# Starch and Related Products



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Canada



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I N D U S T R Y P R O F I L E

1990–1991



# STARCH AND RELATED PRODUCTS

## FOREWORD

*In a rapidly changing global trade environment, the international competitiveness of Canadian industry is the key to growth and prosperity. Promoting improved performance by Canadian firms in the global marketplace is a central element of the mandates of Industry, Science and Technology Canada and International Trade Canada. This Industry Profile is one of a series of papers in which Industry, Science and Technology Canada assesses, in a summary form, the current competitiveness of Canada's industrial sectors, taking into account technological, human resource and other critical factors. Industry, Science and Technology Canada and International Trade Canada assess the most recent changes in access to markets, including the implications of the Canada-U.S. Free Trade Agreement. Industry participants were consulted in the preparation of the profiles.*

*Ensuring that Canada remains prosperous over the next decade and into the next century is a challenge that affects us all. These profiles are intended to be informative and to serve as a basis for discussion of industrial prospects, strategic directions and the need for new approaches. This 1990–1991 series represents an updating and revision of the series published in 1988–1989. The Government will continue to update the series on a regular basis.*

Michael H. Wilson
Minister of Industry, Science and Technology
and Minister for International Trade

## Structure and Performance

### Structure

The Canadian starch and related products industry consists of firms engaged in the processing of corn, wheat, field peas and potatoes to produce starch and its derivatives. The immediate co-products derived from the separation of starch are fibre, protein and corn germ. Most firms also carry out further processing to extract products such as modified starches, sweeteners and vegetable oil.

Starch production is the common denominator for companies covered in this industry profile. In some cases, the related products may be of greater value than starch production. The related products vary with the source of raw material.

The corn wet-milling subsector produces corn starch, sweeteners (glucose, fructose, dextrose), corn gluten and corn oil. It consumes approximately one million tonnes of corn annually, valued at current prices at about $100 million. Corn starch is the major form of starch used in Canada. Industrial use (80 percent by the paper and corrugated box manufacturing industries) accounts for 75 percent of all starch consumed in Canada; the balance is used in the food industry. Confectionery manufacturers and fruit and vegetable processors account for roughly one-third of food industry starch consumption, followed by bakeries, biscuit manufacturers and other food processors.

The Canadian food processing sector also uses corn-derived sweeteners in large quantities. Glucose is used by confectioners, ice cream manufacturers, fruit and vegetable processors, brewers, biscuit manufacturers and

miscellaneous food processors. High-fructose corn syrup (HFCS) is used primarily by soft drink manufacturers. Dextrose is also used in the food industry. Dextrines, also produced through the corn wet-milling process, are used in the adhesive and textile finishing industries. Corn gluten is used in the animal feed industry, while corn oil is sold in refined form as a cooking or salad oil, or as shortening.

Producers of wheat starch and gluten consume approximately 150 000 tonnes of wheat annually, worth from $17 million to $20 million at 1990 prices. Wheat starch is used primarily in industrial applications, although its use in food is increasing. Dextrines are also made from wheat starch. Gluten is used as a bakery additive (in flour fortification and baking mixes), in pasta, in pet food and as a meat extender.

Pea starch production uses a varying portion of the annual output of field pea producers in Western Canada. The co-products of pea starch, namely pea fibre, protein and flour, are used in dietetic foods, fortified breads, industrial processes and animal feed supplements. Pea starch manufacturing in Canada is a relatively innovative process, using a novel raw material source to satisfy markets requiring a high-protein, high-fibre content.

Potato starch manufacturing uses cull potatoes or cutting wastes from processing operations that would otherwise be useful only for fodder or disposed of as effluent. The residue from potato starch production is used in animal feed.

In Canada, five firms manufacture starch and related products at nine plants, with a total employment of approximately 800 people in 1990. Two of the firms are wholly owned subsidiaries of U.S. multinationals. The top three manufacturers account for approximately 95 percent of domestic production capacity. The only vertical integration in the industry (for the purpose of procuring raw materials) is found in wheat and potato starch and gluten production.

Industry shipment figures are not available from Statistics Canada; however, the 1990 value of total industry production is estimated at $350 million (Figure 1). Exports in 1990 were $113 million. The major market is the United States, with other markets also in Japan and Europe. Principal export items are HFCS, wheat gluten and wheat starch. Imports amounted to $108 million in 1990, mostly starch and dextrose. The United States is the major source of imports, followed by the European Community, with some tropical starches coming from Asia.

Approximately 75 percent of production is centred in Ontario, but New Brunswick, Quebec, Saskatchewan and Manitoba each have one plant. There are regional differences based on the raw material used. The Manitoba and Saskatchewan plants use field peas for raw material while the New Brunswick plant relies on potato waste. The plant

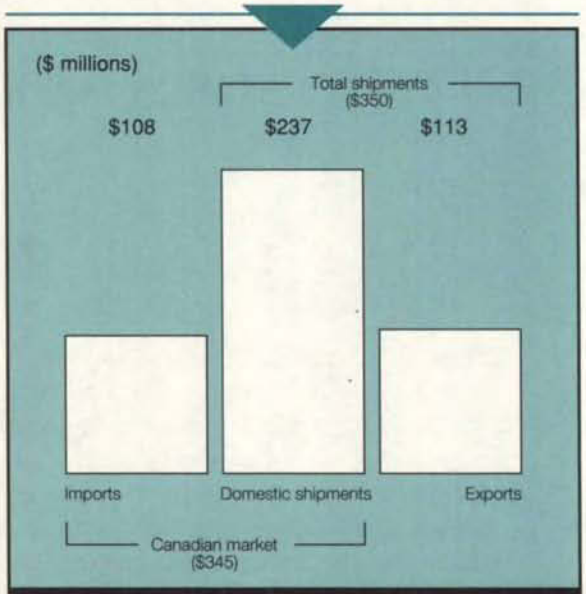

*Figure 1 — Imports, Exports and Domestic Shipments, 1990*

in Quebec and one of the plants in Ontario are based on wheat, and the other Ontario plants use corn. Plant location reflects raw material availability, proximity of markets and transportation costs.

**Performance**

The starch industry has undergone significant expansion since 1975, particularly of corn wet-milling capacity, which doubled from roughly 1 500 to 3 000 tonnes per day. This increase was the result of capital investment that grew by some $225 million between 1975 and the early 1980s. In addition, the efficiency of older wet-milling plants has been improved with extensive installations of electronic process monitoring and control equipment. This expansion was due to increasing opportunities for corn-based sweeteners to replace sucrose (sugar) in the food processing sector.

Investment in the pea starch subsector has been less dramatic, with total capital investment at less than $10 million from its inception in about 1975 to the present. Area planted to field peas has increased substantially, primarily as a result of the export demand for peas.

The capital stock in the wheat starch subsector is estimated at between $60 million and $70 million on a replacement cost basis. Increasing world use of wheat starch and wheat gluten improves prospects for expansion in this industry.

Until 1980, exports of starches were considered negligible, accounting for 1 percent of production at most. Since 1980, the northeastern United States has become a market for modest quantities of wheat and corn starch as a result of the

increase in production at Canadian plants in Ontario and Quebec. More recently, some pea starch has been exported to the United States and Japan.

Wheat gluten exports account for approximately 75 percent of production of this product. Exports in recent years have been primarily to the United States, with additional markets in Mexico, Japan, Thailand, Taiwan and France.

Producers of pea starch are also increasing their exports, moving food-grade protein and fibre products into Japan, Europe and the United States.

The export market is particularly important for co-products and by-products of corn starch production. The U.S. market for sweeteners derived from corn, particularly HFCS, mushroomed in 1983, with exports to the United States increasing from approximately $1 million in 1981 to about $25 million in 1983. The United States continues to account for significant quantities of Canadian exports of HFCS, which totalled $59 million in 1990. The price competitiveness of these exports has been greatly aided by the U.S. government sugar program, which has maintained a high domestic price for sugar. In addition, by-products of the corn wet-milling process are exported, including corn germ to the United States for oil extraction and corn gluten feed to the United Kingdom, Japan and the United States.

The profitability of the starch industry is highly dependent on raw material costs. Historically, corn starch producers have purchased local corn at prices in line with those of their U.S. competitors. In 1986, a countervailing duty (CVD) on U.S. corn was imposed as a result of a countervailing duty investigation. The duty expired in March 1992.

Profitability also depends greatly on returns for derived products such as glucose and fructose. The substitution of these products for sucrose now appears to have levelled off. The addition of two new corn wet-milling plants in Canada, as well as several new plants in the United States since 1979, has heightened competition in the Canadian market. These factors have significantly affected profitability and investment in this industry.

## Strengths and Weaknesses

### Structural Factors

Competitiveness in the starch industry depends on raw material costs, transportation, scale of operations and processing technology. A related factor is the opportunity for further processing of starch into higher-value co-products.

Corn starch manufacturers purchase corn locally from producers or merchandisers. Smaller quantities of corn are imported from the United States to fill particular needs. Pea starch manufacturers contract directly with growers for supplies of field peas, while the one potato starch producer is also a potato dealer who uses cull potatoes and cutting wastes for starch production.

Canadian starch manufacturers are located near their raw material suppliers (pea and potato starch) or their markets (wheat starch) or both (corn starch). For the pea processing industry, the *Western Grain Transportation Act* provides favourable freight rates both for the finished product and for moving the raw materials to processors.

The relatively small-scale operations of Canadian plants could be considered their major structural weakness. There are a greater number of U.S. plants, and most of them are larger than the largest Canadian plant. Their size advantage as well as their greater specialization result in economies of scale not available to Canadian plants. For example, U.S. corn starch manufacturers specialize in a limited range of products that are produced in large quantities and sold at low margins. Plants are run at full capacity to keep production costs low. Canadian manufacturers, by contrast, generally produce a wider range of products to satisfy the Canadian market.

In the area of process technology, Canadian starch manufacturers have not diversified into new end products (e.g., alcohol and chemicals) to the same extent as U.S. manufacturers.

As corn starch is the major starch produced for the Canadian market, its price largely determines the price of all primary starches produced in Canada. However, the price of Canadian corn starch is itself strongly influenced by the U.S. price because of the large U.S. corn starch production and the prominence of American starch in total world production. The U.S. price is in turn determined by the price of corn in the Chicago market. Therefore, Canadian starch producers are subject to price competition from imported U.S. corn-based starches and sweeteners. This pressure on the Canadian industry decreases as plants shift production away from widely produced starches to specialty areas featuring wheat gluten, HFCS or pea protein and fibre.

### Trade-Related Factors

Import tariffs on widely produced, low-value-added starches in Canada and the United States are generally not high enough to present significant trade barriers. The Canadian tariff on these starches is one cent per pound, with the exceptions of sago and cassava starches (tropical starches not produced in North America), which have a tariff of 0.84 cents per pound, and etherified or esterified starches, at 12.5 percent ad valorem. U.S. Most Favoured Nation (MFN) tariffs are 0.4 cents per pound for potato starch and 0.55 cents per pound for other starches, with the exception of cassava and sago starches, which are duty-free.

Canadian and U.S. tariffs for starch co-products are higher than those for low-value-added starches, providing more effective protection to producers. Canadian tariffs on the major co-products are 17.5 percent ad valorem for wheat gluten and 1.5 cents per pound for glucose and fructose. U.S. tariffs are 6 percent for glucose and fructose and 8 percent ad valorem for wheat gluten for human consumption. U.S. tariffs on wheat gluten for pet food are 4 percent ad valorem.

Under the Canada-U.S. Free Trade Agreement (FTA), tariffs are being eliminated, beginning on 1 January 1989, in five or ten equal, annual steps, depending on the product.

Japanese and European tariffs on starch and co-products present more formidable trade barriers than those in the United States and Canada. Japan imposes a tariff on imports of starch and wheat gluten, which is currently 25 percent ad valorem but is not bound under the General Agreement on Tariffs and Trade. The European Community (EC) imposes variable levies on starch and wheat gluten imports. The present EC levy for corn and potato starch is 238.5 European currency units (ECUs) per tonne ($369.68 per tonne) and that for wheat starch is 305.21 ECUs ($473.08) per tonne, while the levy on wheat gluten is 698.9 ECUs ($1 083.30) per tonne.

The Canadian industry faces no known significant non-tariff barriers (NTBs) in the United States. Exports of Canadian wheat gluten, however, are facing competition from EC exports that are subsidized by their governments as a result of increased European production of wheat starch and gluten. Japan has a quota on starch imports, which may limit Canadian exports in the future.

Effective May 1991, as a result of Section 705 of the FTA, import permits are no longer required on wheat starch and gluten from the United States. Section 705 called for the removal of Canadian import permits when subsidies to Canadian wheat producers were equal to or greater than those to U.S. wheat producers.

Canadian companies have turned to specialization in related primary or higher-value-added products. Exports of these products, including wheat gluten, dietary fibre, HFCS and modified starches and proteins, outweigh the imports of lower-value-added starches from sago, cassava and potatoes. Under the FTA, the remaining Canadian and U.S. tariffs on starch and its co-products will be eliminated between 1993 and 1998.

### Technological Factors

The focus of research and development in the Canadian starch industry has been on the use of enzymatic processes and the refinement of the physical properties of starch, such as its particle size and solubility, to suit special end uses. New product applications include the use of corn starch as a biodegradable packaging material.

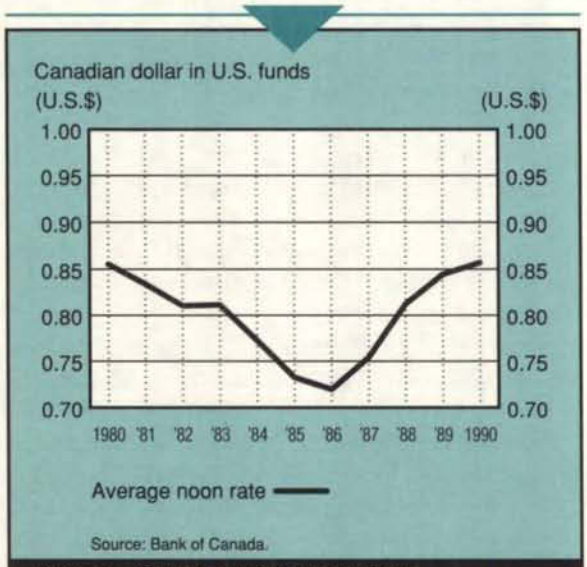

*Figure 2 — Canadian–U.S. Exchange Rates*

Corn wet-millers, particularly those in the United States, are widening the range of their co-products to include ethanol, biochemicals and lysine. This diversification will provide increased flexibility to meet changing market conditions.

### Other Factors

The industry has expressed concern about the relatively higher value of the Canadian dollar in recent periods vis-à-vis the American dollar (Figure 2). On the other hand, under certain economic conditions, it is widely recognized that a significantly lower value is likely to be inflationary. The resulting higher domestic costs and prices can erode, over time, the short-term competitive gains of such a lower-valued dollar. In addition, the effects of a strong Canadian dollar are offset somewhat by cheaper raw material prices.

## Evolving Environment

Major change is not foreseen in the market for corn-based starches and sweeteners. The use of corn-based sweeteners has levelled off, as the replacement of sucrose (sugar) with fructose now appears to have stabilized. The development of crystalline fructose opens the way for the replacement of granular sugar for cooking and table uses. At present, fructose is produced primarily as a syrup for use in food processing. One problem with crystalline fructose has been its tendency to absorb moisture.

The U.S. domestic sugar program, which maintains high domestic prices, has provided a sizable export market for

Canadian fructose. Artificial sweeteners such as aspartame are increasing the competition facing corn-based sweeteners in both domestic and export markets.

In the United States, corn wet-millers are using sweeteners as a feedstock for biochemical production.

The use of starch in biodegradable packaging, an area of considerable promise, has been restrained because of problems encountered with the degradation of starch-based plastics in municipal landfill sites. The move to composting in solid-waste management may provide new opportunities for starch-based products, since they degrade more readily under such conditions.

Starch is also being modified to act as a fat replacement in food products.

Expansion in wheat gluten production has occurred recently in Canada. Developments in baking technology are allowing the use of medium-protein wheat flour fortified with wheat gluten. The addition of gluten increases the protein content of the flour and reduces the dependence of flour millers and bakers on high-protein wheat. Competition from subsidized EC wheat gluten exports is expected to continue.

The demand for more dietary fibre and protein in human nutrition has created product and marketing opportunities for pea processors. The addition of a second pea processor in Western Canada will provide further capacity to meet market opportunities. Regulation of nutritional claims in labelling and advertising will have an impact upon pea processors in marketing dietary fibre and protein concentrates.

Peas are not traded on commodity exchanges and, as a result, are not suffering the same depressed prices experienced by publicly traded cereal grains and oilseeds due to international export subsidies. Extreme competitive pressures are being experienced by pea processors on both starch and protein products from U.S. starch and soymeal manufacturers, who benefit from the use of low-priced cereals and oilseeds.

Fluctuations in potato prices and crop output are expected to continue to restrain starch production from this crop. Supply management for potatoes, which would set prices according to a cost-of-production formula, could raise input prices for this industry and hamper competitiveness. To date, the proposed supply management scheme has not proceeded beyond the stage of public hearings and excludes processing potatoes.

An area of potential expansion for the corn wet-milling subsector is in the production of fuel ethanol from corn. With the elimination of lead from gasoline, ethanol blended with methanol is being promoted by the corn industry as a replacement for lead as an octane enhancer. Ethanol has not been competitive as a partial replacement for gasoline without special tax treatment, as has been accorded in some U.S. states to gasoline refiners. Increases in crude oil prices may improve prospects for blending ethanol with gasoline.

As the major industrial user of starch in Canada, the paper sector should continue to be a cyclical but relatively stable market under the FTA. The brewing industry, which primarily uses sweeteners, will not be directly affected by the FTA, although there is pressure on a multilateral basis for changes to the trading environment under which this industry operates.

U.S. tariff elimination under the FTA could augment regional market opportunities in the United States for Canadian potato and pea starch producers.

At the time of writing, the Canadian and U.S. economies were showing signs of recovering from a recessionary period. During the recession, companies in the industry generally experienced reduced demand for their outputs, in addition to longer-term underlying pressures to adjust. In some cases, the cyclical pressures may have accelerated adjustments and restructuring. With the signs of recovery, though still uneven, the medium-term outlook will correspondingly improve. The overall impact on the industry will depend on the pace of the recovery.

## Competitiveness Assessment

The Canadian corn starch and corn wet-milling subsectors in general will be internationally competitive with access to corn at prices comparable with those in the United States. With the expiration of the CVD's, the traditional pricing arrangement and comparability between U.S. and Canadian corn is expected to resume. The elimination of corn tariffs under the FTA will challenge the rest of the industry to restructure to face greater competition and opportunities in the United States, such as those offered through greater specialization in further downstream products.

The wheat starch and wheat gluten subsector is competitive in domestic and export markets at present, although subsidized European competition is a major threat. The elimination of Canadian import controls for wheat starch and gluten could lead to increased challenges in the domestic market. Lower wheat prices, as a result of the new domestic wheat pricing policy, will contribute to strengthening the competitive position of the industry.

The potato and pea starch producers should continue to be competitive under the FTA, although any technological advantage enjoyed by pea processors may be partially offset by lower raw material costs available to their U.S. competitors.

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## PRINCIPAL STATISTICS[a]

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|
| Establishments | 10 | 10 | 10 | 9 | 9 | 9 | 9 | 9 |
| Employment | 1 100 | 1 100 | 1 000 | 1 000 | 1 000 | 1 000 | 1 000 | 800 |
| Shipments[b] ($ millions) | 71 | 75 | 75 | N/A | N/A | N/A | N/A | 350 |

[a]All data are based on ISTC estimates. This profile deals with products manufactured primarily by establishments classified to other food industries, SIC 1099 (see *Standard Industrial Classification, 1980*, Statistics Canada Catalogue No. 12-501).

[b]Shipments data for 1983 to 1985 are for starch only; data for 1990 are for starch and co-products.

N/A: not available

## TRADE STATISTICS

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988[a] | 1989[a] | 1990[a] |
|---|---|---|---|---|---|---|---|---|
| Exports[b] ($ millions) | N/A | N/A | N/A | N/A | N/A | 83 | 112 | 113 |
| Domestic shipments ($ millions) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 237 |
| Imports[c] ($ millions) | 6 | 13 | 16 | 36 | 37 | 81 | 86 | 108 |
| Canadian market ($ millions) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 345 |
| Exports (% of shipments) | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 32 |
| Imports (% of Canadian market) | 8 | 15 | 18 | N/A | N/A | N/A | N/A | 31 |

[a]It is important to note that data for 1988 and after are based on the Harmonized Commodity Description and Coding System (HS). Prior to 1988, the shipments, exports and imports data were classified using the Industrial Commodity Classification (ICC), the Export Commodity Classification (XCC) and the Canadian International Trade Classification (CITC), respectively. Although the data are shown as a continuous historical series, users are reminded that HS and previous classifications are not fully compatible. Therefore, changes in the levels for 1988 and after reflect not only changes in shipment, export and import trends, but also changes in the classification systems. It is impossible to assess with any degree of precision the respective contribution of each of these two factors to the total reported changes in these levels.

[b]See *Exports by Commodity*, Statistics Canada Catalogue No. 65-004, monthly. Separate data on starch and co-products were not collected prior to 1988.

[c]See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly. Imports for 1983 to 1985 are for starch only to ensure comparability with data on shipments.

N/A: not available

## SOURCES OF IMPORTS[a] (% of total value)

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|
| United States | 83 | 90 | 73 | 80 | 81 | 85 | 89 | 91 |
| European Community | 6 | 4 | 24 | 17 | 16 | 12 | 8 | 7 |
| Other | 11 | 6 | 3 | 3 | 3 | 3 | 3 | 2 |

[a]See *Imports by Commodity*, Statistics Canada Catalogue No. 65-007, monthly.

## DESTINATIONS OF EXPORTS[a] (% of total value)

| | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 |
|---|---|---|---|---|---|---|---|---|
| United States | N/A | N/A | N/A | N/A | N/A | 92 | 98 | 98 |
| European Community | N/A | N/A | N/A | N/A | N/A | 6 | 1 | 1 |
| Other | N/A | N/A | N/A | N/A | N/A | 2 | 1 | 1 |

[a]See *Exports by Commodity*, Statistics Canada Catalogue No. 65-004, monthly.
N/A: not available

## MAJOR FIRMS

| Name | Country of ownership | Location of major plants |
|---|---|---|
| CASCO Div. of Canada Starch Operating Company Inc. | United States | Cardinal, Ontario<br>London, Ontario<br>Port Colborne, Ontario |
| Nacan Products Limited | United States | Collingwood, Ontario |
| Ogilvie Mills Limited | Canada | Candiac, Quebec<br>Portage la Prairie, Manitoba<br>Thunder Bay, Ontario |
| Parrheim Foods | Canada | Saskatoon, Saskatchewan |
| F.W. Pirie Co. Ltd. | Canada | Grand Falls, New Brunswick |

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