis does not value intermediate products. Total returns to the sector are calculated on the basis of final product sales only. Thus payments made to producers in this option are directed to producers who make the final sales of the products. It is assumed that arbitrage among the various levels of the livestock sectors will direct the appropriate proportions of the total subsidy to each level in the production chain.

As in the other options, it is assumed that production quotas for dairy and poultry products remain at the same levels as in the base. Prices for feed grains paid by livestock producers would increase by the amount of the FFA subsidy. Fluid milk prices would increase to account for the higher feed costs but prices of industrial milk and poultry products would not.

TABLE 7 Estimated Annual Compensation for Removal of FFA by Province and Commodity (000's \$)

Province	SECTOR				TOTAL
	Beef	Hog	Dairy	Poultry	
British Columbia	\$ 624	\$ 1,335	\$ 2,720	\$ 2,176	\$ 6,855
Ontario	114	8	85	14	221
Quebec	252	875	1,641	262	3,031
New Brunswick	275	779	1,114	1,007	3,176
Prince Edward Island	338	841	673	97	1,948
Nova Scotia	253	1,252	1,053	1,191	3,750
Newfoundland	121	672	664	2,007	3,464
TOTAL	1,977	5,762	7,950	6,755	22,444

4. Direct Producer Payments (Red Meats Only)

Nearly two-thirds of the current FFA subsidy goes to the dairy and poultry sectors whose production is controlled (Committee of Experts 1990). Since the potential for growth of the supply managed sectors is limited by the present institutional arrangements, the benefits of the FFA subsidy in these sectors are mainly financial. In the Atlantic provinces, a major focus for growth and development of the agricultural industry has been in the red meats sector. This option includes the diversion of all FFA funds currently going to the dairy and poultry sectors to permit an enhancement of the payments going to the red meats sectors. The pork and beef sectors would, therefore, receive the total amount of FFA funds, paid directly to the end users of feed grains as in Option 3.

The allocation of supply managed FFA subsidy expenditures to the beef and pork sectors in each of the affected provinces is shown in Table 8. The allocation is based on the current proportions of FFA expenditures received by these two sectors in each province. The pork sector is the major beneficiary of the redirected FFA subsidy.

Calculation of Feed Grain Prices

Since 1984, local feed grains marketed commercially have been eligible for the FFA subsidy. Thus livestock producers have had no extra incentive to purchase feed grains that have been imported into FFA eligible regions over locally produced feed grains. Local producers of feed grains receive the market price for their products which is equivalent to the landed price of feed grains imported into the feed grain deficit regions, adjusted for quality differences. Purchasers of feed grains pay the market (landed) price and are eligible for the

TABLE 8 Allocation of FFA Expenditures from Supply Managed to Red Meats Sectors (000's \$)

Province	Current Total to all Sectors	From Dairy and Poultry	TO	
			Beef	Hogs
Newfoundland	\$ 2,561	\$ 1,962	\$ 299	\$ 1,663
Prince Edward Island	1,435	565	162	403
Nova Scotia	2,764	1,648	277	1,371
New Brunswick	2,335	1,558	407	1,151
Quebec	2,240	1,398	313	1,085
British Columbia	5,048	3,596	1,145	2,451

Source: Committee of Experts (1990).

FFA subsidy.

If the FFA subsidy is discontinued or is paid directly to end users of feed grains on a per animal basis, it is assumed that the price of local feed grains in feed deficit regions would remain unchanged. Purchasers of feed grains would have to pay the landed price for feed grains imported from outside the region, but would not be eligible to claim any FFA subsidy on the purchased grains. Thus their effective price of feed grain purchased would be increased by the amount of the FFA subsidy. However, producers of feed grains in the feed deficit regions would receive exactly the same price for their feed grains regardless of whether or not the FFA subsidy is paid to purchasers of feed grains.

It is recognized that in the present circumstance, the feed grain processing sector may not be perfectly competitive. If that is the case, some portion of the present FFA subsidy may not be passed through to the livestock producers. This implies a somewhat smaller impact on livestock producers than would be the case if the feed grain processing sector was perfectly competitive. However, investigation of the competitiveness of the feed grain processing sector was beyond the scope of this study; it was assumed to be perfectly competitive and thus unable to retain any of the FFA subsidy.

Estimated Impacts of Feed Freight Assistance Options

Impacts on the Hog Sector

Complete removal of the FFA subsidy greatly increases the cost of hog production in the affected regions, since the purchase of feed grains represents a high proportion of total costs of hog production. Hog production decreases in

Options 1 and 2 by three to four percent in New Brunswick, Prince Edward Island and Nova Scotia (Table 9). The impact on production in Quebec is somewhat less, since not all of Quebec currently is eligible for FFA payments. Hog production in Newfoundland is reduced by more than ten percent owing to the sharp rise which could be expected in feed grain prices if the FFA subsidy is removed entirely.

Hog production increases slightly in the Atlantic provinces if the FFA subsidy is channelled directly to end users of feed grains (Option 3). In the case where the FFA subsidies that are currently received by dairy and poultry producers are redirected to red meat producers (Option 4), hog production increases by three to seven percent in the Atlantic provinces. In both cases, hog production in Quebec declines, since the increase in price of feed grains outweighs the effects of the payment that are made directly to hog producers. Hog production increases in British Columbia in the fourth option due to the large transfer in subsidy from the supply controlled sectors to the hog sector.

Gross margins are severely negatively affected in all provinces when the FFA subsidy is removed. Even in the case of compensation in the form of an annuity payment, gross margins are lower than in the base case. However, a change in the way the FFA is paid could assist the pork industry. In Policy Options 3 and 4, where FFA is paid directly to the end users of feed grain, pork sector gross margins increase considerably.

Impacts on the Beef Sector

With elimination of the FFA subsidy, impacts on beef production are similar to those for hog production, though the magnitude is somewhat less (Table 10). With beef, the decrease in all provinces, except Newfoundland, is less than two percent. In contrast with hog production, payment of the FFA subsidy to end users (Options 3 and 4) results in lower levels of beef production than in the base. The negative effect from higher feed grain prices outweighs the positive effect from direct producer subsidies in the beef enterprise.

As with pork, removing the FFA subsidy results in gross margins that are much lower than in the base, even when producers receive a compensating annuity in Option 2. Redirection of the FFA subsidy to end users (Option 3) results in gross margins lower than the base in the beef sector for most provinces. However, gross margins in the beef sector are mostly higher than the base in Option 4, where beef producers receive a higher total subsidy than in the current arrangement.

Impacts on the Dairy Sector

No changes occur in the production of milk from imposition of any of the

TABLE 9 Summary of Expected Impacts on the Hog Sector from Adoption of Alternative Feed Freight Assistance Policies (% Changes from Base Case)

Province	Option 1	Option 2	Option 3	Option 4
	No Compensation	Compensation	Payments - all Livestock Prod.	Payments to Red Meats
SOWS				
British Columbia	-1.7	-1.7	-1.5	0.7
Quebec	-0.9	-0.9	-0.8	-0.4
New Brunswick	-3.1	-3.1	0.1	5.9
Prince Edward Island	-3.2	-3.2	0.9	3.0
Nova Scotia	-3.6	-3.6	0.6	3.7
Newfoundland	-10.6	-10.6	5.6	7.3
GROSS MARGINS				
British Columbia	-7.4	1.1	-1.0	7.1
Quebec	-1.1	-1.0	-1.0	0.3
New Brunswick	-10.4	-2.6	-2.1	16.6
Prince Edward Island	-5.4	1.2	5.5	12.1
Nova Scotia	-8.9	-0.3	0.9	9.8
Newfoundland	-46.5	7.9	4.2	134.7

policy options, since the supply of milk in each province is strictly limited. It has been suggested that higher costs of production in some regions as a result of higher feed grain prices could affect future distribution of milk quotas. However, this possibility is ignored in the analysis.

A summary of estimated impacts on the dairy sector of the various policy options is provided in Table 11. Gross margins are reduced in Option 1, where the FFA subsidy is removed. In contrast to the pork and beef sectors, payment of an annuity as compensation for removing the FFA subsidy increases the gross margins (plus compensation). In Option 3, the FFA subsidy on feed grains is removed and paid directly to the end user. Since dairy production could not change, gross margins to the dairy sector did not change. In Option 4, where the FFA subsidy currently paid on feed grains used by the dairy sector is diverted to the red meats sectors, gross margins in the dairy sector are reduced to the same level as in Option 1.

Impacts on the Poultry Sector

Although poultry producers in each province have a quota on production, they can still underfill the quota. This happens in Newfoundland and, to a lesser extent in British Columbia, in Options 1 and 4, where poultry producers lose

TABLE 10 Summary of Expected Impacts on the Beef Sector from Adoption of Alternative Feed Freight Assistance Policies (% Changes from Base Case)

Province	Option 1	Option 2	Option 3	Option 4
	No Compensation	Compensation	Payments - all Livestock Prod.	Payments to Red Meats
BEEF				
British Columbia	-1.7	-1.7	-1.7	-1.2
Quebec	-0.3	-0.3	-0.3	-0.4
New Brunswick	-1.6	-1.6	-1.2	-0.5
Prince Edward Island	-1.6	-1.6	-1.5	-1.3
Nova Scotia	-1.9	-1.9	-1.6	-0.6
Newfoundland	-5.5	-5.5	-4.5	-1.7
GROSS MARGINS				
British Columbia	-2.5	-1.9	-1.8	1.9
Quebec	-0.2	0.1	0.3	0.1
New Brunswick	-6.7	-3.0	-1.2	9.4
Prince Edward Island	-4.0	-0.3	-2.7	-1.6
Nova Scotia	-8.3	-6.7	-5.8	3.1
Newfoundland	-23.0	-6.5	1.5	119.0

all benefits from the FFA subsidy (Table 11). The small reduction in overall Canadian poultry production is accommodated by imports from the U.S. (up to the maximum allowed) and a small reduction in poultry consumption.

Since in this study poultry prices are not permitted to increase following an increase in costs of production, gross margins in Options 1 and 4 are significantly reduced from the base in all provinces except Quebec. In Newfoundland, gross margin to the poultry sector is reduced by 37 percent, due to the effects of higher feed grain prices and a reduction in enterprise size (not shown in Table 11). In Option 2, where producers receive an annuity as compensation for the higher feed grain prices, gross margins are higher than in the base for all provinces except Newfoundland. Gross margins are slightly improved in most provinces in Option 3, where the FFA subsidy is paid to end users.

Impacts on the Crops Sector

Since no changes in local prices of feed grains to producers of feed grains could be anticipated for any of the policy options considered, there is no reason to expect changes in quantities produced or in gross margins of crop producers in FFA eligible areas. Only the imports of feed grains into the feed-deficit areas are affected. For options where livestock production decreases,

TABLE 11 Summary of Expected Impacts on Gross Margins in the Dairy and Poultry Sectors from Adoption of Alternative Feed Freight Assistance Policies (% Changes from Base Case)

Province	Option 1	Option 2	Option 3
	No Compensation	Compensation	Payments - All Livestock Prod.
Dairy			
British Columbia	-0.3	1.4	1.1
Quebec	0.0	0.4	0.0
New Brunswick	-0.9	1.3	1.2
Prince Edward Island	-0.6	2.0	2.5
Nova Scotia	-0.7	0.7	0.3
Newfoundland	-2.3	0.5	6.5
Poultry			
British Columbia	-2.3	0.3	0.9
Quebec	-0.1	0.0	-0.3
New Brunswick	-4.1	1.5	2.7
Prince Edward Island	-3.3	1.2	0.2
Nova Scotia	-3.2	1.2	1.3
Newfoundland	-37.2	-16.1	1.7

imported feed grains decrease by generally less than one percent, except in Newfoundland where feed grain imports decrease by nearly 14 percent. In Options 3 and 4 where livestock production increase, imported feed grains increase by relatively small amounts.

Implications of FFA Policy Actions

Although agriculture in the FFA eligible areas is responsive to changes in both the level of the subsidy and the way it is paid, agriculture in most of these areas is not dependent on it. Even with the relatively high levels of producer responsiveness assumed in this study (Klein et al. 1993), it does not appear that production of red meats would disappear in most of these areas with complete removal of the FFA subsidy and no compensation. This seems to be a reasonable conclusion since the FFA subsidy accounts for less than three percent of adjusted cash receipts for hogs and less than 1.5 percent of adjusted cash receipts for beef cattle (Committee of Experts 1990).

Payment of the subsidy to the end users would cause fewer distortions in Canadian agriculture than is the case currently. However, only small gains would be made nation wide. Such a change in the method of payment would, however, lead to winners and losers within the affected regions. The issue of

dilution of the FFA subsidy, if it is distributed to more producers, was not dealt with in this study.

The red meats sectors can be stimulated by redirecting the part of the FFA subsidy currently going to the supply-controlled sectors to the red meats sectors. However, gross margins in the supply-controlled sectors would be reduced.

A "buy-out" of the capitalized value of the subsidy would remove the economic distortion caused by the subsidy and compensate the producers (in aggregate) fully for their loss of the subsidy. Further research would be required, however, for a workable compensation program to be prepared.

Conclusion

The subject of transportation policy in agriculture has been widely studied and debated in Canada. However, the results of previous studies cannot be meaningfully compared to the results in this study. In an Agriculture Canada Working Paper (Kerr et al. 1991), the authors examined thirty-two economic studies of the Canadian grain handling and transportation system. They found so little commonality of analytical approach, assumptions, geographic areas, products considered, and time periods of analysis that they concluded that any comparison of results would be misleading to readers. This does not mean that previous studies were poorly done or that their conclusions were faulty given the assumptions made. In most of the cases, previous studies were conducted to answer specific questions for specific interest groups, and were never intended to provide information which could be used for broadly defined public policy objectives. In contrast, this study used a regional model that covered the whole country; this permitted a comprehensive evaluation to be made of both direct and indirect consequences of changes in transportation policy.

Although this study has provided quantitative estimates of production and financial impacts of a number of policy options for the WGTA and FFA programs, it has not provided many of the finer details of how these options would actually work. This deficiency is related to the limitations inherent in a large sectoral linear programming model like CRAM which was used in the analysis. Agricultural production in Canada is very complex. It is difficult to include all of the relevant opportunities and constraints from each area of each province in an aggregate model. It might be possible that a small area of one province could lose most of its production of a commodity, while another small area could actually increase its production under a certain policy option, but CRAM would not detect it. This should not detract from the usefulness of the study, however. This study provides an overview of expected impacts that can be useful to those engaged in policy debates about the WGTA and FFA subsidies. It should be obvious that if any changes are proposed to the present WGTA or FFA programs, they would have to be accompanied by detailed

examination of the many special production situations in affected provinces. No less should be expected for such complicated issues!

References

- Agriculture Diversification Alliance. 1989. *Transforming the Crow*. Calgary. Agriculture Canada. 1990. *Report of the Transportation Committee, Agri-Food Policy Review*. Ottawa: Agriculture Canada.
- Askin, T. 1988. *The Cost of Grade Segregations to Primary Elevators*. Winnipeg: Economics and Statistics Division, Canadian Grain Commission.
- Cairns, M. 1990. "Productivity, Regulatory Pricing and the Western Grain Transportation Act". Winnipeg: Grain Transportation Agency.
- Committee of Experts. 1990. *Report to Signatories on 1989 Net Benefits to Red Meat Producers*. Vol. 1. Ottawa: Agriculture Canada.
- Ewins, A. 1990. "Quebec Insists Crow be Paid to the Railways", *Western Producer*, May 24.
- Gilson, J.C. 1982. "Western Grain Transportation", *Report on Consultations and Recommendations*, Ottawa: Minister of Supply and Services.
- Government of Canada. 1897. *The Crow's Nest Pass Act*. Government of Canada. Ottawa.
- Hall Royal Commission. 1977. *Grain and Rail in Western Canada*. The Report of the Grain Handling and Transportation Commission, Vol. 1 and 2, Winnipeg.
- Kerr, W.A., G. Fox, J.E. Hobbs and K.K. Klein. 1991. "A Review of Studies on Western Canadian Grain Transportation Policies". Working Paper 6/91. Policy and Grains and Oilseeds Branches. Ottawa: Agriculture Canada.
- Klein, K.K., S.N. Kulshreshtha, B. Stennes, G. Fox and W.A. Kerr. 1993. "Transportation Issues in Canadian Agriculture I: Regional Modelling for Policy Analysis", *Canadian Journal of Regional Science*, 16: 21-38.
- Snavely Royal Commission. 1977. *Report, Commission on the Costs of Transporting Grain by Rail*. Vol. 1, 1976; Vol. 2, 1977. Ottawa: Minister of Supply and Services.