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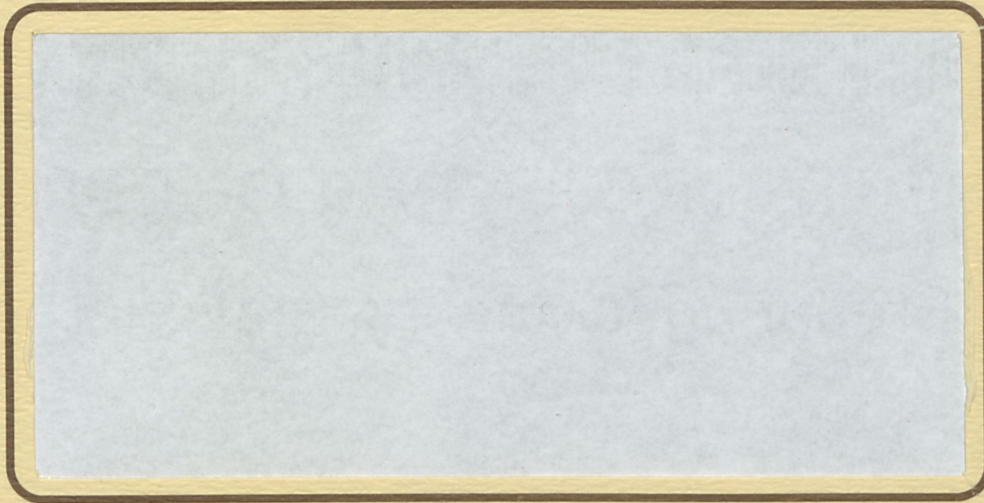
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# RURAL ECONOMY



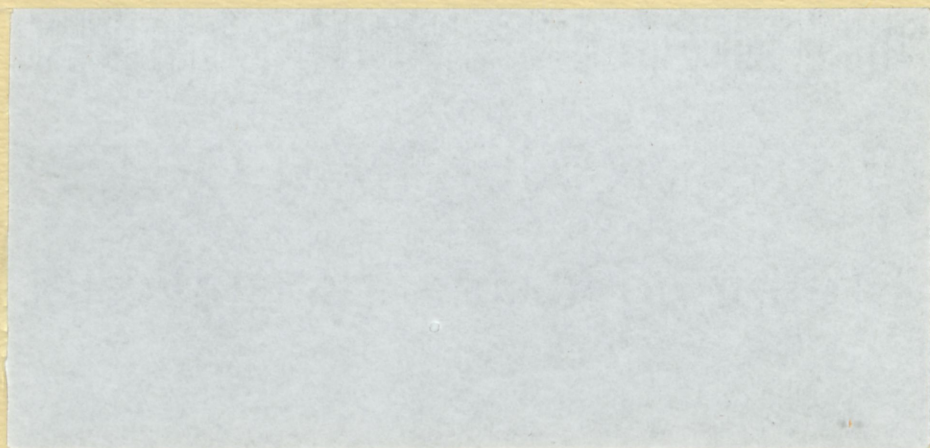
## PROJECT REPORT

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**Preparing for the International Market:  
Trade in Malt and Malting Barley**

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Project Report 90-11

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## Executive Summary

The Canadian malting industry is small, but with significant export markets. However, the varieties of Canadian malting barley traditionally grown, 6-rowed, blue aleurone, have limited the export market, since brewers require consistent malt types to produce consistent beer, and much of the world uses 2-rowed white aleurone varieties. However, Canadian farmers have begun to grow 2-rowed, blue aleurone varieties, for which there is greater international demand. A high yielding 2-rowed or 6-rowed white aleurone variety might also expand Canadian malt and malting barley markets. Another factor affecting the Canadian export markets could be the higher protein levels in Canadian barley.

A relatively small and protected domestic market, with an oligopolistic market structure at both the malting and brewing industry levels, coupled with extensive regulation of the input and output markets by the Canadian Wheat Board (CWB) and provincial liquor boards, has both hindered and helped the domestic malting industry. The opening up of the Canadian market to more liberalized trade through the Free Trade Agreement or other means could provide opportunities for Canadian maltsters, but largely through the restructuring it may impose on the domestic brewing and malting industries.

The potential of the international market for growth will be a function of rising incomes and population in areas such as Asia and Latin America. Intense price competition from subsidized European and American barley is a negative factor for Canadian exports. However, the ability of the CWB and Canadian maltsters to develop markets for their malting barley and malt, with its distinctive characteristics is also important. The extent to which Canadian malting barley or more importantly, malt, is a differentiated product on the world market, and cost factors will determine the future of the Canadian malting barley and malt industries.

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## Introduction

Barley production is second only to wheat in Canada's grain industry. It is of major importance in the prairie provinces, where almost 90% of Canadian barley is produced. Alberta accounts for approximately 50% of prairie production (Statistics Canada 22-201, 1988-89). In 1989 barley sales added 683 million dollars to farm cash receipts, approximately 3% of farmer's gross income in that year (Statistics Canada 11-010, October 1990). The price premium paid for malting barley accounts for approximately \$40 to \$50 million, or 5% of gross revenue from barley (DRIE, 1987, p. 9).

Barley along with canola are the major production substitutes to wheat in Canada. Barley has the advantages of growing better on saline soil and being more drought resistant than either wheat or canola. Due to its shorter maturing time, barley can be grown in areas with fewer frost free days, or on rolling land where the hollows freeze earlier in the growing season. Barley also has a higher yield per hectare than either canola or wheat and may require less chemical inputs. The relatively lower cost of producing barley can be a deciding factor in the determination of what to plant during years of cash flow shortages. The fact that barley can be sold directly as feed, rather than through the Canadian Wheat Board's (CWB's) quota system, gives it the potential for being a cash crop. This adds flexibility to decision-making on farms which produce barley.

The relatively higher economic return to the farmer for malt versus feed barley has been sufficient to encourage the substitution of malting for feed varieties in planting. Other factors such as maltster support of research to develop new Canadian barley varieties have contributed to extensive use of malting varieties in Canada. Moreover, improved malting varieties developed through plant breeding have reduced considerably the yield trade-off between feed and malting varieties, the latter traditionally having lower yields.

Since 1967, the quantity of barley used for feed in Canada has increased by approximately 50% while the quantity of barley used by the domestic malting industry has shown only a modest increase (Wilson, 1983a, p. 9). However malt barley and malt have increased in importance as Canadian exports. Canada is the world's second largest exporter of malting barley (Grain Marketing Office, 1980, p. 1) and the sixth or seventh largest exporter of malt (*FAO Trade Yearbook*, 1986). Canada exports about 40% of her malt production (Canada Grains Council, 1989). Canadian exports fell between 1984 and 1986 as did shipments. However, exports have recently shown some improvement (Industry, Science and Technology Canada, 1988b, p. 1). The malt industry employed between 500 and 600 workers in 1987. Value added processing in 1982 was estimated to be worth about \$90 million (DRIE, 1987, p. 10-11) (Graphs 1, 2, and 3).

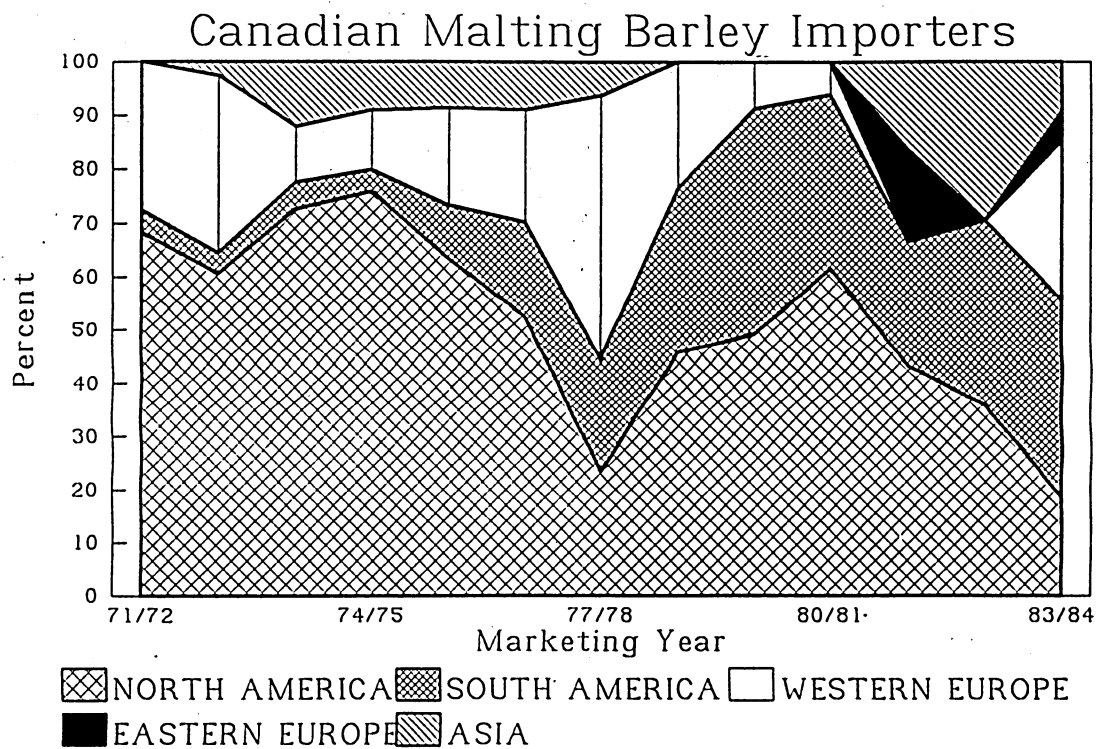
The Canadian brewing industry employed about 13,982 workers directly and another 6,250 workers in distribution and retailing agencies, and added over \$700 million to gross domestic product in 1986 (Industry, Science and Technology Canada, 1988a, p. 6).

Given the role of malting barley and the associated malting and brewing industries to Canada, relatively little research has been done in the area of marketing and in particular export marketing. This report examines Canada's potential as an active participant in the domestic and international malting barley markets.

Analysis is carried out in four stages. First, the technical aspects of the barley malt and brewing processes in relation to economic variables are discussed. Second, the structure of the Canadian industry is described. The third section deals with Canada's position in the international market place. Lastly, the Canadian malt and malt barley industries are examined with respect to the Canada-U.S. Free Trade Agreement.

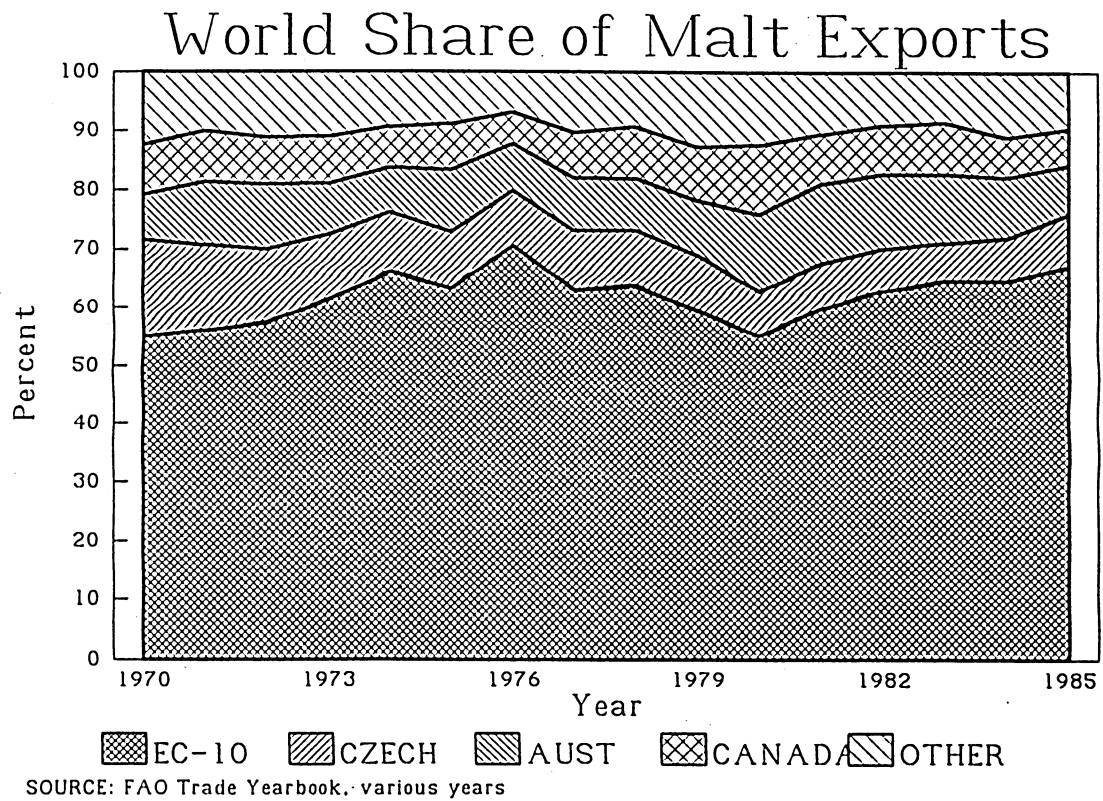


GRAPH 1



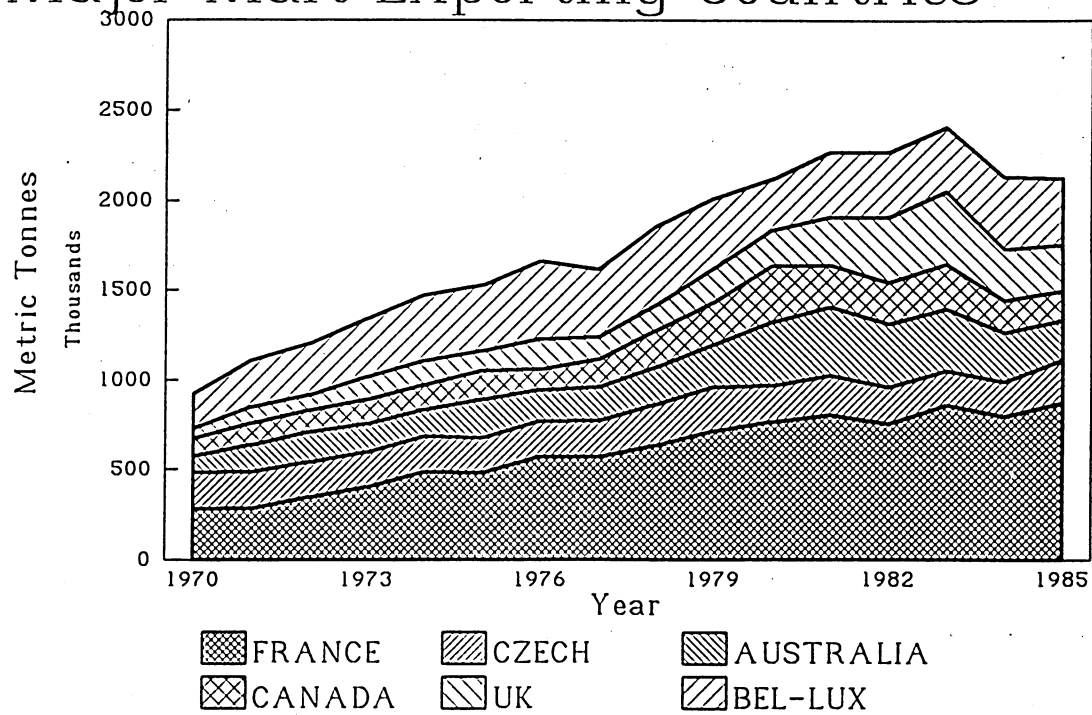
SOURCE: Grain Marketing Office, 1980.  
Brewing and Malting Barley Research Institute, estimates.

GRAPH 2



GRAPH 3

# Major Malt Exporting Countries



## The Malting Process and Technology

The process of converting grain to malt, or malting, is the first stage in the brewing process. Since the procedure is distinct from other stages in brewing, and because it can be done in a central location and the product can be easily shipped, advantages of specialization and economies of scale accrue to malting. This has led to malting evolving into a separate industry (Coutts, 1973, p. 1).

The malting process achieves essentially the same break-down of grain constituents which occurs when a seed is planted in warm soil, with sufficient moisture to begin growing. Under controlled conditions, the cleaned and graded grain is wetted until the moisture content of the kernel is increased from approximately 14% to over 45%. This procedure is called steeping (Coutts, 1973, p. 7-9; Pomeranz, 1973, p. 374).

In the next stage of malt production, excess water is drained from the steeped grain and under controlled moisture and temperature levels, the "chilted grain" begins to germinate enzymes which break down the cell membrane (cytases) and the carbohydrate chains (diastases), and proteins (proteases) are activated (Coutts, 1973, p. 9-10).

In the third stage, the germination phase is ended before too much of the starch and sugars are consumed by the developing root system. This is done by kilning the "green malt". The moisture content of the kernels is lowered from the over 45% levels reached in steeping to less than 4%. During kilning, care must be taken not to heat the grain too quickly, thereby destroying the enzyme systems. The finishing temperatures of the kilning process depend upon the intended end use of the malt. The resulting malt is then cleaned, polished and mixed according to the specific requirements of the customer (Coutts, 1973, p. 10).

Sprouts, rich in vitamins and proteins, are the main byproduct of the malting industry. Such sprouts generally find a use as protein supplements, for example in dairy feeds (Coutts, 1973, p. 10-11; Pomeranz, 1973, p. 377-380). The dockage (chaff weed seed and other grains), cleaned from the barley when it arrives at the malthouse, is also sold as feed. This material also includes undersized kernels of malt. The result is an economic loss to maltsters as they are unable to recover the price premium paid to the Canadian Wheat Board for malting grade barley (DRIE, 1987, p. 3).

Although any grain could be used in the malting process, barley has certain characteristics which make it ideally suitable for the purpose. Barley kernels release relatively large amounts of alpha and beta amylases.

"The combination of both amylolytic enzymes results in a more complete and rapid degradation of starch than in malts from most cereal grains. This degradation of starch is accompanied by breakdown of other grain components (mainly proteins and non-starchy polysaccharides) and yields an optimally modified malt" (Pomeranz, 1973, p. 374).

Another reason barley is the preferred malt grain is that the husks remain attached to the kernel after threshing. The husks protect the kernel from damage during the malting process and lead to a more uniform product. None the less, since the flavour characteristics of barley are a relatively minor consideration when making beer, given significant rises in the price of barley, other grains or man-made enzymes will be substituted for barley. Malting barley makes up about 60-65% of the final selling price of malt (Industry, Science and Technology Canada, 1988b, p. 1). In turn, malt constitutes about 20% of the cost of production of beer (Industry, Science and Technology Canada, 1988a, p. 1). Taxes are a significant portion of the retail price for beer and thus malt prices are a much smaller component of the retail price of beer.

Three main types of malt are produced from barley: brewers' malt, distillers' malt and specialty malts. In describing the characteristics of these types, the reason for their distinctive end uses becomes evident.

Brewers' malt is made from barleys having plumper, heavier kernels. This malt is kilned at temperatures which range from 160-180°F. The high drying temperature reduces enzymatic activities, darkens the grain, and increases malt flavour and aroma (Pomeranz, 1973, p. 925; Bass, 1982, p. 925). Ninety-five percent (95%) of the malting barley processed in Canada becomes brewers' malt (Canada Grains Council, 1985, p. 61). This compares to 85% world wide (Grain Marketing Office, 1980, p. 25).

By way of contrast, only 4% of the malt produced is distillers' malt (Canada Grains Council, 1985, p. 61). In order to maximize enzyme activity, this type of malt is kilned at temperatures of approximately 120-140°F. Small kernelled barley, high in protein content is generally used for distillers' malt. The decrease in the size of the market for distillers' malt has led to more of these smaller kernels being screened out, which, as mentioned before has an economic cost for the industry. High diastatic or distillers' malt is also used in the pharmaceutical and food industries. With the exception of "peat malt" used in making scotch whiskey there is little concern for colour or flavour development in distillers' malt (Pomeranz, 1973, p. 377; Bass, 1982, p. 925).

Specialty malts, with distinctive characteristics of flavour, aroma, colour, or clarity, are produced in small quantities for specialty beers, breakfast cereals, sugar colourings, and coffee substitutes (Bass, 1982, p. 926). They represent approximately 1% of domestic malt production (Canada Grains Council, 1985, p. 61).

Small quantities of malt or malting and brewing byproducts are also used for the production of glues, adhesives, lubricants, non-flammable materials, soil compaction and anti-compaction agents, etc. (Pomeranz, 1973, p. 385-386).

### **The Brewing Process**

The brewing process involves combining malt, hops, adjuncts, yeast and water in specific formulations to produce consistent and distinctive beers. Hops, and to a limited extent barley malt, contribute to the flavour and aroma of the beer. Hops also give beer its distinctive bitter taste. Adjuncts are sources of starch, such as corn, which provide an economical method of using the excess enzymes produced by the barley malt. With the trend towards lighter bodied and coloured beers, the use of adjuncts in malt beverages is expanding (Bass, 1982, p. 926-927). This trend is welcomed by Canadian brewers, in particular, as it reduces costs and makes Canadian beers a little more price competitive with their American counterparts, which have contained a higher percentage of adjuncts for several years.

The first step in the brewing process is called mashing. The malt and adjunct are mixed with water, and by enzyme activity, starch is reduced to dextrins and maltose, and complex proteins are degraded into nitrogen compounds. The mash is then drained or lautered, reserving the liquid for the brewing process. The spent grains are a byproduct of the process and are sold as animal feed. The liquid mixture which results from lautering is called wort. It is transferred to a brew kettle where the hops are added. This mixture is then cooked and cooled, and the hops are removed. Yeast is added to the cooled wort and the mixture is fermented. The beer is aged, filtered, carbonated, and finally packaged. Bottled beer is pasteurized to extend its shelf life. Keg beer is for immediate sale and therefore is not pasteurized. The specific mixture of ingredients, the time taken for each stage of the process and the choice of cooking temperature, determines the specific consumer related characteristics of the beer produced. The most important factor contributing to a uniform product is the variety of barley used and the condition of this barley (Coutts, 1973, p. 2; Pomeranz, 1973, p. 380; Bass, 1982, p. 927-929).

### **Malting Barley Characteristics and Developments**

Malting barley varieties can be contrasted with feed barleys by the malting properties inherent in them. "Malting varieties usually have faster, more even germination, lower levels of protein and higher levels of desirable enzymes and starches than do feed varieties" (Ulrich, 1985, p. 2). The degree of germination in malting types is over 95% (DRIE, 1987, p. 2). The first malting barleys to be produced in Canada were 2-rowed cultivars. However, when protectionist sentiments in the United States culminated in the 1890 McKinley tariff, the export market for malt barley was severely curtailed. Producers wanted to find alternative markets for barley, in addition to brewers. But the 2-rowed strains of that era had very low yields which made them uneconomical for livestock feed. Therefore, when the 6-rowed, blue aleurone, Mandscheuri variety from Russia was introduced around the turn of the century, it quickly found favour. The variety grew well under Canadian conditions, had excellent malting properties, and had acceptable yields (Metcalf, 1985).

The choice of barley varieties in Canada has been significantly influenced by the brewing and malting industries and government policy. During the 1920s Canada Malting Company promoted malting barley to farmers, through barley days and the farm press. In 1933 a National Barley Committee was established by the federal government, to promote the interests of Canada's barley industry and coordinate the efforts of the government, universities, and private industry in all aspects of barley "production, marketing, transportation, processing, research and utilization" (Ulrich, 1983, p. 20). The National Barley Committee was later divided into expert committees on Grain Quality, Grain Breeding and Grain Diseases. These organizations are still in existence. In 1948, the private efforts of malting and brewing firms were coordinated by the creation of the Brewing and Malting Research Institute. The prime objective of the Institute is to assist in the development and promotion of improved malting barley varieties. The result of these efforts is that today about 60% of the barleys planted in the prairies are malting varieties (DRIE, 1987, p. 32). Until 1950, less than 10% of the land planted in barley was devoted to 2-rowed barleys. By the time Klages was introduced in 1977, this proportion had increased marginally to 16%. This relatively small proportion of 2-rowed varieties grown in Canada for the first two thirds of the century can be contrasted to locations outside North and Central America where 2-rowed, white aleurone, barleys have been the most common. Since Canada produced 6-rowed, blue aleurone barley, there was little emphasis on the requirements of export markets (Ulrich, 1983, p. 21-22; Metcalfe, 1985). American brewers tend to use 6-rowed, white aleurone barleys which are grown in the U.S. limiting the market for Canadian malt (Industry, Science and Technology Canada, 1988b, p. 2).

The trend in the North American brewing industry has been towards the use of 2-rowed types. Canadian producers have followed this wave and today, production is equally divided between 2 and 6-rowed cultivars. Bonanzo and Argyle have been the most common 6-rowed cultivars grown, due to their disease resistance and adaptability to a variety of environmental conditions. Two-rowed varieties planted include Betzes, Klages, Elrose, and Harrington. With the exception of Betzes, these new cultivars have properties, equal or superior to the 6-rowed North American types (in terms of early maturity and enzymatic vigour in malting). They also have yield and kernel plumpness equal to European 2-rowed strains. The substitution of 2-rowed varieties for 6-rowed by farmers will continue, not only due to market demand, but also because the most potential for gains from plant breeding can be expected in 2-rowed types, due to the large gene pool available. The Manchurian germplasm from which Canadian 6-rowed varieties have been developed is almost exhausted in terms of new factors (Metcalfe, 1985; Bass, 1982, p. 919).

Because such a large proportion of barleys grown in Canada are malt varieties, the prime Canadian malting barleys are also top feed barleys. This situation is an anomaly since the objectives of breeding barley for feed or malting are in conflict. The "maltsters need high yielding low protein barley, while feeders want high yielding, high protein barley" (Alberta Agriculture, 1974, p. 16). Brewers in North America have adapted their processes to these higher protein barleys. However, the protein levels of Canadian barley could be a factor in many export markets (Landry, 1977, p. 7; Coutts, 1973, p. 15).

In addition to the variety of barley used, specific qualities prized by the malting and brewing industries can be affected by environmental conditions, and the handling and storage of the barley. The maltster considers moisture content, which should be below 14.8% so that the barley can store well, as an evaluation factor. A minimum of frozen, heated, immature, weathered or stained, and chemically or mechanically damaged kernels are desirable since these factors affect germination and lead to a non-uniform product. Diseases such as mildew or blackpoint can add undesirable flavours to beer and therefore affected barley cannot be used. Varieties of barley cannot be mixed prior to malting since the malting characteristics of each cultivar are unique. This means that during transport and handling the varieties cannot be mixed. The plumpness of the kernel affects the yield of malt and therefore is of considerable economic importance to the maltster and brewer. The nutrients in the soil, the length of the growing season, temperature and available moisture have a bearing on the quality of barley produced. For example, low moisture levels during growing lead to nitrogen being accepted in concentrated form in the growing plant and results in higher protein levels (Coutts, 1973, p. 17). Protein is an important factor in brewing since there is an inverse relationship between it, and barley and malt extract. Protein levels may also affect yeast growth in the brewing process, as well as head retention and clarity in the final product (Coutts, 1973, p. 6). The farmer can also affect quality by his

choice of the time to plant, the crops grown on the land in the past, the residues on the land, the maturity at harvest, improper threshing equipment adjustments, improper on-farm drying or poor storage conditions (Coutts, 1973, p. 12-18).

### **The Influence of Technical Factors on the Market**

The decision to grow a malting barley variety does not automatically mean the end user of the grain is a maltster. The farmer by his agronomic practices can determine whether his grain is malting quality. However, the biggest influence on the quality of the grain is still outside the farmer's control. Environmental conditions are still the prime determinate of malting quality. Thus, farmers grow malting varieties, on the chance that they can reap the benefits of the higher valued malt market. However, in some areas of Canada, the growing conditions will make the possibility of achieving malt quality remote. But the promotion of malt varieties in Canada by the brewing industry and government has led to malt varieties also being used for feed varieties. So, not only is the yield a choice factor, farmers may also be giving up a premium for protein in the feed market.

The choice of malting varieties developed and promoted affects the barley industry on a macro level as well, because some foreign brewers may not have processes which can adjust to the higher protein Canadian varieties. Even the choice between developing 6-rowed versus 2-rowed varieties has influenced which markets Canada sells to and the overall size of Canadian exports.

The malt market, both domestic and international, exists only within an unspecified range of prices. If the price of barley rises, more adjuncts will be added. At very high price levels, synthetic enzymes will be substituted. This has already occurred in the distilling industry and to some extent in the brewing industry (Sibbald Group, 1973, p. 112). If rises in the price of feed barley push up the price of malt barley, the size of the malt market will be influenced, not by changes in the demand for brewing products, but by the relative prices of substitute intermediary products. However, some of this cost squeeze would be offset by increased prices received for the animal feeds which are a prime byproduct of the malt industry.

The overall quality of malting barley produced in Canada is very important in determining whether a particular crop will actually be used for malting. During years when overall quality is high, some malting quality barley will be reclassified as feed (Ulrich, 1983, p. 67). Historically between 10 and 40% of barley is used for malt. In years when growing conditions are poor, the barley used for malting may be inferior in quality to barley rejected for malting in a normal year. Maltsters "make do" with available supplies because the supply of malt barley is virtually all by domestic producers. The Canadian Wheat Board controls the sales of barley for export and domestic sales for human consumption. Imports of malting barley into Canada are allowed only by permit. A permit, in turn, requires the total absence of any domestic malting barley (DRIE, 1987, p. 9). This situation will change if U.S. subsidy levels for barley drop to equal or below Canadian subsidy levels and the market is opened up for American malt and malt barley under the terms of the Free Trade Agreement (FTA).

### **Canadian Production**

The role of the Canadian Wheat Board is not limited to protecting the Canadian market for domestic barley producers. The Board also provides producers with some intra-year stability through the pooling system. This means the timing of the producers' decision to market is not of great importance in the price received for Board grains as long as there is quota open. The producer is shielded from volatile price swings in the international market. However, he can continue to capture any gains from selling in the cash feed market. This is a change from the period prior to the 1975/76 crop year, when the pool for malting barley did not exist. At that time producers had to evaluate their crop relative to the overall quality of barley produced in that year. They could then decide whether to sell in the cash feed market or wait and perhaps receive the malting premium of 5¢/bushel over the price for No. 1 Feed grade delivered to the Board. Since the actual price paid by malsters was approximately 30¢/bushel higher than the feed price, the benefits of growing malt barley

accrued to all producers in the pool (Sibbald Group, 1973, p. 31). The risks of production<sup>1</sup> and the effects of lower yields accrued only to malting barley producers. The formation of a separate pool resulted in the benefits and the costs being allocated to the malting barley producer. However, as noted earlier, varietal selection and producers' choices of which cultivar to grow have resulted in a bias in production in favour of malt varieties, so some of the costs are being borne by feed producers.

The CWB's intervention in the market is not limited to primary production. The Board protects malting firms from competition by licensing malt imports. Thus far, permits have only been granted for specialty malts not produced in Canada (DRIE, 1987, p. 19). Maltsters are also somewhat protected from domestic competition since the CWB sets the price to be paid by maltsters for the barley. That price is consistent to all maltsters at any point in time (DRIE, 1987, p. 24). Therefore, volume purchases of barley are of benefit only to the maltster, in that they lock in a particular price. There is no discount for a volume purchase.

In the early 1980s export prices for malt barley declined. The CWB reacted by lowering export prices and increasing domestic prices. This pricing policy seriously undermined the maltsters' export markets. Consequently in February 1986, the Board agreed to price concurrence for domestic malting barley (DRIE, 1987, p. 16 and 19).

Market power is not only concentrated in the selling of raw product. There are only 3 malting firms in Canada, managing a total of 5 plants. Canada Malting Co. Ltd. is the largest firm and accounts for approximately 71% of total industry capacity. It is a public company with the largest corporate shareholders (each controlling about 20% of the shares) being Labatt Breweries of Canada Ltd. and Molson Breweries of Canada Ltd. The dispersion of the 3 Canada Malting plants across the country puts the firm in an excellent position to service the domestic market (DRIE, 1987, p. 6).

Dominion Malting Ltd. has one plant located in Winnipeg. The plant's small capacity (16% of the market) and its inability to bag malt has led to its specialization in servicing the domestic market. Dominion maintains a close affiliation with Carling O'Keefe (DRIE, 1987, p. 7).

The newest Canadian malting company, Prairie Malt Ltd., came into commercial production in October 1978. It was sponsored, largely as an economic development project by the Government of Saskatchewan. In 1989, the plant was sold to Schreier Malting Company of Wisconsin and the Saskatchewan Wheat Pool. In 1990, employees were invited to buy up to 24% of the common shares of the company. The plant has 13% of Canadian industry capacity. It exports about 70% of its production (Industry, Science and Technology Canada, 1988b, p. 1; Agriweek, July 9, 1990).

All three companies have received assistance from what was formerly the federal Department of Regional Industrial Expansion. The firms undertook construction to expand and modernize their facilities. For example, direct heating processes were converted to indirect heating. This change resulted in reduced levels of nitrosamines in the finished malt, making the malt more acceptable to brewers and assisted maltsters in competing in some foreign markets. Market development work has also been done by various federal agencies (DRIE, 1987, p. 21).

While the area accounts for less than 25% of brewing activity, almost 60% of Canada's malting capacity is located in the prairie provinces. This incongruity is due to several factors. First, all malting barley is grown in the prairie provinces, and second, Canada's malt export markets are concentrated in the western U.S. and the Pacific rim. Other considerations are transport costs, lower land costs, lower energy costs, and the availability of fresh water and space for effluent disposal. However, eastern plants do have a superior locational advantage for eastern markets (DRIE, 1987, p. 9).

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<sup>1</sup> A domestic hedging facility is not available for malt barley. The Minneapolis Grain Exchange has a futures contract for malt barley.



As well as at the intermediary processing level, market concentration occurs further down the production chain. There are 11 brewing firms in Canada, managing 39 plants. A few small cottage breweries are not included in this total. As indicated earlier, the firms are backward integrated into the malting industry. And as noted by Ulrich, brewers and maltsters have had a considerable impact on primary barley production through their influence on the varieties selected, licensed and grown in Canada. Provincial liquor regulations restrict the movement over provincial boundaries and encourage local production. These restrictions may prevent plants from taking advantage of economies of scale in production by having large central plants with local bottling facilities. Alternatively, intrinsic factors in the product, such as the bulkiness of beer, especially consumer sized packaging of beer; handling problems; and a short shelf life also contribute to localized production. Liquor regulations along with other considerations such as the fact that foreign brewers use more adjuncts, and foreign grown varieties of malting barley, particularly the 2-rowed winter varieties grown in Europe, are produced more cheaply, perhaps due to government support, have meant that under circumstances of free competition in the beer trade, Canadian breweries might not be able to compete. Therefore provincial liquor boards have encouraged the consumption of domestic beer, rather than imported or specialty beers through their pricing practices. However, the recent General Agreement on Tariffs and Trade (GATT) panel ruling that these pricing practices are unfair to Canada's trading partners and are thus subject to retaliation, will likely result in the raising of domestic beer prices to equal or exceed import prices (i.e., if a cost of servicing formula is used). The increased price is likely to reduce total demand and with the prices of foreign substitutes being cheaper, some consumers may shift to foreign brews, wine or other forms of alcohol. The Canada-U.S. trade agreement will affect the breweries indirectly, even though the brewing industry has been ostensibly excluded from the deal. These effects are discussed in a subsequent section.

The malting barley, malt and brewing industries are an example of countervailing power in the marketplace. If the CWB sets the barley price too high, there would be no export markets and as noted earlier, domestic brewers would switch to the use of enzymes derived from other sources. The price of malt is influenced not only by costs of production and the price of substitutes, but also by the possibility of encouraging entry into the market by new participants. Molson and Labatt, two of the largest brewing firms in Canada, exert market power through the oligopsonistic nature of their industry and through their controlling interest in Canada Malting. Residual malt supplies are purchased from competing malt firms. Thus:

"the brewers can transfer the risk of demand fluctuations to the rival maltsters (i.e., Dominion Malting Co. and Prairie Malt (Canada) Ltd.). The ability to transfer this risk would in turn help deter new entrants. Thus prices of malt may be kept near competitive levels, if not by actual competition, then by fear of new competition through increased vertical integration" (Ulrich, 1983, p. 30).

The two major brewing firms are also in the position to bargain with rival malsters using the threat of increasing Canada Malting's production (Ulrich, 1983, p. 27-30). In turn, the price of and hence the quantity of beer demanded is controlled by provincial liquor boards. These boards also control the relative price of substitutes. Even though their power to differentiate between foreign and domestic beers may be eroded, they will still control prices for distilled products and wine. As well, governments may change the manner in which they tax domestic production, in order to make it more competitive with foreign imports.

### Canadian Consumption

Canadians consume 81 litres of beer per capita each year. This works out to about 2/3 of a bottle of beer each day, for every man, woman and child in Canada. However, Canadian consumption of all types of spirits has been declining since 1981. Beer makes up 52% of Canadian alcohol consumption followed by 32% for hard liquor and 16% for wine. In Alberta, the figures are 42%, 44% and 14% respectively. Albertans are the largest drinkers of hard liquor in Canada, consuming 10 litres per capita, compared to the Canadian average of 6.5 litres. However hard liquor consumption in Alberta is down 2.2 litres from 1981. Total consumption of beer in Alberta is down 91 million litres from 1981. In 1985 per capita consumption of beer in Alberta was 74 litres. Albertans are Canada's biggest consumers of imported beer, mainly American; the largest drinkers of canned beer; and the second biggest consumers of light beers. Approximately 6.3% of Albertan's beer consumption is imports; 5.4% is American imports. Between 1983 and 1986, Alberta sales of

light beer increased from 8% of the market to 18%. Nationally, about 11% of beer consumption is light beer. During the period from 1975 to 1985, the market share of wine and wine products in Alberta grew from 10% to 14.3%. Per capita consumption in Alberta in 1985 was 9.75 litres, and although not significantly different from Canadian consumption, it was enough to make Albertans the largest wine consumers per capita in Canada (Statistics Canada 32-230; Gilmour, August 29, 1987a, p. C1).

The decline in alcohol consumption in general, has been attributed to increased taxes, increasing the price of alcohol; social pressures against excess alcohol consumption, particularly in regards to drinking and driving; changing lifestyles with a concern for physical fitness; and an aging population which tends to drink less. The decline in beer consumption can also be attributed to changing consumer tastes in favour of sweeter drinks. Hence, the growing market for wines, wine coolers, liquor coolers and light beer (both in alcohol content and flavour). More air conditioned buildings have also led to less beer consumption. The result for the brewing industry has been a shrinking overall market for spirits, with some loss of consumption due to changing consumer tastes. However, beer remains better placed in the market than distilled products due to the incorrect perception it is "lighter" in alcohol content than an equivalent serving of spirits. Brewers have had to change their formulations to adapt to the changing tastes and compete with foreign products. However, this has created an opportunity for small cottage breweries to develop specialty beers with stronger flavours to fill particular market niches. Changes to government legislation have also been important in allowing cottage breweries to spring up (DRIE, 1987, p. 12; Sibbald Group, 1973, p. 71-73; Gilmour, August 29, 1987b, p. C1).

The demand for malt and ultimately for malting barley is a derived demand. The factors which influence the demand for the final product, usually beer, influence the demand for malt. For example, western and eastern Canadian consumers have different preferences. In the west a lighter lager beer, which contains less hops and barley, and more adjuncts, is brewed. In the east, more ale, which requires more hops and barley, is produced. Lager requires about 36 lbs. of malt per barrel of beer and ale requires about 46 lbs. (Sibbald Group, 1973, p. 54). The decrease in per capita beer consumption, slow population growth and the lighter formulations will result in a stable or declining domestic malt and malting barley market. The only positive support for increased domestic disappearance of malt, in the future, comes from increased exports of Canadian beer. However, since the brewing industry has been excluded from the Canada-U.S. Free Trade Agreement, it is quite likely that if Canadian beers began to achieve a significant market share in the United States, American brewers would contemplate some sort of trade action.

## **International Demand**

### *General Factors*

The international markets for malt barley and malt are highly volatile. The volume of malt or malt barley purchased depends, in part, on the availability of U.S. dollars. "This is particularly true in countries in the Eastern Hemisphere, who may have European currencies available but very few U.S. dollars" (Coutts, 1973, p. 45). The market is also subject to large swings in price. For example, competing malt supplying nations have been known to adjust the price downward suddenly, by as much as \$40/ton (Sibbald Group, 1973, p. 120). The local production and quality of malt barley produced, influences the import demand in countries such as the U.S. and the United Kingdom (UK). Thus, not only is it a derived demand, it is also a residual demand.

In many less developed countries such as Peru and Costa Rica, a growing consumer taste for beer has led to dramatic increases in imports. Changes in government policy on the foreign exchange position of a country, may change the level of imports or determine the source of imports. Other factors such as a hot summer, which may temporarily influence the consumption of beer, will also influence the disappearance of malt.

The choice between importing malt barley or malt is determined by factors such as the existence and capacity of a local malt industry, the quantity desired (i.e., a small amount of a particular malt for a specialty product would probably be imported), the storage facilities available, and the malting process used (i.e., will the process have to be substantially adapted to suit the malt variety being imported). Another factor is that Canadian maltsters have been able to differentiate their product and thus achieve some consumer loyalty.

"Canadian barleys do not appear competitive with barleys from other parts of the world on the surface. In spite of this fact Canadian barley malts have achieved an excellent reputation for consistent high quality and can compete in markets where the unprocessed barley malt might not be competitive" (Coutts, 1973, p. 45).

In fact the quality of Canadian malt has been such that, at times the product has sold at a premium of as much as \$20/ton higher than the market rate (Sibbald Group, 1973, p. 120).

If data were available, a demand curve for either Canadian malt or malt barley in each importing country could probably be estimated with the following function:

$$Q_c = -P_c + P_f + P_a + P_e - I - F_c / F_f + P_o P_i + Y_i - S_i + D_i + \alpha X_i$$

where:

- Q = quantity
- i = the ith country
- P = price (c.i.f.) inclusive of subsidies
- c = Canadian malt or malt barley
- f = foreign malt or malt barley
- a = adjuncts
- e = synthetic enzymes
- I = inflation factor
- F = foreign exchange rate
- Pop = population
- Y = income
- S = supply domestically produced
- D = measure of income dispersion
- X = measure of changing consumer tastes

Since the demand for malt or malt barley is driven by the demand for a consumer product, which requires consistency in order to achieve brand loyalty, the short run price elasticity is probably quite inelastic. The time required to adapt the process to a different technology or experiment with the recipe to take advantage of short term price fluctuations in the inputs, would probably preclude frequent changes in the process. If the changes necessitated the adoption of a new product by consumers, the time required to implement production variations would be lengthened. This is probably why malt demand appears to be more inelastic than barley demand. Although the variety of barley chosen is important to the type of beer produced, changes in both the malting and brewing process can accommodate a relatively wide degree of variation. Malt is a much more specific product.

In the long run, however, if significant cost savings result, the production process can and will be changed. Thus, the long run price elasticity could be very elastic.

### *The Malt Market*

Canada's major competitors in the malt market include France, Belgium, Luxemburg, West Germany, the UK, Czechoslovakia and Australia. The European Community (EC) as a whole accounts for over 50% of the world's exports (Grain Marketing Office, 1980, p. 2 and 118-119).

EC producers are at an advantage in selling to the world market. They receive subsidies through restitution orders of between \$55 and \$100 per tonne on their malt exports (DRIE, 1984, p. 13-14). However, Canadian malt exports have withstood the pressures from competing subsidies much better than Canadian barley exports have (Grain Marketing Office, 1980, p. 7).

Other challenges face Canadian maltsters, in addition to competitors' export subsidies. For example, many importers like Japan and Korea have non-tariff barriers to imports such as quotas. Canada also suffers from uncompetitive ocean freight rates, and irregular and infrequent service. This affects customers in eastern South America, Africa, and the Pacific Rim (DRIE, 1984, p. 13-14).

Canada uses indirect export subsidies to support domestic malt and malt barley industries. As indicated earlier, federal government grants have been used to modernize infrastructure in the malt industry. The Saskatchewan government committed equity capital to the development of a malt plant in Saskatchewan and the Alberta government has announced a commitment to a new malting facility in the province. Export credits are also provided for grain and grain products amongst other goods. The federal and provincial governments also provided support, through their purchases of rail cars and other capital expenditures such as building grain handling facilities. The Western Grain Transportation Act (WGTA) replaced the crow rate, with direct payments to the railroads to an amount equivalent to the "crow benefit" on grains for export providing a transportation subsidy. Canadian barley and malt producers benefited from an amendment to the WGTA which redefined the U.S. as an export market (DRIE, 1984, p. 14 and 17). Maltsters in the U.S. were attempting to have their government start a trade action. However, the Free Trade Agreement eliminated this benefit and forestalled any action.

In addition to subsidies, another reality of the international market is the degree of risk involved. Canadian maltsters may hedge the currency of their trading partner, or the cleanings sold as feed barley. However, the lack of a domestic futures market for malt barley prevents them from hedging their primary input (DRIE, 1984, p. 13). Political risk may be insured against through the Export Development Corporation.

The major markets for malt are Japan, Brazil, Venezuela, the Union of Soviet Socialist Republics (USSR), Switzerland, the Philippines, Nigeria, Cameroon and the U.S. Canada's major market areas are in the Pacific Rim, the Caribbean, Central and South America and the U.S. Japan and the U.S., Canada's two largest customers, account for approximately 65% of export sales (DRIE, 1987, p. 14). It is interesting to note that although Japan is one of Canada's largest buyers, most of their imports come from Australia and the EC (External Affairs, 1985, p. 309). The U.S. produces and exports malt. Canadian exports supplement domestic supplies in the deficit western U.S. region.

### *The Barley Market*

Major competitors in the malt barley market include the EC, Australia, the German Democratic Republic (GDR), Argentina and Czechoslovakia. Importing countries include Poland, the E.C., Japan, the GDR and Switzerland. A large portion (over 15%) of trade in barley is between E.C. member nations (Grain Marketing Office, 1980, p. 117 and 123). Canadian markets include the U.S., Colombia, Ecuador, Peru, Japan and the UK.

Similar problems of subsidies, non-tariff barriers, and uncompetitive ocean freight rates plague barley exporters as they do maltsters. However, risk in the barley market is dealt with differently. Canadian sales of malt barley may be handled by private firms purchasing from the CWB and reselling, or through direct negotiations by the Board. Direct sales account for approximately 65% of total sales (Wilson, 1983b, p. 497). As mentioned earlier, the Board uses a pooling system. This system has the effect of diffusing risk amongst all producers so that currency movements, the timing of sales and price risk become somewhat less important factors. In addition producer prices have been stabilized through the Western Grain Stabilization Act (WGSA) and other grain programs. Sales by large grain firms can be hedged by offsetting contracts perhaps in a variety of grains. Or large firms which have the option of making delivery from other sources, may hedge on non-Canadian commodity exchanges.

The CWB sets prices relative to: competitors' prices, supplies, foreign exchange rates, ocean freight rates, foreign subsidies and other factors; given their mandate to sell as large a quantity as possible at the "best" price (Landry, 1977, p. 1-3). However, since this is not a price directly determined by the market, and demand is not a fixed quantity in a captive market, it is difficult to evaluate the CWB's performance in maximizing producer incomes. More importantly, the CWB can influence, by their pricing practices, the quantity of Canadian malt barley, malt or even beer sold internationally, since at different price spreads different degrees of finishing may be purchased by importing nations. The Board's mandate is to sell grain and there is no indication that domestic value added considerations are part of their pricing decisions.

### Market Prospects

During the 1970s global beer production was growing at a rate of between 3 and 4% per year. World trade in malt was growing by about 6 to 9% annually. Most of the increase in beer consumption was centered in the developing world where the growing of barley, or malt production was difficult due to climate or other factors. Canadian malt exports were growing by about 10% annually, while malt barley exports were experiencing fluctuating demand, with little growth. Since 1980, the general world economic climate, excess capacity in the American malt industry and aggressive marketing by the EC has led to a highly competitive market. Canada lost some markets initially, however many buyers have since returned to Canadian suppliers (Grain Marketing Office, 1980, p. 2; DRIE, 1984, p. 12).

Further threats to Canadian markets have existed due to the trade war between the EC and U.S. Washington targeted Japan's barley malt market, which has been a major Canadian market. In an all out confrontation between the coffers of the two economic giants, Canada would end up the loser.

As global economic conditions improve, particularly in the developing countries, demand for malt and malt barley can again be expected to grow. Assuming a relatively free market, Canada can be expected to be a major competitor, depending on the effects of the market restructuring which will probably result from the Canada-U.S. Free Trade Agreement.

Canada is in an excellent position to service the Caribbean and North, Central and South American markets. Mexico was expected to be a growing market prior to the weakening of the international oil market. If international oil prices remain consistently at a higher level, Mexico can again be looked upon as a vast undeveloped market. Beer consumption in countries such as Brazil, Colombia, Chile and Ecuador is expected to continue increasing. Canada will face competition from the U.S. in the Mexican market and the EC and Australia in the South American market (Grain Marketing Office, 1980, p. 3-4; External Affairs, 1985).

The large population base in Asia offers the greatest potential market. While there is some potential for domestic production in countries such as Japan, Korea and China, overall market growth in imports is expected (Grain Marketing Office, 1980, p. 6; External Affairs, 1985).

The Mediterranean countries show the most potential in Western Europe for increased malt and malt barley sales. Canada will face heavy competition from the EC in the area, especially given the level of EC subsidies and lower transportation costs (Grain Marketing Office, 1980, p. 4; External Affairs, 1985).

Eastern Europe is self-sufficient in both commodities. However, President Gorbachev implemented new laws designed to reduce the consumption of hard liquor. Vodka production was being reduced by 20% per annum, between 1985 and 1990. It was expected that the reduced consumption of vodka would be offset by increased production and consumption of beer. This switch may provide further opportunities for malt exporting nations (Grain Marketing Office, 1980, p. 4-5; External Affairs, 1985).

The Middle East and Africa are not expected to be major markets, both because of the preponderance of followers of Islam, who do not consume alcohol, and low per capita incomes. Markets in Africa are widely dispersed. Colonial ties and subsidized exports are expected to favour EC producers (Grain Marketing Office, 1980, p. 5; External Affairs, 1985).

## The Canada-U.S. Free Trade Agreement

There are four provisions in the agreement which directly affect the malting barley, the malt and ultimately the beer industries. Tariffs on all goods will be eliminated by January 1, 1988 under the terms of Chapter 4. The other three provisions are as follows:

### Article 701:5

"Canada shall exclude from the transport rates established under the *Western Grain Transportation Act* agricultural goods originating in Canada and shipped via west coast ports for consumption in the United States of America."

### Article 705:1

"Commencing at such time as the level of government support for any of the grains, wheat, oats or barley in the United States of America becomes equal to or less than the level of government support for that grain in Canada, Canada shall eliminate any import permit requirements for wheat and wheat products, oats and oat products, or barley and barley products, as the case may be, originating in the territory of the United States of America, except that Canada may require that the grain be:

- a) accompanied by an end-use certificate which has been completed by the importer of record declaring that it is imported for consumption in Canada and is consigned directly to a milling, manufacturing, brewing, distilling or other processing facility for consumption at that facility;
- b) denatured if for feed use; or
- c) accompanied by a certificate issued by Agriculture Canada or its successors; if for seed use."

### Article 1204:

- 1) With respect to measures related to the internal sale and distribution of beer and malt containing beverages, Chapter Five shall not apply to:
  - a) a non-conforming provision of any existing measure;
  - b) the continuation or prompt renewal of a non-conforming provision of any existing measure; or
  - c) an amendment to a non-conforming provision of any existing measure to the extent that the amendment does not decrease its conformity with any of the provisions of Chapter Five.
- 2) The Party asserting that paragraph 1 applies shall have the burden of establishing the validity of such assertion.
- 3) Existing measure in paragraph 1 refers to a measure in force as of October 4, 1987."

Chapter Five is a reiteration of the GATT principle of treating the goods of a foreign nation in the same manner as domestic goods.

Under the Free Trade Agreement exports of malt or malt barley are again subject to full transport cost when travelling to U.S. destinations by rail.

When Article 705 comes into effect the protected domestic market for malt and malt barley will be eliminated. The price for malt and malt barley will be a North American, rather than a Canadian price. A North-South rather than West-East flow of malting barley will probably develop recognizing that there may be constraints due to the varietal preferences of the brewing industries in the two countries. The extent to which each country benefits from trade in malting barley will probably depend on the price competitiveness of producing in each country. To a large extent the varieties of barley which are developed, their respective yields, and the regions to which they are agronomically suited, will determine the locations which become major malt barley producing areas. Of course, the competitive crops available and their prices will also be a locational factor. Since the Canadian Grain Commission licenses all new varieties of grain, their responsiveness to new plant breeding developments will have an impact on the long term viability of the industry. The preferences of maltsters and brewers for particular varieties will also be a consideration. The removal of tariffs will not likely be an important factor since the American barley tariff of U.S.23¢/kg in effect in 1989, is not a significant barrier to trade.

The future of the Canadian malt industry will depend directly on the fate of the Canadian brewing industry, the extent to which economies of scale can be captured in the malting process, and transportation rates. If Canadian malt plants are operating at less than an efficient size and transportation costs are not prohibitive, the malting industry will probably centralize itself near large breweries. As well, if the brewing industry consolidates, malting plants may no longer be in viable locations. The size and location of the export markets would become more important, but the volatility in the international market would no longer be countered by a relatively stable domestic market. If Canadian malt is a differentiated product, for reasons other than the variety of barley used, this may be a factor in favour of a healthy domestic industry. The size and age of American plants will be important in determining how the malt industry responds to free trade. Canadian plants are old, and the return on investment has been too low to warrant new investment in the industry. However, if interest rates remain relatively low and the opportunities for increased sales develop, this situation could change (DRIE, 1984, p. 14). The narrow price range within which malt can be sold and still be competitive with other sources of enzymes has also limited return on investment. U.S. malt tariffs of U.S. 66¢/kg prior to the Free Trade Agreement tariff reductions, while a factor in competitiveness, are not prohibitive to trade. Thus, tariff removal under the Agreement is not a significant factor for malt exports.

While Article 1204 has probably excluded the brewing industries in the respective countries from an FTA challenge, all GATT rights and obligations remain. Any restrictions on the flow of beer between the two countries due to internal marketing practices might remain in effect. However, the expected U.S. challenge of Canadian distribution and floor pricing practises under the GATT or through domestic U.S. law may result in a more open Canadian beer market. The recent GATT ruling which decided that provincial liquor board pricing, distribution and retailing practices were barriers to trade and thus subject to retaliation will likely change the special mark-up rate on Canadian beer despite the Free Trade Agreement. If Canadian brewers face the same input prices as American brewers, but are not allowed to take advantage of economies of scale due to restrictions which require production in each province, it could seriously undermine the Canadian industry, especially if Canadian and American beers face the same mark-up. If, on the other hand, brewers are allowed to consolidate and take advantage of economies of scale, while only maintaining localized bottling facilities, the industry might survive and prosper. Interprovincial negotiations to remove barriers to trade in beer are continuing. The acceptability of Canadian beers to American consumers (and vice-versa) and the ability of Canadian breweries to locate close to the large American markets are also important factors. The removal of tariffs on malt beer of 3.30¢ per litre will only reduce the price by approximately 1¢ per bottle. As with malt and malt barley, the phasing in period for the removal of tariffs is over ten years.

## Conclusion

Maltsters and to a lesser extent barley producers have faced a volatile world market with a protected domestic market, enabling them to maintain continuous production and to some extent diffuse the risks of international trade. The approach to selling malt or barley was to find a market for what Canada produced rather than producing the product demanded in the world market. To some extent this has been due to limitations on production of 2-rowed, white aleurone varieties, under Canadian conditions. However, with the development of Klages and subsequent improved varieties, Canadian farmers have had more flexibility in choosing what varieties to produce. Institutional barriers to change may be a factor in their slow adoption.

With a more open market, the challenge which will face barley producers, maltsters and brewers is how responsive they can be to market changes and how responsive the Canadian system can be to changes. The extent to which Canadian malting barley or more importantly, malt, is a differentiated product on the world market and cost factors will determine the future of the Canadian industry.

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