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CORN: WESTERN CANADA

Corn production in western Canada, predominantly in Manitoba and, to a lesser extent, Alberta has increased significantly over the last five years. Although it represents a relatively small component of total production of coarse grain in western Canada, it has increasingly become a viable alternative to other cereal crops because of improved corn varieties and the increased feed grain demand related to expansion of the hog industry in western Canada. Due to the drought in 2001-2002, corn imports into western Canada increased significantly but are expected to decrease in 2002-2003, because of increased domestic feedgrain production. This issue of the *Bi-weekly Bulletin* examines the situation and outlook for corn in western Canada.

In western Canada, corn is grown for grain for human and livestock consumption, and as a silage for animal feed.

The three main climatic variables that affect growth are day length, temperature, and rainfall. Day length and temperature affect flowering and maturity while temperature and rainfall affect yields.

Cumulative temperatures, calculated from daily maximum and minimum temperatures and expressed as corn heat units (CHU), are a better measurement for achieving physiological maturity than calendar days. The higher the CHU, the faster the corn develops. Optimum development occurs when daytime temperatures reach 30°C.

In western Canada, hybrids have been developed that require an overall lower CHU per season. Producers can choose from many different hybrids with varying CHUs that will meet the particular needs of the farm. In general, a crop with a higher CHU will have higher yields but the risk that the crop will not develop before the first frost is a potential danger.

Corn requires increasing levels of water as the plant progresses. On average corn requires about 20 inches of water. The amount and distribution of precipitation in Manitoba is suited to corn production. On sandy soils, moisture stress can reduce yields, while on clay, compacted or poorly drained soils excessive moisture can cause growth problems.

The first consideration in choosing a grain corn hybrid is the ability of the hybrid to reach maturity before the first frost. Frost damaged corn is of inferior quality, difficult to market and sold at a considerable discount to mature corn. On the other hand, a hybrid that matures too early will usually yield less because it does not make full use of a growing season.

Once the heat unit rating for a farm has been established, the producer should select a hybrid that requires 200 CHU less than expected. This will ensure that corn planted by mid-May will reach full maturity before a damaging frost nine out of ten years.

During the final stages of grain filling, reserves of carbohydrates stored in the stalk are moved into the grain. Once this source of energy is gone, the stalk dies and becomes susceptible to stalk rot organisms. The larger the ears are the quicker this process occurs. Some hybrids gain a high yield potential at the expense of the stalk strength by draining all the stalk of its reserves. Under a good growing season the stalk may contain enough carbohydrate reserves to maintain stalk strength, however in poor growing seasons the drainage of stalk reserves will result in premature death of the stalk and severe lodging or breaking.

GM and Bt corn

The exchange of genetic material between different species of corn occurs naturally in the environment. Until recently, genetic cross-breeding to produce plants with desirable traits took years of development. Through the use of biotechnology, scientists are now able to identify a particular gene in one plant and integrate this desired gene into a new plant more quickly. This new product, often described as genetically modified (GM) corn, is a subset under the biotechnology umbrella. GM corn hybrids have been developed with broad spectrum herbicide tolerance and insect resistance.

Bacillus Thuringiensis (Bt) corn is a type of corn that has been genetically modified using a bacteria that has insecticidal properties. Bt is a naturally occurring soil-borne bacterium that produces crystal-like proteins that selectively kill the European corn borer. When eaten by the corn borer, the stomach enzymes form toxins which are poisonous. These proteins have been found to be safe for human consumption.

In order to prevent developed resistance by the European corn borer, it is recommended that producers plant Bt corn every second year or plant non-Bt refuges with a Bt crop. This ensures that a significant population of corn borers with susceptibility to Bt will survive. The hope is that Bt corn will continue to be effective against the corn borer for at least 10-15 years.

Canada

Infestation levels in Manitoba are sporadic and variable with some areas experiencing heavy infestations while other areas have little or no damage. In Manitoba it is estimated that approximately 27% of corn was planted to Bt varieties in 2001.

The advantages of growing Bt corn are that it increases corn yields, reduces the use of farm chemicals and lowers the chances of ground water contamination.

Many of the early-maturing hybrid varieties are flint-dent crosses. The hard kernels produced allow these hybrids to be harvested at higher moisture levels. This can be a significant advantage in short-season areas.

Grading

Corn grading by the Canadian Grain Commission for the primary and export market is based on test weight, degree of soundness, percentage heated, total damaged corn, and the amount of cracked corn and foreign material.

Test weight, measured in pounds/bushel (lb/bu) is one of the main determinants used in grading. For example, a grade of No.1 Canadian Western will have a minimum test weight of 56 lb/bu. Test weight is a significant factor in selection and pricing for both the distillery trade and feed millers.

Production

In 2001, corn production in western Canada accounted for only approximately 3% of Canada's total corn production. Almost all corn produced in western Canada is grown in the Manitoba Red River Valley with a small amount grown in Alberta. Prior to 1978, very little corn was produced in Manitoba. In 1981, corn area reached a record 91,100 hectares (ha) and production was almost 432,000 tonnes (t). However, as a result of poor weather and varietal problems in the early 1980s, area seeded thereafter dropped significantly. Area seeded in the late 1980s and early 1990s increased but low prices and adverse weather again led to a lower area seeded during the 1992-1995 period.

Since 1996, production in Manitoba has trended upward due to higher seeded area, new lower heat unit varieties and good growing conditions. In 2000, the second highest corn crop at 264,200 t was produced for grain use, while an additional 362,900 t was harvested for silage/fodder. For 2002, Agriculture and Agri-food Canada (AAFC) is forecasting a crop of 355,000 t of grain corn with an additional 650,000 t of silage.

In Alberta over the past 20 years, seeded area has ranged from a low of about 1,100 ha in 1996 to a high of 6,100 ha in 2000.

Uses

The Diageo Canada distillery in Gimli, Manitoba uses about 2.4 million bushels (Mbu) of corn annually. Clean corn without any objectionable odours and a high test weight of 56 lb/bu and 14.5% moisture content or lower is required. Corn is accepted up to 15% moisture, but at a discount. Manitoba supplies the distillery with most of their requirement except in years where the quality is not sufficient. In these years the distillery secures supplies from the United States (US).

Manitoba grain corn is processed and used by the hog and poultry industries, while the remaining plant called **stover** can be used for wintering beef and dairy cattle. However, stover is usually worked back into the soil because of its low nutrient value.

Corn is often grown for the production of **silage**. Silage is the production of feed that has been preserved by acidification. This is the result of a fermentation process carried out by various bacteria in an anaerobic environment.

The moisture content of the crop at harvest usually determines silage quality. A moisture level too high results in fermentation instability and spoilage. Moisture levels too low result in inadequate packing and higher levels of aerobic fermentation, again resulting in spoilage and a lower quality.

Harvest for silage is ideal when the grain moisture content is about 45%. The advantages of silage production are that it can be harvested in most weather conditions, and can salvage crops damaged by hail, frost, and high weed competition. However, high levels of hail and frost can cause nitrate production.

Silage has a higher output of nutrients per acre than grain and is a better energy source than barley silage or alfalfa hay. Limited market potential due to spoilage during transportation, make silage production better suited to areas of close proximity to cattle on feed. In addition, a high requirement for capital investments in storage facilities, forage harvesters and the need for specialized trailers are other constraints to silage production. In Alberta the potential for corn silage as an alternative to small grains has yet to be tapped.

WESTERN CANADA: CORN SUPPLY AND DISPOSITION

September-August crop year	**2000 -2001**	**2001 -2002 f**	**2002 -2003f**
	.....thousand tonnes.....		
Production	292	252	355
Imports	423	1,950	1,000
Total Supply	**715**	**2,202**	**1,355**
Food & Industrial Use	125	125	125
Feed & Other Use	590	2,077	1,230
Total Use	**715**	**2,202**	**1,355**

Note: Carry-out Stocks are assumed to be nil.
f: forecast, AAFC, July 2002
Source: Statistics Canada, June 2002

Grazing corn

Corn grown for grazing may increase the potential corn area due to its ability to use more manure per acre than cereal crops and as a way to cut costs on manure disposal. Producers can also reduce the expense of having to cut and haul feed to the cattle and it has the natural advantage of standing above the snow, allowing cattle the opportunity to eat more of the plant.

Trials conducted out of AAFC's Brandon research centre estimate that overwintering feeding costs can be reduced by $0.50/day/cow for every day that the grazing season is extended. The three year trial found that the performance of cows on extended corn grazing was comparable to drylot feeding. The study also found that quality improved when corn was swathed.

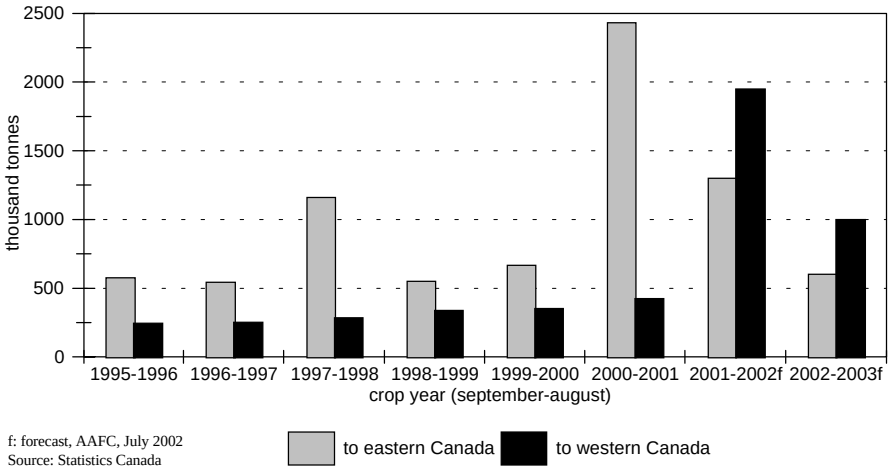
Additional research out of Lacombe, Alberta found that corn production for use as winter grazing showed a yield advantage over barley. When corn was seeded at higher densities per acre than the typical 30 inch rows, it yielded as much as other competing small grain alternatives. The results showed that corn could be grown in areas where barley could not, but had an economic advantage limited to areas in the south, because of the higher heat units required and in the Peace River region where there are a greater number of daylight hours.

Test trials conducted by the Ontario Ministry of Agriculture, Food and Rural Affairs found that lower test weight corn still has significant energy content and that pig growth was not significantly affected with test weight values as low as 45 lb/bu.

Disease problems
The presence of fusarium head blight (FHB), a fungal disease that infects many cereal crops, has become a major source of concern for producers and feed mills. The strain Fusarium Graminearum produces mycotoxins such as Deoxynivalenol (DON) that can threaten the health of livestock. All non-ruminants and hogs in particular have an extremely low tolerance level to the mycotoxins. The prevalence of the disease in wheat and barley crops in Manitoba and to a lesser extent in Saskatchewan, means that feed mills have had to source feedgrains from regions farther away that have lower or no levels of infection. This has added to the cost of hog production over and above the cost of testing for the mycotoxins. Grain corn appears less susceptible to fusarium and therefore a much larger percent of the grain will be suitable for the feed industry. However, all cereal and corn residue can help the fungus survive the winter and act as an innoculate source in the spring. In order to lower the risk of fusarium, it is recommended that pulse crops or oilseeds be seeded in the year after a corn crop.

Other uses
Corn can be processed into hundreds of edible and non-edible products. Corn is used in the beer making process by using dry adjuncts such as milled corn grits or with liquid adjuncts like corn syrup. Corn is used in food products such as cereals, cake mixes, carbonated beverages, candies, and corn meal. Other uses include paper products, pharmaceuticals, spark plugs, and paint and varnishes.

CANADA: CORN IMPORTS FROM THE US



Corn's varying use in food and industrial bio-products and as a feedstock in bio-refineries, makes corn potentially one of the best crops suited to a variety of near-term and future uses. (*see also Bi-weekly bulletin Volume 14 Number 9 entitled, "Ethanol"*)

Trade
Western Canada rarely exports grain corn. However, whiskey exports have increased steadily to CAN$4.5M in 2000.

Imports into western Canada, after averaging about 0.37 million tonnes (Mt) during 1998-99 to 2000-2001, are forecast by AAFC at 1.95 Mt in 2001-2002. About 98% of all imported corn into western Canada is produced in the 4 northern states of Minnesota, North Dakota, Montana, and South Dakota. Of these states, roughly 83% is imported from Minnesota and North Dakota.

The increase in corn imports into western Canada is the result of lower domestic feed grain supplies due to a drought reduced crop in 2001, and concerns with fusarium in wheat and barley. These two factors combined to make US corn attractively priced relative to domestic feed grains. Cattle performance on corn is about the same as barley, so feed lot operators have easily substituted corn for use in their feed rations. Compared to barley as a feed ingredient, corn has about 8-9% more energy but slightly less protein.

The largest year-over-year increase is expected to occur in Alberta where imports are expected to increase from about 0.10 Mt in 2000-2001 to about 0.78 Mt in 2001-2002. British Columbia is forecast to import about 50,000 t in 2001-2002.

CORN COUNTERVAIL DUTY

On July 10, 2000, the Manitoba Corn Growers Association filed a complaint alleging injurious dumping and subsidization of imports of grain corn from the US. The complaint was limited to imports into Canada west of the Ontario-Manitoba border and involved about $50 million in imports over the period in question. The Canadian International Trade Tribunal (CITT) determined on October 10, 2000, that the evidence presented was a reasonable indication that the dumped and subsidized grain corn from the US caused injury to the domestic industry. On November 7, 2000, the Canada Customs and Revenue Agency (CCRA) made a preliminary determination that grain corn imported from the US into western Canada has been dumped at prices that were, on average, US$1.01/bu below profitable levels and that US corn was subsidized by, on average, US$0.57/bu. Accordingly, a provisional countervail duty of US$1.58/bu was applied to grain corn imported from the US for destinations west of the Manitoba/Ontario border.

In the CCRA's preliminary investigation it was determined that the following US farm programs constitute actionable subsidies: (a) loan deficiency and marketing assistance loans; (b) marketing loss assistance payments; and (c) federal crop insurance programs.

The finding required proof that: (1) there was a concentration of US corn into the regional market; and (2) that the dumping or subsidization of corn causes injury or retardation or is threatening to cause injury to the producers of all or almost all of the grain corn produced in the regional market.

On March 7, 2001 a CITT inquiry found that a substantial proportion of locally produced corn did not enter the regional commercial market and thus was not injured by the dumped and subsidized US corn. The CITT concluded that the minimum injury threshold was not met and therefore the provisional duty was rescinded.

Trains ranging from 25 to 100 cars are moved directly by either Canadian Pacific or Canadian National railway to destinations near Lethbridge, Alberta, or by Burlington Northern railway to locations in Montana and then the contents are trucked to points in Alberta.

In Manitoba and Saskatchewan, imports are forecast to increase to 0.75 Mt and 0.38 Mt in 2001-2002 compared to 0.18 Mt and 0.11 Mt in 2000-2001 respectively. The increase is primarily the result of an expanding hog industry, low US corn prices relative to feed barley and the prevalence of fusarium head blight primarily in the Red River Valley, which can threaten the health of hogs. Corn is primarily imported by truck from destinations in Minnesota and North Dakota. The export of potash, flax, and oats to the US and the back-haul of corn into Canada has provided opportunities for lower freight rates. Imported corn requires documentation indicating that the corn has been tested to demonstrate that unapproved varieties have not been detected.

Pricing

Pricing in North America is based on the Chicago Board of Trade (CBoT) quotations. In general, due to a local shortage, the price for locally grown corn would be comparable to the per unit cost of importing US corn. In years where there is a surplus of local corn, prices may be slightly discounted. Corn is also priced relative to other feedgrains such as barley and feed wheat.

The price of imported corn is determined by the CBoT corn nearby futures price plus additional factors such as the exchange rate between the US and Canada, freight from supplier to destination, and brokerage fees.

Factors affecting prices

Since the introduction of the Federal Agriculture Improvement and Reform Act in 1996, the loan deficiency payment (LDP) program has provided strong support for US producers. The program allows farmers who meet certain criteria to receive a one-time payment for the difference between the loan rate and their posted county price and, in return, they forego any further benefits from the marketing assistance loan program for that year. In a period of low market prices, relative to the loan rate, a farmer receives a substantial LDP payment, maintains ownership of the grain, and can then sell at a higher price when prices strengthen. There is, however, a risk that prices could decrease even more after the farmer receives the LDP payout, eroding some of the gains from the payout.

LDP payouts on corn as of June 21, 2002, averaged US$0.15/bu on 7.3 billion bushel (bln bu), which is about 76% of the 2001-2002 crop. For 2000-2001, payouts averaged US$0.29/bu on 8.3 bln bu, or 83% of the corn crop. The Farm Security and Rural Investment Act of 2002, increased the loan rate for corn in 2002-2003 to US$1.98/bu, establish a target price of US$2.60/bu and provided an additional US$0.28/bu in direct payment. As well, the newly introduced counter-cyclical payments will contribute to additional producer support. The counter-cyclical payment is calculated as follows: target price - direct payment - (higher of the loan rate or season average farm price).

The LDP has encouraged corn production and has resulted in a corresponding decline in prices. While this has benefited livestock producers and industry users in Canada with low priced corn, Canadian grain producers have been hurt by the lower prices.

OUTLOOK: 2002-2003

For 2002-2003, **coarse grain** supplies in western Canada are forecast by AAFC to increase due to a larger seeded area and increased yields. Production is forecast to increase by 2.5 Mt to 15.5 Mt due mostly to higher barley, oat, and corn production. Corn production is expected to increase significantly to 0.36 Mt due to a 43% increase in seeded area in Manitoba. The average farm price in 2002-2003 is expected to increase to CAN$115-135/t from CAN$105-125/t in 2001-2002.

Imports of corn for 2002-2003 are expected to fall to 1 Mt compared to the forecast of almost 2 Mt for 2001-2002 due to larger Canadian feedgrain supplies, and a narrower spread between the price of Canadian barley versus US corn. For 2002-2003, feed barley prices are expected to range between CAN$135-165/t for No.1 in-store, Lethbridge versus CAN$150-160/t in 2001-2002.

US corn supplies for 2002-2003 are expected to be unchanged as lower carry-in stocks will be offset by higher production. Production is expected to increase by about 3% compared to 2001 to 9.8 bln bu, due to a higher seeded area. Higher domestic industrial use and slightly higher exports are expected to reduce carry-out stocks to the lowest level since 1997-1998 and are expected to be supportive for corn prices in 2002-2003.

In 2002-2003, the mid-point average US farm price of corn is forecast to increase to US$2.00/bu from US$1.91/bu in 2001-2002. This implies a nearby average futures price on the CBoT of about US$2.25/bu.

New improved corn varieties better suited for production in western Canada, fusarium concerns with barley production and corn's relative substitutability in feed rations make corn production a viable crop as a feed source for a growing hog industry.

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