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Export Markets for Canadian Grain: Trends and Market Mix

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INTRODUCTION

This paper overviews the results of three separate, but related economic research projects conducted from 1985 to 1991 and funded by Farming for the Future. The topic of the first two of these concerned export markets for wheat. The third focused more on export markets for feedgrains, particularly barley. One might question how such topics relate to the theme of Agri-food Diversification, which is the focus of this Farming for the Future research conference. The three projects do relate to this theme. They focused on the analysis of diverse and distinct market segments for different types or classes of grains and the relative values of different characteristics of grain. Our emphasis on wheat and barley markets also reflects the fact that while other special crops provide very useful production and market alternatives for Alberta farmers, the relatively limited market size for many special crops necessitates continued research on the agronomic and economic characteristics of wheat, barley, and oilseeds. Some basic information on the recent geographic destination of Canada's total grain exports (including oilseeds) and on Canada's share of world grain markets in the last decade is given in Tables 1 and 2.

A major concern of the first project was to analyse trends, market shares and values of different types or classes of wheat based on characteristics such as protein content or quality that are important to wheat users. We also analysed the changing pattern of import behaviour by wheat importing nations. For this purpose importers were classified into five broad categories, based on similar socio-economic characteristics of their markets. These categories were the developed or high income market; the centrally planned markets of eastern Europe and the former USSR; the centrally planned Asian market (a market dominated by China); the very substantial but fragmented middle-income developing nation group; and the low-income developing nations, a group that includes the poorest countries in the world.

In the second study, we analysed "importer loyalty" for different classes of wheat and for wheat from different suppliers. This involved estimating the probability of repeat purchases by the different broad categories of buyers for wheat from different sources and for broad classes of wheat. The final study focused on barley export

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markets. This study included an analysis of time-series data on barley imported into four selected markets. These analyses complemented a cross-sectional analysis of feedgrain and total grain imports.

Overall a number of quantitative methods and economic models were applied in these analyses. Exporter and importer profiles for wheats and barley were based on market share and trend data. Market share models included deterministic constant market share models which enabled us to decompose changes in market shares into world trade, country, commodity, and competitive effects. Econometric analyses enabled us to make estimates of the value of major characteristics of wheat. These techniques also provided the estimation procedure for analysis of an aggregate cross-sectional analysis of foodgrain demand, and were the means of estimating import demand functions for four major barley markets. Programming analyses were employed in the importer loyalty analysis. Some of the more important results of these varied analyses are outlined below.

DISCUSSION OF THE THREE STUDIES AND THEIR CONCLUSIONS

Study 1: Export Markets for Canadian Wheat, Trends and Market Mix

Our first analysis documented Canada's relatively high level of dependence on the two centrally planned market segments (Asian centrally planned markets and the East European-former USSR group). Canada also accounts for a relatively high proportion of the diminishing developed country or high income market segment of the world wheat market. In contrast, Canada has a relatively low penetration of wheat markets in the middle-income segment of richer less developed countries. This work demonstrated that the wheat imports of the middle-income segment of the world market for grains have grown more rapidly than any other market segment and now constitute the largest aggregate market. Indeed, bodies such as the International Wheat Council, based on past trends, have forecast that the middle income group is likely to be the predominant source of future growth in world wheat markets. We concluded that the middle-income developing countries' relatively low dependence on Canadian wheat appears to reflect their preference for lower priced, lower-protein wheats that are more suitable for use in noodles, steamed breads, or unleavened breads. We also observed that the middle-income market appears to have a preference for white wheats, rather than red wheats such as produced in the Prairies, mainly because these countries lack well developed markets for livestock feed. Compared to red wheats, white wheats can be ground at much higher extraction rates to yield flour that does not show discolouration from the coloured seedcoat and wheat germ particles. These initial observations were the subject of further economic analysis in both the wheat-oriented projects.

We analysed the difference in world prices for wheats of different protein levels and for white as versus red wheats. Initially, we analysed f.o.b. export prices for some nine different wheats for which such data were available. These included Australian Prime Hard and Standard White; U.S. Dark Northern Spring, No. 2 Hard Winter and Hard Winter Ordinary, No. 2 Soft Red Winter and No. 2 Western White; as well as CWRS No. 1 and No. 2. We used statistical techniques that enabled us to assess the effect of a change in one variable while holding constant the levels of other variables. From this analysis we calculated the implicit prices for protein in world markets. This was one of the first such studies to establish defensible estimates of protein content of wheat; it has sparked a number of subsequent analyses. Our estimates suggested that

protein was somewhat higher valued in the early to mid-1980s than in the mid to late-1970s. We calculated that, on average in the 1980s, the real value of the premium (in 1980 US dollars) for a 1% increase in protein was $5.30 per tonne, compared to an average $4.38 premium in the earlier five years. We also observed and calculated a positive premium for white wheat over red coloured wheat (holding other factors constant). We estimated this premium to be $13.36 per tonne (in 1980 U.S. dollars) in the 1980s, compared to some $12.11 earlier. Our initial estimates of premiums associated with country of origin, based on f.o.b. data, were not reliable. Subsequent exploration of these on delivered (i.e., c.i.f.) prices, as in the Japanese market, suggested appreciable premiums for wheat shipped from Canadian origins.

Our analysis in this first study led us to the conclusion that Canada's predominant wheat, high quality, high value CWRS, developed with the aid of rigorous grain licensing and grading standards, has served well in achieving a large Canadian share of both the high income developed country and the Eastern European-former USSR import markets and will remain an important production option for western grain producers, particularly those located in the driest cropping regions which are agronomically well suited to the production of CWRS wheat. We concluded that this was, however, not the case for the moister regions in which CWRS grading No. 1 is seldom achieved and where there is sufficient moisture to enable higher yielding wheats to be viewed as a potential production alternative. Our estimates of the protein premiums in world markets indicated that where normal moisture levels permit and subject to the availability of agronomically appropriate 3-M wheats, producers' revenues could be substantially improved by the development of such higher yielding wheats. This conclusion arose from our findings, confirmed by subsequent results by other researchers, that the implicit value of a one percentage increase in protein content typically yields a much lesser increase in price than the loss in yield from the protein content-yield trade off which, although not quantified precisely, is thought to involve some 10 to 15 percentage points increase in yield for a one percent reduction in protein. This was the basis of our recommendation for increased emphasis in research priorities on the development of improved high yielding wheat varieties that are adapted to local conditions in the moister regions of the prairies. The results also point to the advantage of developing white wheats within the CPS class.

Study 2: Market Share Competition in World Wheat Markets

The second study focused on importer loyalty for wheat, as measured by the estimated probabilities of repeat purchases by members of the broadly aggregated groups of importers, from the major wheat suppliers (US, EC, Canada, Argentina and Australia) and for different classes of wheat (hard, medium, soft, Durum, and "other" classes of wheat). The initial econometric analysis supported the behavioural model which was built on the hypothesis that wheat importers distinguish between wheat from different sources and different classes of wheat. With this assurance, we proceeded to estimate the transition probabilities of repeat purchases. We were also able to calculate the probabilities of an importing region shifting from one source of wheat to another. We were not able to distinguish between the different sources of consumer loyalty which may arise because of features of quality, such as protein content and characteristics (as characterizes Canadian wheat), reliability of grading (as characterizes Canadian and Australian wheats) or a preference for other characteristics, such as white wheats (as produced in Australia) or the use of favourable terms of credit and price concessions or subsidies (which may have advantaged US and EC wheats). We observed that the

highest probabilities of repeat purchases of wheat by developed country importers were for wheat purchased from the US. This was the case in the aggregate and also for the purchases by both the developed country, middle-income, and lowest income importing groups. The probability of repeat purchases from Canada by middle-income countries was extremely low--lower than for any other supplier. The probability of repeat purchases by the East European group of importers was higher for all exporters, including Canada, than shown by the middle-income group, but was highest for the EC, perhaps reflecting the advantage of geographic location, and the benefit of concessional sales terms. Consumer loyalty to Canadian wheat imports was higher than for any other supplier for only one group, the centrally planned Asian importers. This reflects the high repeat purchases made by China of CWRS No. 3, perhaps reflecting Chinese importers' perception of CWRS No. 3 as "good value" and, perhaps, reflecting well developed trading relationships between the trading institutions involved in these sales. Even so, the probability of repeat purchases from the US was also relatively high for this market. Canada did rank relatively well in terms of share gain probabilities, as there was a strong probability for most importers to shift their purchases toward Canadian wheat. But this was not exhibited by the mid-income importing group; this group of importers exhibited a higher probability of switching to purchases of Australian wheat.

Our conclusions from this particular project tended to reinforce those from our previous study: while there is an appreciable market for high quality, high protein, higher priced wheats that has been of traditional and major importance to Canada as a wheat exporter, there does not seem to be a pronounced purchaser loyalty for Canadian wheat in some substantial and growing markets, specially the largest and most rapidly growing group, the middle income developing countries. Sales to that market segment face very strong competition and for most suppliers to that market, except for the US, the probability of repeat purchases is low. We also concluded that factors other than quality and reliability were influential in repeat and switched sales. The evident importance of concessional credit, export restitutions, and export subsidies in sales of wheat highlight the importance to the small country exporters, Canada, Australia, and Argentina, of achieving improvements in the rules governing international trade in farm products.

Study 3: Export Markets for Canada's Foodgrains and Feedgrains

In the third study we focused much more on export markets for feedgrains, particularly for Canadian barley. Some comparative analyses of foodgrain and feedgrain markets were also undertaken. Canada's role as the largest barley exporter has been surpassed in recent years by the European Community. On the import side, the middle-income developing countries have become the fastest growing market segment for barley imports, replacing developed countries as the leading market outlet. Canada's export profile data reveal that developing and Eastern European countries became expansionary markets in the 1980s while developed countries have imported a decreasing share of Canada's barley exports.

Constant market share analyses of the world barley and coarse grain markets reveal that those exporters with the highest export concentration in the rapidly expanding markets in richer developing countries registered positive export growth due to this concentration. While corn is still the dominant feedgrain traded on world markets, barley became, by 1985, the fastest growing feedgrain export, resulting in positive export growth for those exporters, like Canada, for which barley is a prominent

feedgrain. Despite appreciable reliance on the less rapidly growing developed and East European import markets for barley, Canada has been relatively competitive in world barley markets, at least in the time period covered by this study. In wheat, Canada's exports have tended to be more concentrated on less rapidly growing market segments and on less rapidly growing classes of wheat. Canada's competitive position in world wheat markets has varied over time and, toward the end of the 1980s, was evidently worsened by the United States export enhancement program subsidies.

The major determinants of cereal import demand in seventy-four less developed countries (LDCs) including middle-income and poorer LDCs were analysed through the use of an econometric cross-sectional model. Import demand in these increasingly important markets is affected by the level of income and degree of urbanization, financial capacity proxies, and domestic grain supply variables. We were also able to analyse the impact of income distribution on less developed countries' cereal import demand in 1986 and 1987 for a more restricted sample of twenty-three nations. These show a greater than proportional increase in cereal imports due to an increase in the income share of the poorest 40 percent of their populations. High levels of government debt appear to have inhibited cereal importation in nations in South America, but not in Asia and Africa. In these three continental regions, particularly in Africa, there seems to be a positive relationship between food aid and cereal imports.

In models where cereal imports were disaggregated into feedgrains and foodgrains we found that feedgrain import demand is more sensitive to either upward or downward changes in income than is foodgrain import demand. This is one factor which helps to explain why feedgrain exports grew more rapidly in the 1970s and collapsed to a greater degree than wheat exports in the 1980s. World import demand for wheat appears to be relatively more "recession proof" than is the case for world barley imports. However, world barley markets show potential for greater future growth subject to improvements in the income levels of importing regions.

Time series analyses of barley import demand in four Canadian export markets--the (former) USSR, Japan, Colombia and China--were undertaken. The results revealed that Russia's characteristic pattern of import fluctuations is caused mainly by domestic barley and livestock production fluctuations. The price of barley imports also affects USSR barley import decisions, implying financial constraints are an important aspect of the Soviet market. In the Japanese market, barley import demand underwent a structural shift around 1972 when usage of barley changed from foodgrain to feedgrain. Canadian barley changed from an inferior foodgrain to a normal feedgrain, as reflected in the income elasticity of demand. The Canadian dollar-Japanese yen exchange rate is an important determinant of Japan's barley import demand. Colombia's import demand is largely for malting barley and has been influenced most by barley import prices and foreign exchange reserves. As a developing country, Colombia faces financial constraints that influence import decisions. For China, another developing country, barley imports are affected by the price of barley imports and by the price of wheat imports which is, for China, a substitute for barley imports. Domestic barley and hog production also influence this nation's barley imports. One important but unanswered question regarding China's cereal imports concerns the prospects for future increases in feedgrain imports by that nation. Some reputable researchers and grain institutions have forecast that China will become a substantial net importer of feedgrains in the future. To date, this has not occurred.

Overall, our empirical analysis supports the contention that the fortunes of the developed and the developing nations are closely intertwined in the world food economy. The pace at which poor nations can develop, both through increasing income levels and improving income distribution, significantly influences their cereal imports and, concomitantly, cereal exports from rich nations such as Canada.

MAJOR IMPLICATIONS

Our conclusions highlight the importance to the Canadian grains economy of achieving fairer international trading rules for agriculture. An agreement within the provisions of the General Agreement on Tariffs and Trade that materially decreases distortions from internal support, substantially reduces export subsidies, and considerably improves market access must be viewed as a most important priority for the Western grains sector. A second major implication of these studies is that economic growth in the less developed world, particularly in the middle-income developing countries has substantial impacts on the world market for grains. Growth in these economies is particularly important for future growth in world markets for feedgrains.

In addition to other results and conclusions noted in the preceding discussion of these studies, these projects also contributed to the training of several graduate students and helped to advance a number of features of applied economic analysis. My colleagues and I appreciate the funding from the Farming for the Future program which supported these studies.

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Table 1. Canada's Major Grain Markets, 1991-92

	Volume (MMT)	Share (%)
China	7.68	25
Russia/USSR	5.59	18
Japan	4.53	15
Brazil	1.95	6
U.S.A.	1.83	6
Iran	1.16	4
Others	8.48	27
TOTAL	31.22	100

Source: Canadian Grain Commission.

Table 2. World Wheat and Barley Exports and Canada's Share

	Wheat			Barley		
Year	World Exports (MMT)	Canada Exports (MMT)	Canada's Share (%)	World Exports (MMT)	Canada Exports (MMT)	Canada's Share (%)
1982/83	98.7	21.4	21.7	13.3	6.1	45.9
1983/84	102.8	21.8	21.2	15.7	4.2	26.8
1984/85	107.0	19.4	18.1	18.0	2.4	13.3
1985/86	87.8	16.8	19.1	18.5	4.8	25.9
1886/87	91.3	20.8	22.8	18.6	6.0	32.3
1987/88	106.1	23.6	22.2	16.0	3.5	21.9
1988/89	97.2	13.5	13.9	17.1	3.4	19.9
1989/90	97.0	17.0	17.5	15.8	3.7	23.4
1990/91	94.3	20.5	21.7	18.2	4.5	24.7
1991/92E	107.2	24.0	22.4	20.2	4.2	21.0
1992/93P	101.7	24.0	23.6	18.5	3.3	17.8

Source: U.S. Department of Agriculture, *Export Markets for U.S. Grain and Products*, July 1992.