

RURAL ECONOMY

Market Access in Western Canadian and Northwestern United States Table Potato Markets

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Project Report 98-01
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Project Report



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Abstract

This report examines market opportunities in British Columbia for Alberta produced table potatoes. The report also seeks (1) to assess the cost competitiveness of the Alberta table potato sector, compared with costs of potato production in British Columbia and the Pacific Northwest (PNW) of the United States (US); (2) to provide a preliminary understanding of potential trade flows and trading volumes based on relative cost competitiveness; and (3) to assess the importance of particular potato attributes to table potato buyers in British Columbia.

The study also undertakes a description of the environment in which trade takes place between Alberta and British Columbia. This is done to document conditions under which inter-province trade takes place, and to attempt to assess whether trade regulations affect Alberta shippers differently than shippers located in British Columbia. No overt barriers to trade were found. However, some rules do appear to impose different trade practices on potatoes moving across provincial boundaries compared to potatoes that are grown and sold within British Columbia.

The study finds that, based on available cost estimates, Alberta producers are strongly cost-competitive in the British Columbia table potato market. However, potato production in the Pacific Northwest is also cost-competitive in the British Columbia table potato market. While Pacific Northwest production dwarfs that of Alberta, application of similar supply functions in the two regions suggests that there is a market for both Alberta and the Pacific Northwest in the British Columbia table potato market. This estimate is made in the context of new, and in our view better than recent past, estimates of the size of the British Columbia table potato market for 1996. These estimates suggest that British Columbia-based producers face serious cost constraints to expanding potato output and that the table potato market in British Columbia represents an opportunity for 51,500 metric tonne to be supplied by competing regions.

Finally, the study reports on an assessment of table potato attributes considered important to potato buyers in the British Columbia market. British Columbia buyers appear willing to pay the highest prices for potatoes that are white, medium size, and of British Columbia origin. Potatoes from Alberta and the Pacific Northwest become equally attractive compared to British Columbia potatoes when prices are slightly below those received by sellers of equivalent British Columbia grown potatoes. Study estimates suggest that table potatoes grown in Alberta are valued equally by British Columbia buyers when potatoes grown in Alberta are priced \$7.70 per tonne below those of local potatoes, and Pacific Northwest potatoes are valued equally to those grown locally when Pacific Northwest potatoes are priced about \$13.90 per tonne below local prices. These estimates should be viewed with caution since (a) they are “best” ones given the levels of confidence of the study results, and (b) they represent a current perception about the desirability of non British Columbia grown table potatoes. Such perceptions may be long-term or fleeting, and may be subject to change as perceptions of BC buyers change with time or with new information.

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Introduction

Potatoes are temperate zone plants, usually grown in regions with cool summers. The annual plant develops tubers underground from about six weeks after planting, with final maturity and harvest from 40 to 110 days thereafter. Depending on the seed that has been planted, the final product will take on many different shapes, sizes and colours. Common group types include russets, reds, whites, and yellow-fleshed, while common variety groups include Russet Burbank, Norland, Superior and Yukon Gold.

The term *fresh potatoes* refers to the group of potatoes representing *table stock* potatoes, *seed* potatoes as well as *raw potatoes for processing*. Those potatoes sold into the fresh market for food use are the *table stock potatoes*, compared to those that are used for seed or processing purposes. In comparison, *seed potatoes* are used for planting purposes only, while *raw potatoes for processing* are used for processing purposes.

In 1996, world potato production of fresh table stock, seed and raw potato products for processing was 284 million metric tonne (mmt), representing an increase of 2.6 percent from 1992. China was the major producer, accounting for 16 percent of total 1996 global production, while the United States (US) ranked fourth at 7.3 percent and Canada fourteenth at 1.3 percent.

Canadian potato production occurs in all provinces, however about 47 percent of production takes place in the eastern region of the country, namely New Brunswick and Prince Edward Island. The central region of Canada accounts for approximately 20 percent of national production, while the remaining 32 percent takes place in the western region (Statistics Canada - CANSIM; Table 1). Throughout the country, the trend has been a rise in the consumption of processed potatoes and a decline in fresh table stock use.

In British Columbia, potato production is a larger percentage contributor to farm income than is potato production in Alberta. More potatoes are grown in British Columbia than any other vegetable, with potato production concentrated in the Lower Mainland, on Vancouver Island, and in the Okanagan and Kootenay areas. With a high per capita population in these areas, the province of British Columbia represents

a large market for fresh potato producers. It is estimated that this market represented over 1.8 million metric tonnes (mmt) in 1996. Recently, concerns have been raised in the Alberta potato industry concerning market access issues in the large British Columbia market for Alberta table potatoes. From an economic perspective, there are potential rationalisations for substantiating these concerns. These include:

- Alberta's cost-competitive position in the British Columbia table potato market relative to competing suppliers' position, including British Columbia, Idaho and Washington;
- The degree of market integration between the Canadian and US fresh potato industries; and
- Buyer perceptions /preferences in British Columbia for purchasing table potatoes.

Through an examination into each of these alternative rationalisations, present market situation and future market potential can be revealed in the British Columbia table potato market. As such, this is the primary intent of this study.

Objectives of the Study

The objectives of this study are as follows:

- i. To examine market opportunities for Alberta table potatoes in the British Columbia fresh potato market.
- ii. To assess the cost competitiveness of Alberta's table potato industry, compared with nearby competing regions such as British Columbia, Idaho and Washington State.
- iii. To provide a preliminary assessment of potential trade flows and trading volumes based on the cost-competitiveness of the Alberta table potato industry.
- iv. Finally, the study undertakes an assessment of potato attributes important to table potato buyers in British Columbia.

Approach

This report provides information on the Canadian, Alberta, British Columbia, United States (US) and the US Pacific Northwest (PNW) fresh potato industries regarding industry structure, trade, policy and marketing direction. Specifically, the latter involves identifying British Columbia market opportunities for table potatoes originating in Alberta and the PNW states. This analysis is jointly performed using a stated preference model for identifying British Columbia wholesale buyer preferences in table potato purchases and supply potentials into the British Columbia table potato market. To identify British Columbia wholesale buyer preferences in table potato purchases, a stated preference model was used to construct a survey. The stated preference methodology used to prepare the survey asks the respondents (wholesale buyers) to choose from a set of hypothetical purchase choices. The benefit of this survey is its ability to identify the characteristics of table potatoes that are important to buyers in the British Columbia market, while making a preliminary quantitative assessment of their relative importance to these table potato purchasers. The survey is focused on objective (iv), and attempts, (a) to assess characteristics of table potatoes that are important to buyers in the British Columbia market, and (b) to make an initial quantitative assessment of their relative importance to these buyers.

The information used in the report was gathered from published and unpublished information, personal conversations (which are referenced at the end of this report), as well as a mail survey. Statistical data was collected from, among others, Agriculture and Agri-Food Canada (AAFC), Alberta Agriculture, Food and Rural Development (AAFRD), provincial marketing boards in British Columbia and Alberta, the United States Department of Agriculture (USDA), the United States International Trade Commission (USITC) and Statistics Canada on-line. For the most part, factual data is focused on the most recent five to seven year period (approximately 1990-96) where such data were obtainable.

Background

The Canadian Potato Industry

The relative importance of potatoes to farm cash receipts (FCR) varies from region to region in Canada. For Canada as a whole, the importance of the potato crop has been increasing in value and as a percent of FCR. Between 1985 and 1995, potatoes averaged between 1.3 and 2+ percent of total national agricultural FCR (Statistics Canada - CANSIM).

Table 1. Provincial Share of Canadian Domestic Potato Production¹

Province	1996	
	metric tonne	share
<i>Eastern Region</i>		
P.E.I.	1,179,360	30%
Nova Scotia	53,570	1%
New Brunswick	637,081	16%
<i>Central Region</i>		
Quebec	465,076	12%
Ontario	314,345	8%
<i>Western Region</i>		
Manitoba	750,164	19%
Saskatchewan	55,294	1%
Alberta	364,785	9%
British Columbia	93,804	2%
<i>total</i>	3,913,479	

¹ includes potatoes for all uses

Source: Statistics Canada, CANSIM

In the 1990's, Canadian potato acreage has averaged approximately 320,000 annually, with production averaging approximately 3.4 million metric tonnes (mmt) per year (Statistics Canada - CANSIM). Total Canadian production (for all uses) decreased by 8.8 percent in 1993 - poor weather conditions caused national production to fall from 3.6 mmt in 1992 to 3.3 mmt in 1993. However 1996 saw a record crop of 3.9 mmt (Table 1). Slightly over 354,000 acres were used to grow the record 1996 crop.

Canadian potato production occurs throughout the country (Figure 1), with about 47 percent of Canadian production taking place in the eastern region of the country, namely New Brunswick and Prince Edward Island

(Newfoundland is aggregated with Nova Scotia). The central region of Canada accounts for approximately 20 percent of national production, while the remaining 32 percent take place in the western region (table 1). From 1990 to 1995, average farm price received for potatoes in Canada averaged 7.55 cents per pound. Average total farm value during this period has been slightly over C\$480 million.

The British Columbia and Alberta Potato Industries

In British Columbia, potato production is a larger percentage contributor to farm income than is potato production in Alberta. More potatoes are grown in British Columbia than any other vegetable, with potato production concentrated in the Lower Mainland, on Vancouver Island, and in the Okanagan and Kootenay areas. In 1995, British Columbia producers planted 5400 acres of table potatoes, 1300 acres of process potatoes and 2125 acres of seed potatoes. Harvested production on those acres was 65,092 tonnes, 19,051 tonnes and 18,144 tonnes of table, process and seed potatoes respectively (British Columbia Ministry of Agriculture, Fisheries and Food). The production of table potatoes in 1995 represents a 48 percent increase from 1990 levels.

Potato production in Alberta takes place throughout the province, with the majority of the acreage in the irrigated areas of Lethbridge, Taber, Vauxhall and Bassano-Brooks. The dryland areas of Alberta such as Edmonton and Lacombe also account for considerable acreage (PGA 1996). The main varieties of fresh potatoes produced are Russet Burbank, Russet Norkotah, Red Norland, Yukon Gold, Bintje, Superior, and Carlton. Acreage devoted to table potatoes in Alberta has been declining from 1990 to 1995. This may be due, in part, to increased production of seed potatoes for the United States market, and possibly also to increased production (but not acreage) of process potatoes. For example, seed acreage in Alberta increased 31 percent from 1990 to 1995, while production of seed potatoes increased 41 percent over the same period. Table potato production declined 15 percent from 1990 to 1995 (PGA 1996).

The 1997 potato outlook for acreage was promising. It was estimated (PGA 1997) that the province's 140 growers would grow approximately 28,000 acres of potatoes in 1997. About 52 percent would be for processors, 27 percent for the seed industry and the remainder for the table stock market.

The average farm price and total farm value for potato farms in both British Columbia and Alberta from 1990 to 1993 reveals that Alberta's average farm price falls below that of British Columbia. However, the total farm value of production continues to exceed that of British Columbia. One measure of the importance of potato farming in British Columbia and Alberta is the percentage of each province's potato

FCR to the total FCR of that province. Over the period 1985 to 1995, potato FCR as a percent of total FCR in British Columbia averaged 2 percent, and 0.9 percent for the same period in Alberta.

The US Potato Industry

In the United States, potato production has emerged as a highly commercial, capital-intensive enterprise. The US has experienced increases in farm size and yields per acre, specialization by area, and an increase in the production and consumption of potatoes used for processing (Zepp et al. 1995). In both the US and Canada, there has been an increase in average farm acreage along with a decreasing number of potato farms. In their comparison of Canadian and US farm structures, Zepp et al. (1995) reported that in the US, the number of farms reporting potato acreage decreased from 2.6 million in 1939 (at an average of one acre per farm) to 14,782 in 1987 (at an average of 88 acres per farm). In Canada, the number of farms reporting potato acreage decreased from 217,137 in 1961 (at an average of 1.4 acres per farm) to 4,885 in 1986 (at an average of 56 acres per farm).

Production patterns have shifted in the last fifty years from the northeast and central states to the western US.¹ The PNW states of Idaho, Oregon and Washington are currently among the leading potato-producing states in the US (Figure 1). In 1995, 48 percent of all potatoes grown in the United States were of Russet Burbank variety, which was the number one ranked variety planted in that year. In the three PNW states, the main varieties planted in the last three years, in order of percentage planted, were Russet Burbank, Shepody, and Russet Norkotah. In 1995, Idaho, the US's largest potato producing state, planted 83 percent of its seed in Russet Burbank variety (USDA - ERS).

Of the top ranked potato-producing states in the US for the period 1985 to 1994, Idaho, Washington and Oregon rank 1, 2 and 7 respectively (USDA - NASS). In the last few years, Idaho has maintained or increased production as well as average price received by farmers, whereas both Oregon and Washington states have shown slight decreases in production and average farm price.

¹Presently, the western US produces approximately 67 percent of total US potato production, up from 23 percent in 1939 (Zepp et al. 1995).

In 1994, the three PNW states represented 69 percent of total US potato FCR. As such, potato farming in the northwestern states represents a significant amount of revenue for the US economy.

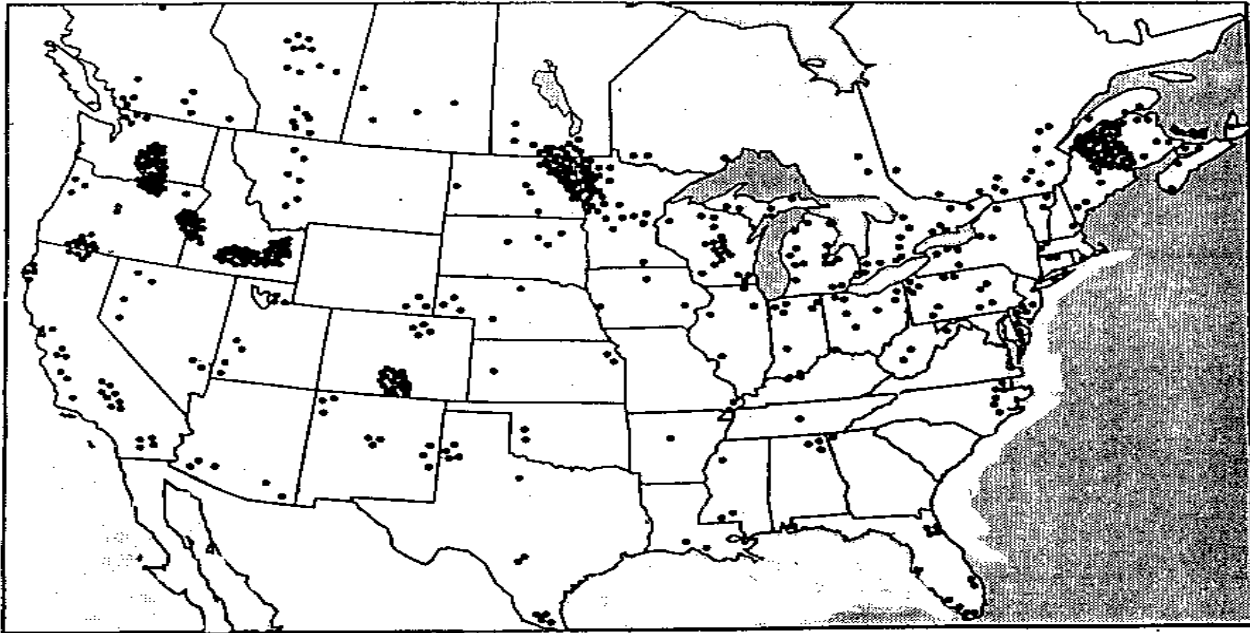


Figure 1: Major Fresh Potato Producing Regions of North America (Source: USITC 1997)

Policy, Marketing and Trade

Domestic Potato Policy in Canada

There are several Federal-Provincial programs focused on international markets for Canadian potatoes. Government programs pertaining to potatoes are of four main types: marketing assistance, production assistance, employment laws, and tax laws. The policies most pertinent to this study are those related to marketing assistance. Marketing assistance programs/agencies for potatoes in Canada include the Economic and Regional Development Program, the Consumer Packaging and Labelling Act and Regulations, the Canada Agricultural Products Act (the CAP Act), and the Program for Export Market Development (Zepp et al. 1995).

Federal Marketing Programs for Canadian Potato Growers ²

Authority for public involvement in potato marketing is derived from Section 95 of the Constitution Act, which allocates legislative powers for agriculture to the federal government and the provinces. At the federal level, the policies which pertain mostly to horticultural products are the Agricultural Products Marketing (APM) Act, and the CAP Act.

The APM Act deals with marketing of agricultural products in inter-province and export trade. It confers federal authority concerning inter-province or export trade to provincial marketing boards or commissions. Authority is granted as a result of a request by a province. The individual boards or commissions are given the authority to exercise the certain federal powers such as those related to pricing, transportation (which includes shippers, packing, and storage) and marketing (which includes appointing sales agents, licensing, and levies on production and/or sales).

Regulation of marketing of agricultural products in import, export, and international trade, as well as providing for national standards and grades of agricultural products, is the focus of the CAP Act (Agriculture and Agri-Food Canada 1995). The CAP Act also provides for inspection, grading, registration of establishments, and standards governing establishments for Canadian agricultural products. Agriculture Canada administers the CAP Act. Some provinces, Alberta and British Columbia included, have their own similar legislation which incorporates federal standards, but may be more rigid than the provisions in the federal statute. Such standards may act as inter-province trade barriers (Canadian International Trade Tribunal 1991).

Regulation of fresh and processed vegetables is conducted by the Fresh Fruit and Vegetable Regulations (FFVR), the Licensing and Arbitration Regulations, and also by the Processed Products Regulations (PPR). Through prescription of preliminary standards for health and safety, quality (grades), packaging, and labelling, marketing of these products is facilitated.

The Regulations for Fresh Fruit and Vegetables, which include standards for grades, labelling, packaging, and health, apply to inter-province trade as well as to imports and exports (Canadian International

²For more detailed information, see: Canadian International Trade Tribunal 1991.

Trade Tribunal 1991). Produce that has been prescribed a grade standard, under the regulations, cannot be imported in bulk form. With a valid federal produce license, an exemption from the bulk import prohibition may be obtained for products that are to be re-packed or processed. An exemption can only be obtained if the receiver contacts an industry representative (marketing board, for example) in the receiving and neighbouring provinces. The marketing board would respond to the receiver, either agreeing or disagreeing to the bulk import shipment. After submitting a request to Agriculture Canada (which reviews the request and the marketing board's response) the receiver will receive a response in writing from Agriculture Canada. However, prior approval is needed to facilitate inter-province and import trade in this way. Since the beginning of the century, the Fresh Fruit and Vegetable Regulations have been involved with promoting orderly marketing. Only in the past few decades has there been some form of exemption process for these regulations.

If processed potatoes are being exported or imported across provincial boundaries or internationally, the products must meet prescribed labelling, packaging, compositional, as well as minimum quality standard specifications set by the Processed Products Regulations (PPR) under the CAP Act. The types of processed potatoes covered by the PPR include white potatoes (whole, sliced, diced, cubed, Julienne, shoestring, regular cut, and crinkle cut), sweet potatoes (whole or cut), and frozen french fried potatoes (straight or regular cut, shoestring or Julienne, and crinkle cut Julienne). Fresh or processed products that are produced and sold within a province are not categorized under either set of regulations (FFVR or PPR). These fall under provincial jurisdiction.

The Farm Products Marketing Agencies (FPMA) Act permits the National Farm Products Marketing Council to advise agencies which administer national and regional marketing plans. This allowance for the producer-developed national or regional marketing plans is one role of the FPMA Act.

Provincial Marketing Programs for Canadian Potato Growers

Intra-province trade in horticultural products takes place under provincial jurisdiction. Canadian provinces have enacted legislation concerning the promotion, control, and regulation of production,

transportation, packaging, storage and marketing of agricultural products (Canadian International Trade Tribunal 1991). In Alberta, the Alberta Marketing and Agricultural Products Act provides for the establishment of provincial marketing boards which are, for the most part, run by producers for producers. These boards are supervised by the Provincial Agricultural Products Marketing Council, whose main purpose is to enable, motivate and assist agricultural commodity groups to grow and develop domestically and internationally through co-operation.

Vegetables in Alberta are marketed through three boards and two associations that represent growers' interests. The three boards are the Potato Growers of Alberta (PGA 1996), the Alberta Fresh Vegetable Marketing Board³, and the Alberta Vegetable Growers' Marketing board. The two associations include the Alberta Greenhouse Growers' Association, and the Alberta Market Gardeners' Association.

The Potato Growers of Alberta is a regional marketing board that deals with promoting the industry, and maintaining a minimum price on all potatoes at the farm gate (except processed potatoes) sold in Alberta. The mission of the Potato Growers of Alberta is to create success in Alberta's potato industry supporting sustainable production, marketing, development, and co-operation (PGA 1996). Other marketing organisations at the provincial level in Alberta for potatoes include Edmonton Potato Growers Inc., a producer-owned marketing company, and the Alberta Seed Potato Growers' Association.

In British Columbia, the Natural Products Marketing Act provides for the promotion, production control, transportation, packing, storage, and marketing of natural British Columbia products, and creates marketing boards which administer regulations for the marketing of regulated products (Canadian International Trade Tribunal 1991).

The Natural Products Marketing Act constitutes the British Columbia Marketing Board (BCMB). Concerning potatoes, the BCMB supervises the British Columbia Vegetable Marketing Commission, which has become the most important of the five boards that the BCMB supervises. The Commission is authorised to promote, control, and regulate the production, transportation, packing, storage and marketing of vegetable

³ As of June 5, 1997, the activities of the Alberta Fresh Vegetable Marketing Board have been suspended, after the 7-member board of directors resigned. While the Board continues to exist in principle, its office is closed and its regulatory authority will cease.

products, including both fresh and processed potatoes, provincially, interprovincially, and for export under the APM Act (Canadian International Trade Tribunal 1991). All regulated potato products being shipped into British Columbia or through British Columbia to the United States, must first be graded and packed in approved containers. In British Columbia, the movement of potato products requires transport permits. Any shipper/driver (from Alberta, for example) must obtain a British Columbia shipping permit upon entry to the province, whether the potatoes are destined for British Columbia, or are being moved through British Columbia into the United States.

Trade Policy, Issues and Patterns

In North America, a substantial amount of vegetable trade is captured in the potato sector. Because of this, it is important to examine some of the policy provisions and implications of fresh potato trade in North America. Vegetable (potato) trade between the US and Canada is governed through the North American Free Trade Agreement (NAFTA). The 1994 NAFTA encompasses the 1989 bi-lateral agreement between Canada and the US known as the Canada-US Free Trade Agreement (CFTA) and expands the CFTA to include Mexico as a third trading partner. Fresh potato trade between the US and Canada currently takes place under modest trade restrictions. Further, as negotiated under the CFTA, restrictions on fresh potato trade between the US and Canada are reduced as of January 1, 1998. In addition, the province of British Columbia has imposed antidumping duties on imports of fresh potatoes from Washington, Oregon, California and Idaho since 1984. The antidumping duties vary based on the difference between a calculated “normal value” and the export price for various varieties, packs and sources (USITC 1997).

Trade flow of potatoes between the US and Canada is generally accomplished without incident. Overall inspection and certification of potatoes for US import requirements is performed by Agriculture and Agri-Food Canada’s inspection service, and USDA officials certify US potatoes as meeting Canadian import requirements. A summary of the barriers to international trade in table potatoes is as follows:

1. Import tariff of \$7.72 per tonne (to be reduced to zero as of Jan. 1, 1998).
2. British Columbia’s antidumping duties.

3. Phytosanitary restrictions/standards.
4. Grading, labelling, packing and health standards.
5. Bulk shipment regulation.
6. Provincial transportation fees.

From an inter-province perspective, the barriers to trade include all of the above barriers except (1) and (2).

In the table stock and seed markets, Canada and the US have been each other's largest trading partners for a number of years. In the process market, while the US is Canada's target market, Japan is the US's largest market (Statistics Canada on-line: USDOC on-line).

Presently, there is a joint US-Canada Potato Council set up for the Canadian and US potato industries. The council examines issues and shares information on international potato trade, ensuring that programs and policies are clear and do not negatively affect trade (Zepp et al. 1995).

Although data concerning export trends of Alberta fresh potatoes, and import trends of the British Columbia fresh potato market are available from Statistics Canada, difficulties surround the documentation of inter-province trade statistics, specifically, volumes of trade flows between Alberta and British Columbia. The dearth of such information is a result of the lack of monitoring and reporting of such trade. In effect, volumes of fresh potatoes traded between provinces are unreported to any public agency.

Trade data linking Alberta and the State of Washington suggest that Alberta imports of table potatoes from Washington have been larger than exports. Recently, however, exports to Washington have been surging. Table potato exports from Alberta to Washington increased more than 300 percent in 1996 from year-earlier levels, rising above 2 thousand tonne in that year. British Columbia's import trade volumes from Washington from 1991 to 1996 appear consistently to have been in the 40 to 50 thousand metric tonne range. However, British Columbia's geographic position permits it to serve as an entry point for Washington fresh potatoes destined for various locations in western Canada. These destinations include British Columbia as well as Alberta, Saskatchewan and Manitoba. It is therefore difficult to assess recent import patterns of Washington potatoes into the British Columbia table potato market alone.

As in Alberta, British Columbia imports from Washington have consistently exceeded exports, which have been increasing steadily since 1991. The actual final destinations of these shipments however, cannot be told for certain. Therefore the 44,619 tonnes of table potatoes that were recently imported from Washington were not necessarily all destined for the British Columbia market, and thus were not necessarily consumed (or not all consumed) in British Columbia.

Alberta's Competitiveness in the British Columbia Market

Cost-Competitiveness

A comparison of the three regions allows at least a preliminary examination of the cost-competitiveness of each region with respect to the other. As shown below, the estimated total variable costs (TVC)⁴ of producing table potatoes in British Columbia, Alberta, Washington, and Idaho can be compared. These figures were estimated on a per tonne basis delivered to Vancouver, as per 1995 tariffs (Canada. Minister of Supply and Services. 1988) and transportation costs (Dixon 1997 and Herch 1997).

British Columbia	C\$171.84 per tonne
Alberta	C\$151.87 per tonne
Washington	C\$131.55 per tonne
Idaho	C\$161.16 per tonne

On average, these costs differ by C\$12 per tonne, and each region is relatively cost-competitive with one another in the British Columbia market. British Columbia has the highest average and total cost of production per tonne at \$172. From a cost perspective alone, Washington (State) is the most competitive region in the British Columbia fresh potato market with a TVC of \$132 per tonne (23% less than the cost to British Columbia growers).

Alberta and Idaho are about equally cost-competitive in the British Columbia market. While Alberta's average cost of production is slightly higher than Idaho's, transportation costs and an import tariff

⁴ Sources: British Columbia Ministry of Agriculture, Fisheries and Food 1994; Alberta Agriculture, Food and Rural Development 1995; Co-operative Extension, Washington State University 1993(?); Co-operative Extension, University of Idaho 1995.

for Idaho balance the total cost-competitiveness of the two regions (\$152 per tonne in Alberta as compared to \$162 per tonne in Idaho).

A potential for self-sufficiency in potato production in British Columbia exists, as the British Columbia climate and soil are excellent for growing a high quality potato. The high cost of production in all regions of British Columbia and the lack of import quotas from foreign potatoes, however, make it difficult for British Columbia producers to serve the entire local market. Large acreage and a long growing season exist in regions of the PNW, mainly Washington. This region also appears to have a cost structure that permits it to be cost-competitive in the British Columbia table potato market.

Supply of Table Potatoes to the British Columbia Market

A problem encountered in researching potato marketing and trade (as well as a wide variety of other agricultural products) is lack of information concerning inter-province movement of product within Canada. Neither exports nor imports moving between provinces are tabulated by any public agency. Though marketing boards may have some idea of the quantities moved in and out of the province by their producers, neither Statistics Canada nor Agriculture and Agri-Food Canada have reliable estimate these movements. For research in the potato sector, for example, inter-province product movement data would be useful to generate (with a high degree of confidence) supply and demand functions, provincial per capita consumption figures, and market shares. In the absence of these data, supply curves, per capita consumption, and the “size” of the British Columbia table potato market must be estimated based on the best information available. Appendix I illustrates a method for calculating a per capita consumption figure for the British Columbia fresh potato market (which in turn is used to estimate the size of this market) and lists the fresh potato per capita consumption figures for all provinces in Canada. British Columbia has the smallest fresh potato per capita consumption rate at 48.3 kg of fresh potatoes consumed per person per year. It has been suggested⁵ that the high percentage of Asian population in British Columbia leads to a lower per capita

⁵ In discussions with horticultural trade officials in government and the private sector.

consumption of potatoes in the province.⁶ With a 1996 British Columbia population of 3.7 million (Statistics Canada on-line), the size of the annual British Columbia fresh potato market is estimated at 181,731 tonnes.

Further manipulation reveals per capita consumption amounts for Alberta and British Columbia based on product specification in the potato sector (i.e., table potato per capita consumption versus process and seed potato per capita consumption). These estimates are based on the harvesting/ production patterns of the three potato types in the respective province. Trends reveal a breakdown of 24 percent to table potato production, 54 percent to process production and 22 percent to seed production (PGA 1996) in Alberta, but a different pattern is revealed in British Columbia. In British Columbia, 18.6 percent of fresh potatoes are produced for the processing sector, with 63.6 percent and 17.8 percent produced for the table and seed markets respectively. It is due to these differences between Alberta and British Columbia that per capita table potato consumption figures have been difficult to obtain and probably unreliable. Based solely on these production -consumption trends and population estimates, 12.2 kilograms of table potatoes were consumed per person in Alberta in 1996, while in British Columbia, 30.9 kilograms of table potatoes were consumed per person. This estimate suggests a table potato market of 116,416 tonnes in British Columbia in 1996 (see Appendix I).

Given the 1995 table potato production, cost of production estimates, and the short run elasticity of supply for potatoes (Heady et al. 1961; Tweeten 1970), supply functions for the three regions can be derived. Appendix II shows a comparison of the estimated supply functions for British Columbia, Alberta and Washington. Estimates of 1995 table potato production in Alberta and British Columbia are 61,700 tonne and 65,000 tonne respectively. As indicated, the 1995 cost of production estimates for these regions is \$C152 per tonne and \$C172 per tonne respectively. Applying the common slope for these functions, the supply relationships are produced. The interpretation of these relationships is that with a \$C20 per tonne increase in price for Alberta producers, an extra 16,000 tonne would be available to be supplied to the British Columbia market.

⁶ Statistics Canada estimates that 12.5 percent of British Columbia's population is Asian. The per capita consumption figures derived are based on the assumption that a Canadian resident of recent Asian-origin consumes 25 percent of the

The same type of analysis can be applied to nearby United States producers. Washington's 1995 table potato production was 1.05 mmt (94 percent greater than that of British Columbia) at a cost of production of \$C132 per tonne. Assuming a similar slope to the supply function, the supply relationships for Washington table potatoes is derived. Washington produces a large amount of potato output, and is highly competitive in potato production. Washington is unlikely, however, to provide the British Columbia market with all of the fresh product it would need to satisfy British Columbia demand. This is so for at least two reasons: (1) British Columbia consumers appear to prefer product from local sources (see later sections of this report); and (2) even significant price increases are unlikely to lead to major changes in Washington output, on the basis of the derived supply functions. An implication of the supply function derived for the State of Washington is that a \$C40 per tonne price increase to Washington producers would lead to increased supply of about 32,000 tonnes.

Market Integration

Recently, claims have been made that both the growing industry and the processing industry for fresh potatoes in Canada and the US are completely integrated.⁷ Conclusions of market integration can be drawn from non-price information that currently exists in the North American market for fresh potatoes, including trade flows and trends, product harmonisation, and cost-competitiveness between the two regions. In a recent submission into the competitiveness of the Canada-US fresh potato industry, it was contended that one of the most striking developments in the potato growing industry in recent years has been the development of a truly North American market, rather than separate US and Canadian markets (O'Melveny and Meyers 1997). Evidence of an integrated North American fresh potato market may be seen in the trade flows and patterns between the two countries over the last few years. It is evident from the export data that Canada and the US are trade partners in the fresh potato sector and that trade is relatively balanced. The average balance in quantities of fresh potato trade between the two countries was 8,430 tons, and C\$17,150 in value from 1993 to 1996.

fresh potatoes of a Canadian or non-Asian origin, thus modifying the per capita consumption figures in Canada to reflect inter-province differences in Asian-origin population.

More evidence of a closely related Canadian and US fresh potato industry may be implied through grade harmonization. The Potato Committee of the Canadian Horticultural Council has been meeting annually with the US National Potato Council to discuss grade harmonization. As a result, beginning January 1, 1995, the US and Canada have implemented a process of harmonizing grading standards for table stock potatoes. Ultimately, grading standards for Canada and US "No.1" graded potatoes will be completely harmonized (Cameron and Hornbostel 1997).

Finally, the cost-competitiveness of producing regions in both countries may imply some degree of market integration. As previously examined, the estimated total variable costs (TVC) of producing table potatoes in British Columbia, Alberta, Washington, and Idaho can be compared. In this case, when table potatoes are delivered to Vancouver these costs differ by C\$12 per tonne. In this case, each region is relatively cost-competitive with one another in the British Columbia market. Though a limited example, this type of analysis is relevant when considering the relatedness of the Canadian and US markets and may imply a degree of market integration.

Combined, these arguments make a case that suggests the North American fresh potato market is highly integrated. Further, these examples help to identify the current market situation that should potentially be encountered. In other words, by assuming a high degree of market integration, our analysis can help us to more easily identify trade distorting practices and/ or market imperfections. As it pertains to this study, the relevance of a completely integrated Canada-US potato market would imply equal opportunities to both PNW and Alberta producers in the British Columbia market, based on economies of size.

Market Preference Methodology

Stated preference (SP) models have become common in recent empirical research in such contexts as product marketing and environmental amenities assessment (Louviere 1988; Adamowicz, Louviere and

⁷ These claims were reported in formal submissions by both the Canadian Horticultural Council and the Food Institute of Canada in their submissions to the USITC's July 1997 investigation into the competitive conditions affecting the

Williams 1992; McFadden 1986). A stated preference model is a discrete choice model that simulates what a respondent is willing to do. The respondent does not make any behavioural changes, but simply states which of several alternatives he/she would select. The theory and logic of discrete choice experiments is discussed by Louviere (1981), Louviere and Hensher (1982), and Louviere and Woodworth (1983). Stated preference methods appears well suited to an assessment of the characteristics of table potatoes desired by British Columbia buyers.

Ideally, this approach would be applied to final purchasers of the table potatoes. For this study, cost and timeliness reasons required that the questionnaire be administered to wholesale buyers of table potatoes for the British Columbia market. The model consists of a survey that puts the respondent in different hypothetical buying situations (i.e., “As a buyer in the British Columbia table potato market, which potato would you buy, or would you choose not to buy either?”)⁸ As a result, buyer attributes as well as market changes are easily identified (Adamowicz et al. 1995).

Analytical Framework

The basis of stated preference analysis is the principle that choices can be modelled using a random utility framework. Ultimately, a utility function for the choices must be introduced with respect to the attributes and the levels of those choices. In Adamowicz et al. (1992) the theoretical utility function is represented as:

$$U_{in} = V [X_{in} + \epsilon X_{in}]$$

where, U_{in} = buyer n 's utility of choosing alternative product i
 V = the indirect utility function associated with the alternative
 X_{in} = a vector of attribute values for alternative i as viewed by respondent
 ϵ = a random element associated with error in measurements of utility

With respect to buyers' perceptions of alternative profiles of table potatoes in the British Columbia market, the utility function can be represented as:

Canadian and US fresh and processed potato industries (USITC 1997).

⁸See Appendix III.

$$U_i = \mathbf{b}_i [S_i + S_{z_i} + T_i + P] + \mathbf{e}$$

where: U_i = the British Columbia buyers' utility of choosing alternative potato profile i
 S_i = source of potato, $i=1$ is Alberta
 $i=2$ is British Columbia
 $i=3$ is Pacific northwestern US
 S_{z_i} = size of table potato, $i=1$ is small
 $i=2$ is medium
 $i=3$ is large
 T_i = Type of table potato, $i=1$ is white
 $i=2$ is red
 $i=3$ is yellow
 P = delivered price per hundredweight to Vancouver, British Columbia in Canadian dollars

The rationale for this survey is that there are various attributes of a table potato that result in the decision to purchase or not to purchase a particular potato. The importance of these attributes can be examined using a questionnaire to assess how purchasers make their buying decisions. For this reason, a survey instrument was constructed which varies these attributes to produce a set of scenarios that can be presented to potato buyers.

In the survey (see Appendix III), each question sets out three different alternatives involving profiles of table potatoes. The respondent is asked to choose the one alternative that best satisfies his or her needs for supplying table potatoes to the British Columbia market. Each respondent was asked to make 12 hypothetical selections. Choices A and B always differed, and each represented a combination of source, size, type, and price attributes for the potato profile. Each hypothetical selection involved a 'no' alternative, allowing the respondent to choose not to buy neither profile A nor profile B.

Results and Discussion

The results of the analytical research (the stated preference model) are displayed in the utility function format as previously described. Interpreting the results of the survey questionnaire, the utility function describing the preferences of the British Columbia buyers' is as follows:

$$U (BC Buyers') = -0.63 S_3 - 0.35 S_1 - 2.74 S_{z_3} - 1.59 S_{z_1} + 0.54 T_3 + 1.08 T_1 - 0.097 P$$

*(0.85) (0.67) (1.05) (0.75) (0.66) (0.71) (0.072)

* Standard errors in parentheses

where, U (*BC Buyers'*) = the British Columbia Buyers' choice utility
 S_i = source of the potato as compared to S_2 =British Columbia
 S_{z_i} = size of the potato as compared to S_{z_2} =medium
 T_i = type of potato as compared to T_2 =red
 P = delivered price per hundredweight to Vancouver, British Columbia in Canadian dollars

The utility function is set up to compare the levels or attributes within each factor, thus indicating the attribute, which is most preferred. The results of the model reveal that British Columbia is the preferred source for the British Columbia buyers, medium is the preferred size, and white is the preferred type. The utility function parameter estimates also allow for the inclusion of a price incentive that would bring the *less preferred* attributes within each factor up to the level of *most preferred*. As a result, the price of an Alberta grown table potato (of similar size and colour) is perceived to be equal to a British Columbia grown potato if it sells for \$0.35 less per hundredweight (\$7.70 less per tonne) than a British Columbia grown table potato. The same interpretation can be used for PNW grown potatoes. In this case, PNW table potatoes would need to be \$0.63 less per hundredweight (\$13.90 less per tonne) in order for them to be preferred *equally* to similar potatoes grown in British Columbia. A large price reduction (about \$2.74 per hundredweight) appears needed to make larger potatoes as attractive to buyers as medium size potatoes. A smaller, but still significant, reduction in price (about \$1.59 per hundredweight) appears needed to attract buyers to small, as compared to medium size, potatoes. A white potato is preferred, with yellow ranking next in desirability, and a red potato being the least preferred of the three alternatives. Thus, British Columbia grown, medium white potatoes appear to be preferred in the British Columbia market to the other alternatives described.

Conclusions

This paper examines the British Columbia table potato market and the opportunities that exist for Alberta producers. A cost-competitiveness study of British Columbia's main competitors, Alberta and the Pacific Northwestern States, reveals that costs in the British Columbia's potato industry are higher than those in nearby regions. Thus, a potential exists for cost-competitive sales into the British Columbia market by competing regions. Current trade patterns are helpful in understanding the changes now underway.

Internationally, the state of Washington ships a substantial number of table potatoes into the Canadian market, most of which are probably consumed in British Columbia. With the absence of interprovincial trade statistics, Alberta's share of this market is unknown. Non-tariff regulations may pose some, though probably modest, barriers to interprovincial trade between Alberta and British Columbia.

Per capita fresh potato consumption figures were calculated for all provinces and territories in Canada, revealing the lowest rate in British Columbia at 48.3 kilograms per person per year for fresh potatoes. However, as the third highest populated province in Canada, and given its relatively low domestic potato production, British Columbia represents a market with room for expansion for its competitors. In 1995, British Columbia produced approximately 102,300 tonne of fresh potatoes. With a fresh potato market size of 181,700 tonne, the potential for a quantity of 79,400 tonne to be supplied from other regions exists.

Further manipulation allowed for similar estimates for the table potato sector specifically. British Columbia reveals a 1996 per capita table potato consumption figure of 30.9 kilograms per person, and thus a table potato market size of 116,416 metric tonne. With in-province production of about 65,000 tonnes annually, the potential exists for an estimated 51,500 metric tonne of table potatoes to be supplied to the British Columbia market.

The supply analysis performed shows the cost-competitiveness of Alberta and PNW producers with British Columbia producers. Washington, a major potato-producing state, appears to be the lowest cost producer serving the British Columbia market. This kind of analysis allows for an indication of the kinds of trade flows that *could* be taking place between those regions *if* the British Columbia buyers were indifferent to the factors providing the make-up of the potatoes, based on the presumption of a highly integrated Canada-US potato market. In fact, buyers in the British Columbia market are not indifferent to these factors, and as a result the trade flows which could take place are significantly less than cost of production calculations would suggest. From the prospective of an Alberta potato producer, the buyers reporting to this study indicated there would need to be a \$7.70 per tonne lower price for potatoes grown in Alberta in order for these buyers to be as satisfied with Alberta grown potatoes as with equivalent potatoes grown in British Columbia.

As a result of a stated preference survey presented to most wholesale potato buyers for the British Columbia market, a preference for British Columbia grown, regular sized white potatoes was revealed. Also revealed was the presence of a higher degree of preference for an Alberta grown potato compared to a US grown potato of the same kind.

A final qualification: Inherently, economic models have limitations. The limitations of this model result mainly from low statistical power of the parameter estimates concerning BC buyers' preferences. A small sample size, (a small number of observations) along with an incomplete data set (not all surveys were returned) result in high standard errors for some of the parameter estimates, which in turn suggests care in interpreting the results of the survey. However, the direction of effects, if not their precise quantitative values, are likely to represent an accurate indication of the views of British Columbia buyers of table potatoes.

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Appendix I

Calculation of Per Capita Fresh and Table Potato Consumption, Canada and Provinces, 1996.

Assume: $C = [Y_{na}(X_{na})] + [Y_a(0.25X_a)]$ where: C= 1996 fresh potato pcc (Stat. Can.)
 Y_{na} = Non-Asian percent of population
 Y_a = Asian percent of population
 X_{na} = Non-Asian fresh potato pcc
 X_a = Asian fresh potato pcc

Step 1. From known Canadian fresh potato per capita consumption (pcc) figure, calculate non-Asian fresh potato pcc in Canada:

$C = [Y_{na}(X_{na})] + [Y_a(0.25X_a)]$ where: C= 1996 fresh potato pcc (Stat. Can.)
 Y_{na} = Non-Asian percent of population
 Y_a = Asian percent of population
 X_{na} = Non-Asian fresh potato pcc

$$(51.4) = [(0.921)(X_{na})] + [(0.079)(X_{na}/4)]$$

$$X_{na} = 54.64 \text{ kg/ person/ yr}$$

Step 2. Calculation of Asian fresh potato pcc in Canada:

$X_a = (X_{na}) * b$ where: X_{na} = Non-Asian fresh potato pcc
 X_a = Asian fresh potato pcc
b= Asian fresh potato pcc as a percentage of non-Asian fresh potato pcc

$$X_a = (54.64) * (0.25)$$

$$X_a = 13.66 \text{ kg/ person/ yr}$$

Step 3. Calculate provincial pc fresh potato consumption figures.

Assume: $C_p = [Y_{na}(X_{na})] + [Y_a(0.25X_a)]$ where: C_p = Provincial fresh pcc
 Y_{na} = Non-Asian percent of population
 Y_a = Asian percent of population
 X_{na} = Non-Asian fresh potato pcc
 X_a = Asian fresh potato pcc

Per Capita Fresh Potato Consumption, Canada and Provinces, 1996.

			Y_a	Y_{na}
NFLD.	54.3	kg/ person/ year	0.69%	99.31%
P.E.I.	54.2	kg/ person/ year	0.77%	99.23%
N.S.	53.8	kg/ person/ year	1.64%	98.36%
N.B.	54.3	kg/ person/ year	0.70%	99.30%
QUE.	52.6	kg/ person/ year	4.03%	95.97%
ONT.	49.6	kg/ person/ year	9.84%	90.16%
MAN.	51.9	kg/ person/ year	5.44%	94.56%
SASK.	53.5	kg/ person/ year	2.16%	97.84%
ALTA.	50.7	kg/ person/ year	7.74%	92.26%
B.C.	48.3	kg/ person/ year	12.46%	87.54%
YUKON	53.7	kg/ person/ year	1.91%	98.09%
N.W.T.	53.8	kg/ person/ year	1.72%	98.28%

Appendix I -- con't

Step 4. Conversion of fresh potato pcc to table potato pcc for British Columbia.

Know: total fresh pcc --- process pcc --- 19 percent of total fresh pcc
table pcc --- **64 percent of total fresh pcc**
seed pcc --- 17 percent of total fresh pcc

Assume: $BC_{tpcc} = BC_{fpcc} * (\beta)$ where: BC_{tpcc} = British Columbia table potato pcc
 BC_{fpcc} = known British Columbia fresh potato pcc
 β = share of fresh potato production captured by table potatoes (Source: BCMAFF)

$$BC_{tpcc} = 48.3 * (0.64)$$

$$BC_{tpcc} = 30.9 \text{ kg/ person/ year}$$

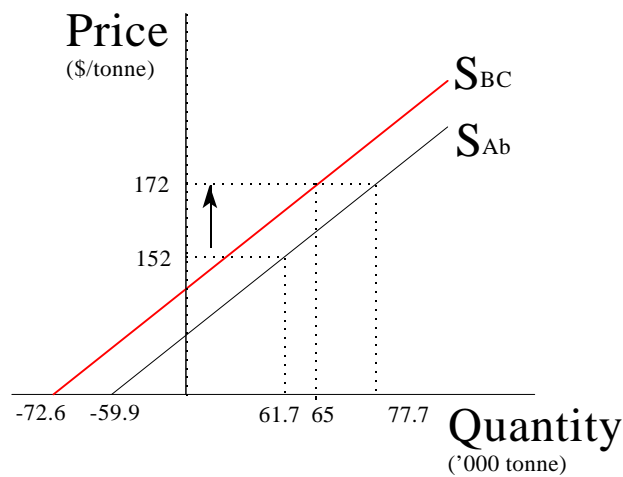
Step 5. Estimated size of British Columbia table potato market.

Assume: $MS = PCC_t * Pop$ where: MS = size of table potato market in metric tonne
 PCC_t = per capita consumption of table potatoes
Pop = population as of 1996 (number of persons)

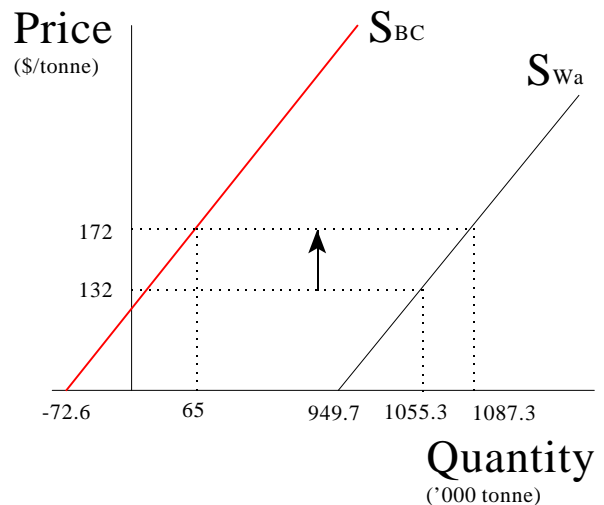
$$MS = (30.9) * (3,766,044)$$

$$MS = 116,416 \text{ metric tonne}$$

Appendix II - Estimated Supply Functions, British Columbia, Washington, Alberta



Estimated British Columbia and Alberta Supply Functions



Estimated British Columbia and Washington Supply Functions

Appendix III

Survey Questionnaire with Accompanying Cover Letter

July 31, 1996

Attention: _____ :

As part of a research project supported by Western Canadian potato producers, we are trying to assess the importance of several factors in the purchase of table potatoes. Our assessment involves a survey, which we are sending out to five (5) prospective buyers.

The survey, which follows, consists of twelve (12) hypothetical situations in which a buyer in the British Columbia fresh potato market could be faced with. Each hypothetical situation, or scenario, consists of a variation of four (4) fresh potato characteristics or attributes. A brief explanation of each attribute is as follows:

Source	Area in which the potatoes were grown
Size	Can#1 <i>small</i> - 1½ to 2¼ in. diameter <i>regular</i> - 2¼ to 3½ in. diameter for round varieties, 2 to 3½ in. diameter for long varieties, where at least 60% have a diameter of 2¼ in. <i>large</i> - 3 to 4½ in. diameter
Type	White fleshed 'baker' types: Russet Burbank, Russet Norkotah varieties Red-skinned: Red Norland variety Yellow fleshed: Yukon Gold, Bintje varieties Early season: Superior, Carlton varieties
Price	Wholesale price per jute (100 lb. sack) in Canadian dollars delivered to the Vancouver area

All potatoes are graded Canada #1 or Yellow where Canadian grade standards apply. Assume that there are no sources of table potatoes available to choose from other than the two (2) presented to you. Assume that the selected choice best satisfies your needs for purchasing table potatoes for your market.

Please return this completed survey to us either by fax or mail as soon as possible. We respect your need for anonymity and no individual person or firm will be identified in our report.

Thank you for your co-operation.

Sincere regards,

Kevin J. Dunlevy
Research associate
University of Alberta

Survey: Assessing British Columbia Wholesale Buyer's Preferred Table Potato Attributes

Scenario 1:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	British Columbia	[I would choose
Size	small	regular	not to buy]
Type	yellow fleshed	yellow fleshed	
Delivered price	C\$15	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 2:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	Alberta	[I would choose
Size	small	small	not to buy]
Type	yellow fleshed	white fleshed	
Delivered price	C\$25	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 3:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	British Columbia	[I would choose
Size	regular	small	not to buy]
Type	red skinned	yellow fleshed	
Delivered price	C\$20	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 4:	CHOICE A	CHOICE B	CHOICE C
Source	British Columbia	PNW	[I would choose
Size	small	large	not to buy]
Type	white fleshed	white fleshed	
Delivered price	C\$25	C\$20	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 5:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	Alberta	[I would choose
Size	regular	regular	not to buy]
Type	yellow fleshed	red skinned	
Delivered price	C\$15	C\$15	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 6:	CHOICE A	CHOICE B	CHOICE C
Source	Alberta	Alberta	[I would choose
Size	small	regular	not to buy]
Type	white fleshed	white fleshed	
Delivered price	C\$20	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____
Scenario 7:	CHOICE A	CHOICE B	CHOICE C
Source	PNW	Alberta	[I would choose

Size	regular	small	not to buy]
Type	white fleshed	yellow fleshed	
Delivered price	C\$15	C\$15	
<i>I would buy (check one)</i>	_____	_____	_____

Scenario 8:	CHOICE A	CHOICE B	CHOICE C
--------------------	-----------------	-----------------	-----------------

Source	British Columbia	British Columbia	[I would choose
Size	regular	small	not to buy]
Type	red skinned	white fleshed	
Delivered price	C\$25	C\$15	
<i>I would buy (check one)</i>	_____	_____	_____

Scenario 9:	CHOICE A	CHOICE B	CHOICE C
--------------------	-----------------	-----------------	-----------------

Source	PNW	British Columbia	[I would choose
Size	regular	large	not to buy]
Type	white fleshed	red skinned	
Delivered price	C\$20	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____

Scenario 10:	CHOICE A	CHOICE B	CHOICE C
---------------------	-----------------	-----------------	-----------------

Source	PNW	British Columbia	[I would choose
Size	small	small	not to buy]
Type	white fleshed	yellow fleshed	
Delivered price	C\$15	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____

Scenario 11:	CHOICE A	CHOICE B	CHOICE C
---------------------	-----------------	-----------------	-----------------

Source	British Columbia	PNW	[I would choose
Size	small	regular	not to buy]
Type	white fleshed	yellow fleshed	
Delivered price	C\$20	C\$15	
<i>I would buy (check one)</i>	_____	_____	_____

Scenario 12:	CHOICE A	CHOICE B	CHOICE C
---------------------	-----------------	-----------------	-----------------

Source	Alberta	British Columbia	[I would choose
Size	large	large	not to buy]
Type	white fleshed	yellow fleshed	
Delivered price	C\$25	C\$25	
<i>I would buy (check one)</i>	_____	_____	_____