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CANADIAN PULSE INDUSTRY: SITUATION AND OUTLOOK

June 8, 2011

Grains and Oilseeds Division
Food Value Chain Bureau
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CANADIAN PULSE INDUSTRY: SITUATION AND OUTLOOK

The production of pulse crops in Canada has more than quadrupled since 1991 as producers diversified out of some main grains into alternative crops to improve their income. The increased production resulted in an expansion of the pulse crops handling, marketing and processing industry. This generated increased employment and secondary benefits, especially for the rural areas of Canada, where most of the expansion took place. This issue of the Market Outlook Report examines the situation and outlook for the Canadian pulse industry.

BACKGROUND

A **pulse** is an annual leguminous crop yielding from one to twelve seeds of variable size, shape, and color within a pod. The Food and Agricultural Organization recognizes 11 primary pulses which, by definition, are harvested solely for the dry seed. Pulses are used for food and animal feed. They are important food crops due to their high protein and essential amino acid content. Pulses are 20 to 25% protein by weight, which is double the protein content of wheat and three times that of rice and the digestibility of that protein is also high. Like many leguminous crops, pulses play a key role in crop rotation due to their ability to fix nitrogen.
The main pulse crops in Canada are dry peas, lentils, dry beans, chickpeas and fababeans. Within the major crop categories, there are several types produced, including the following:
(a) **dry peas** - yellow, green, small yellow, maple, marrowfat;
(b) **lentils** - large green, medium green, small green, red, dark green speckled, brown;
(c) **dry beans** - white pea, pinto, black, dark red kidney, light red kidney, white kidney, cranberry, small red, Great Northern, pink, brown, azuki;
(d) **chickpeas** - large kabuli, small kabuli, desi.

Adaptation and diversification into pulse crop production has provided producers with higher priced alternatives to traditional cereal grain crops and allowed them to spread risk over a greater number of crops to improve their earnings. An additional benefit has been, via alternative crop rotation patterns, improvements in weed, insect and disease control. Because pulse crops have the ability to “fix” their own nitrogen, significant input costs are reduced.

AGRONOMICS AND BENEFITS

Production of pulse crops is limited by climatic and soil conditions. Crops such as dry beans and chickpeas require longer frost free periods and more heat than crops such as dry peas and lentils. Dry beans need adequate moisture later in the summer compared to the other pulse crops. In particular, crops such as lentils and chickpeas do not tolerate excessive moisture and are best suited to the brown and dark brown soil zones in Saskatchewan and Alberta. A further production restraint for pulse production is the limited availability of products for weed control.

Pulse crops are an ideal rotational crop. Their production increase has proven to be valuable in crop rotations which help to control weeds, diseases and insects, and improve soil texture and fertility. Pulse crops, when properly inoculated, are able to fix a large portion of their nitrogen requirements. The nitrogen fixed by pulse crops, which is not removed with the harvesting of the seed, is also available for use by other crops the following year. Growing pulse crops in a rotation can result in yield increases for following crops. The nitrogen fixing ability of pulse crops varies, with fababeans and dry peas having the highest ability and dry beans the lowest.

SUPPLY AND DEMAND CHARACTERISTICS

Canada is the world’s largest producer and exporter of lentils and dry peas. Area seeded in Canada for the four major pulse crops increased by 140% from 1.26 million hectares (Mha) in 1995 to a record

3.02 Mha for 2010. This represents an increase from 5% of the total area seeded in Canada in 1995 to 12% in 2010.

Production of the four major pulse crops in Canada increased by 157% from 2.02 million tonnes (Mt) in 1995 to 5.19 Mt in 2010. Production of dry peas, lentils and chickpeas, is concentrated in mostly Saskatchewan and Alberta while dry bean production is mostly located in Manitoba, Ontario and Alberta.

During the period from 1995 to 2010, wheat and course grain production decreased due to lower seeded area while oilseed and pulse production increased as a result of higher seeded areas. A dramatic increase in lentil and pea area accounted for a production increase of 350% and 97% respectively. During the same time period lentil area increased 327% from 0.33 Mha to 1.41 Mha while pea area increased 70% from 0.82 Mha in 1995 to 1.40 Mha forecast in 2010. Yields have been quite variable and are highly dependant on weather conditions. Because of this reason it can be assumed that yield gains have only increased marginally during this period.

In 2010, for dry peas, of the 2.86 Mt produced, about 65% was in Saskatchewan, 33% in Alberta and 2% in Manitoba. In 2010 a record amount of peas were seeded in Alberta as interest in growing pulses has increased.

Since 1997 Saskatchewan has accounted for more than 96% of all the lentil production. In 2010 of the record 1.95 Mt produced, about 96% is expected to be produced in Saskatchewan and 4% in Alberta.

White dry bean production is concentrated in Ontario and Manitoba while coloured beans are grown in Manitoba, Ontario and Alberta. Ontario typically grows more of the white type, accounting for 81% of the total whereas Manitoba usually grows more of the coloured types accounting for about 42% of the total coloured bean production with Ontario accounting for 31% and Alberta 23%. Due to the risk involved in growing dry beans relative to other crops which have been paying better returns, area seeded has not been trending up in the past decade.

For chickpeas, most of the 128.3 thousand tonnes (kt) are grown in Saskatchewan with minor production in Alberta. In 2009 Alberta accounted for as much as 24% of the production however, due to competing crops the total in 2010 is now minimal. Unlike peas and lentils, chickpea production has not increased due to the risk associated with growing chickpeas and better returns with other crop alternatives.

MARKETING

Handling and Transportation

Pulse crops are delivered by the producer to the plant or the dealer sends a truck to load the seed at the farm. The plants are normally designed to handle one or more kinds of crops. In some cases, such as for feed peas, grain elevators also accept deliveries. Deliveries are made throughout the year based on spot prices or conditions set under production or deferred delivery contracts.

Transportation from the dealer’s plant to the customer in the same region is generally by truck. Railways are used extensively for shipments to customers in North America and for shipments to ports for overseas customers. Peas are usually shipped bulk in railcars while food peas, lentils and chickpeas are mostly shipped in containers.

Containers, generally 20 tonnes, can be filled bulk or with seed packed in bags ranging from 50 to 100 pounds. The containers are trucked to the railway’s closest container terminal, then transported by rail directly to the customer, if located in North America, or to container terminals located at ports, for overseas shipments. Containers can also be trucked to the appropriate port terminal for loading on ships. Some crops are shipped to ports in bags loaded in rail box cars or in trucks, bulk in hopper cars, or in intermodal domestic containers. They are then trans-loaded into ocean-going containers at ports.

Facilities have been developed at the port of Vancouver for the handling of bulk dry peas, lentils and chickpeas. Canadian pulses are normally shipped through Canadian ports along the west coast, Vancouver and Prince Rupert, Thunder Bay, Montreal and other ports along the St. Lawrence Seaway, and through the northern port of Churchill on Hudson Bay.

Quality Standards and Licensing

According to the Canada Grain Act, the pulse crops covered in Canada are dry peas, lentils, dry beans, and chickpeas. The Canadian Grain Commission (CGC) establishes quality standards for these pulse crops. Additionally, the CGC grades and certifies exports for vessel shipments. However quality standards are often set between buyers and sellers.

Marketing Methods

In Canada, there are approximately 100 dealers buying pulse crops from producers, ranging from small family-owned businesses to large companies. Since many dealers have more than one location, the total number of plants receiving at least some pulses is in excess of 300.

Price Determination

There are no futures contracts available for pulse crops in Canada. Production contracts are available before seeding which normally guarantee a fixed price for part of the production. Deferred delivery or forward pricing contracts are available for most pulse crops, under which a producer can lock-in a price for future delivery. The remainder is sold at spot prices at the time of delivery. A more recent innovation in the marketing of pulse crops has been trading on the Internet where bid and ask prices, delivery locations and time frames for delivery are posted. The buyer and seller then negotiate final conditions before the sale is completed.

Marketing Cost

An important factor in price determination to the producer is the cost of freight to domestic and export markets, since the price paid to the producer depends on the price received by the dealer, less freight and handling charges. Also as the majority of Canadian pulses are exported, Canadian prices are dependent on the value of the Canadian dollar and world prices as determined by supply and demand. For feed peas, the price is also influenced by the prices of alternative sources of protein and feed grain.

Processing

The Canadian pulse crop processing industry is very diversified and located mostly in Western Canada and Ontario. Primary processing involves receiving, cleaning and quality sorting of seed. Secondary processing involves preparing seed for use by the consumer and normally secondary processing occurs in a different plant from primary processing.

The largest secondary processor was the livestock feed industry, which consumed a large volume of dry peas, as well as some lentils, chickpeas and fababeans, mainly in the Prairie Provinces. However due to the high costs of pulses relative to other feed grains, the use of pulses in feed ingredients is currently small. One use of dry peas in livestock feed is a mixture of two-thirds ground peas and one-third canola meal. Although canola meal is an excellent source of protein, it is low in digestible energy. Peas have high energy digestibility, and the amino acid profile of peas, which is high in lysine, complements the amino acid profile of canola meal, which is high in methionine and cystine. These amino acids are essential in diets for good growth. Another feed product is an extruded blend of ground dry peas and canola seed. In addition to the two ingredients complementing each other, the high oil content from the canola seed is a readily available source of energy.

Secondary processing includes the splitting of dry peas, lentils and chickpeas; as well as canning, dry packaging, and the production of soup mixes, dehydrated products, gluten free flour, precooked and individually quick frozen products, soups, stews, and snack food. Dry peas and beans are also processed into components such as pea fibre, flour, starch and protein concentrates. Additional products of dry beans are refried beans and bean paste.

Domestic Use

The largest domestic use of pulse crops is for livestock feed. About 90% of the domestic use of dry peas is for livestock feed, mainly in the Prairie Provinces and mainly for feeding hogs. In addition, some low quality lentils, chickpeas, and dry beans are also fed to livestock. A small amount of dry peas are also used in bird seed food. The food market consumes a small but significant portion of pulse crops, while the remainder of domestic use is seed for planting.

Exports

Canada exports pulse crops throughout the world. About 80% the dry pea exports are sold to India, Bangladesh, and China for food use. For 2009-2010, of the total exports of 2.18 Mt, exports by destination were:

- India 1,092.6 kt
- China 417.9 kt
- Bangladesh 308.6 kt

Dry pea exports to Europe and North and South America are also important destinations.

Lentils exports are more evenly exported globally. For 2009-2010, exports were a record 1.38 Mt, with exports by destinations as follows:

- India 281.3 kt
- Turkey 225.9 kt
- Bangladesh 28.0 kt
- UAE 94.3 kt and
- Sri Lanka 73.5 kt

Exports to South America and Europe are also significant export destinations.

Dry beans exports of 255 kt in 2009-2010 are sold largely to Europe and North and South America. Chickpeas exports of 66 kt in 2009-2010 are sold to the Indian sub-continent, with the balance going to Europe, the Middle East, northern Africa and North and South America. There are also exports of pulse crops seed for planting.

Canadian export earnings from the four major pulse crops have increased from about $835 million in 2000-2001 to about $2.1 billion estimated for 2009-2010. The value of exports is expected to continue to increase along with export volumes.

Carry-out Stocks

In 2009-2010 dry pea carry-out stocks reached a record 795 kt due to record supplies. As a result prices were pressured lower to an average price of $185/tonne Free Onboard Plant (FOB).

For lentils, high exports have offset a very large crop and kept carry-out stocks to a low of 52 kt with an average price of $645/tonne FOB.

For dry beans, modest supplies and good exports kept carry-out stocks to a low of 5 kt. The low domestic stocks have supported good average prices of $705/tonne FOB for all types and grades. However, the domestic prices are largely determined by the global supply and disposition situation.

For chickpeas lower supplies have kept carry-out stocks at historic lows. While prices are also determined externally the low stocks have returned about $540/tonne FOB for all types and grades.

Economic Impacts

Farm cash receipts for pulse crops increased by 170% from 1999 to $2.16 billion in 2009. In comparison, over the same time period, receipts for other commodities increased as follows:

- 148% to $6.76 billion for oilseeds,
- 75% to $6.18 billion for wheat, and
- 61% to $1.33 billion for coarse grains.

The increase in production has also benefited the general economy through the handling, processing, and transportation industries, mostly in rural communities. Direct employment by pulse crop dealers is estimated at about 2,500 employees. In addition, pulse crops contribute to employment in grain elevators, transportation, transloading, port terminals, manufacturing of bags and other containers, in secondary processing, in manufacturing of inputs and inoculants for pulse crops, and with suppliers of seed for planting.

US Situation

The US *Farm Security and Rural Investment Act (FSRIA)* of 2002 included dry peas, lentils and small chickpeas under the loan program for the first time. Since then, US production of dry peas and lentils has increased by 416% and 220% respectively. This added production has increased export competition for Canadian dry peas and lentils in world markets and pressured Canadian prices.

US production of pulse crops continue to increase with lentil production in 2010 forecast to increase 58% from the prior year to more than 420 kt while pea production is expected to increase by 13% to 801 kt. The increase in pea production is mostly due to higher yields while the increase in lentil production is due to larger harvested area. Competition from corn, dry beans and canola in North Dakota has limited US pea area in 2010.

2010-2011 FORECAST

Dry peas – Strong export demand, especially from our largest market, the Indian subcontinent, and large fluctuations in domestic use is forecast to sharply draw down ending stocks which will provide support for current high prices.

Lentils – Record supply combined with lower exports to the Indian subcontinent and Middle East will keep prices lower than last year. The large price spread between large green and red lentils is expected to continue.

Dry Beans – Higher North American supply will lower exports and increase ending stocks. Prices have been lower than the prior year and are forecast to remain pressured for the year.

Chickpeas – Record prices have been support by continued strong Middle Eastern demand and higher domestic feed and waste use. Ending stocks are forecast to fall to near record lows.

2011-2012 OUTLOOK

Canadian production of pulse crops is forecast to decrease about 9% in 2011-2012. Pea production is expected to decrease slightly to about 2.8 Mt due to lower seeded area. Lentil production is expected to decrease substantially to 1.6 Mt as a result of significantly lower seeded and harvested area. Bean production is expected to decrease sharply to 190 kt due to acreage competition from soybeans. Area seeded for chickpeas is expected to increase marginally while slightly higher harvested area will result in a 5% increase to about 135 kt. For further information and periodic updates please check "*Canada: Pulse and Special Crops Outlook*" at www.agr.gc.ca/gaod-dco

LONGER TERM OUTLOOK

Canadian seeded area and production of pulse crops is expected to continue to trend moderately upwards during the next decade because of improved varieties resulting in higher yields, increased seeded area because of producers' willingness to continue diversifying out of grains in the Prairie Provinces and increasing demand in Canadian and world markets. The magnitude of the increase will depend on returns from pulse crops relative to grains and oilseeds, moisture conditions, carry-in stocks, crop rotation considerations, the producers' ability to diversify and expanded demand for pulses. Most of the growth is expected to be in Saskatchewan and Alberta due to their large suitable soil types and the pulse varieties developed for production in the Prairie Provinces. Most of the production growth is expected to result from increased seeded area, but average yields are also expected to trend upwards.

The future trends for pulse crops in Canada are as follows:

Dry peas – Production is expected to trend moderately upwards due to increasing demand in the food and feed sectors, the continued development of improved varieties and their fit in rotations with other crops. Canada is expected to continue to be the largest producer and exporter of dry peas in the world.

Relatively new large markets such as China, where pea use is increasingly being incorporated into food use should continue to provide good export growth prospects. In 2009-2010 Chinese exports was a record 418 kt compared with slightly more that 46 kt in 1999-2000. In our largest export market such as India, exports are forecast to continue to increase as a result of an expanding middle class and the country's inability to meet the increasing population growth driven consumption. In India the deficit between production and imports has been growing by on average about 250 kt over the past 6 years with Canadian share of exports comprising about 50% of the shortfall. Exports to India in 2009-2010 were more than 1.1 Mt, almost four times the amount in 1999-2000. For the first three months of the 2010-2011 crop year, pea exports to India, in general are about double the pace compared to the same period in 2009-2010 due to significantly lower prices.

New export markets for food peas are expected to be developed as a result of research and market development focusing on the health aspects of a diet incorporating pulses.

Lentils – Production is expected to continue to trend moderately upwards to meet increasing world demand. Large area of land suitable for lentil production in Saskatchewan and Alberta, the development of improved varieties, as well as agronomic improvements is expected to facilitate production growth. Canada is expected to remain the largest producer of lentils in the world and continue to be the largest exporter. Counties such as India, Turkey, Bangladesh the EU-27 and South America should continue to be our largest markets and prospect for growth, however recent successful marketing initiatives are targeting other developed markets.

Dry beans – Production is expected to remain relatively flat. Larger production in Alberta is expected to be offset by lower production in Manitoba and Ontario. In Manitoba and Ontario, traditional bean growing areas are expected to continue to switch acres to soybean due to good returns and less agronomic risk when compared to beans. Canada’s share of world exports is expected to decrease, in line with the decreased production. The EU-27 and the US will continue to be our largest market.

Chickpeas – Production is expected to slowly trend upwards, but the growth in production will depend on the development of more disease resistant and shorter season varieties, which will enable the crop to be grown over a larger area with reduce production risk. Canada is expected to increase its share of world chickpea production and exports.

Processing

The primary processing industry for pulses is expected to continue to grow slowly but continue to consolidate due to the rapid expansion over the past decade.

Increased secondary processing is expected in all areas, food, feed, bird seed and industrial. The secondary processing sector is expected to become more diversified, with a larger range of products produced. Increased secondary processing is expected to increase domestic consumption and increase exports of semi-processed and consumer ready products.

Identity preservation

In the production and primary processing sectors, identity preserved provides higher value to end-users by contract growing with farmers for pulses requiring precise specifications. The crop is identity preserved from seed to harvest right through the shipping process direct to the buyer's port of destination or processing plant. Identity preservation and traceability for shipments is expected to increase in response to consumer demand in developed countries.

Research

Research is continuing to develop better varieties, and improve disease, weed and insect control. Research on developing new products from pulses is also continuing. This includes research in the areas of the health, nutrition, functionality and environmental sustainability of pulses as new demand drivers, the pharmaceutical and nutraceutical potential, and food and industrial uses. Researchers and industry representatives from Canada and other countries are in the process of developing international standards for the identification and testing of pulse crops. Testing methods are being developed for such traits as colour, texture, taste, cooking time and splitting and milling ability.

CANADA: PULSE CROP* SUPPLY AND DISPOSITION						
AUGUST-JULY CROP YEAR	**2006 -2007**	**2007 -2008**	**2008 -2009**	**2009 -2010**	**2010 -2011f**	**2011 -2012f**
			million tonnes			
Carry-in Stocks	**0.90**	**0.42**	**0.42**	**0.55**	**0.87**	**0.79**
Seeded Area	2.08	2.34	2.50	2.65	**3.02**	**2.59**
Harvested Area	2.04	2.30	2.46	2.59	2.86	2.50
Yield (tonne/bushel)	1.84	1.81	2.01	2.00	1.81	1.89
Production	3.75	4.17	4.95	5.19	5.19	4.72
Imports	0.12	0.10	0.08	0.12	0.11	0.09
Total Supply	**4.76**	**4.69**	**5.45**	**5.86**	**6.18**	**5.61**
Human Food	0.13	0.11	0.11	0.11	0.14	0.14
Industrial Use	0	0	0	0	0	0
Seed	0.33	0.34	0.35	0.38	0.34	0.33
Loss in Handling	0.04	0.04	0.04	0.05	0.05	0.05
Feed, waste and dockage	0.55	0.39	0.26	0.59	0.93	0.46
Total Domestic use	**1.06**	**0.89**	**0.77**	**1.10**	**1.47**	**0.98**
Exports: Grain	3.29	3.38	4.13	3.88	3.92	3.90
Exports: Products	0	0	0	0	0	0
Total Exports	**3.29**	**3.38**	**4.13**	**3.88**	**3.92**	**3.90**
Farm Stocks	0.28	0.20	0.26	0.57	0.47	0.47
Commercial Stocks	0.14	0.22	0.29	0.31	0.32	0.26
Total Carry-out stocks	**0.42**	**0.42**	**0.55**	**0.87**	**0.79**	**0.73**

Source: Statistics Canada
* Pulse crops include dry peas, lentils, dry beans, and chickpeas.
f: forecast