

RURAL ECONOMY

**Case Study: Value Added in the Oats Industry in Alberta
and Western Canada 1998**

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Introduction

The processing of oats to some higher valued product before it is either sold locally or exported is an example of a value added activity. There are many potential uses for oats and many products that can be processed from oats, making it a good starting point when exploring value added in the agri-food and fiber industry in Alberta. Consulting studies have stated that, "The Alberta food and fiber sector operates at the lower end of the value chain" (Toma and Bouma, 1996, executive summary). The objective of this study is to identify and evaluate potential value added opportunities concerning the oats industry in Alberta and western Canada.

Value added, as defined by the *Dictionary of Business and Economics*, is the difference between the price of purchased raw materials and the products final selling price. As a related example we can think of an oats milling facility that sells \$130,000 in finished product (Pony oats) and to make this product it has to buy \$100,000 in raw oats. We can see that this milling facility has added a value of \$30,000. It is important to understand that this is not a profit concept but is solely based on the difference between the value of a product before and after processing. This paper examines value added activity not just for one company but for the oats industry as a whole. Consistent with Toma and Bouma's (1996) approach in their review of value added in the agri-food and fiber industry in Alberta, it is appropriate to look at value added on a broad scale using an industry perspective. As Toma and Bouma described it in *Changing Courses* (1996), value added on an industry scale "is not conceptually difficult. Yet in reality it is enormously difficult" (page 103) Toma and Bouma (1996) had three recommendations for value added in the agri-food and fiber industry in Alberta:

- 1) Create an overseeing corporation to enhance value added activity in view of industry objectives.
- 2) Alberta must be a leading food producer in order to maximize value added activity in the agri-food and fiber industry.
- 3) Review any regulations that may be impeding the progress of value added in the Alberta agri-food and fiber industry.

These recommendations for the agri-food industry as a whole may not be the best way to increase value added in the Alberta oats industry. Due to the relatively small quantity of oats that are marketed, an overseeing corporation would likely only focus on oats as one component of their operations. This may result in a problem where the interests of adding value to oats in Alberta is compromised by increased attention and emphasis given to other bigger industry areas such as wheat and barley. The second recommendation also may not apply in the oats industry because of the location of the consumption market. Alberta, although a large producer of oats, has a small domestic market for food products and thus may have trouble competing with those producing food products closer to the consumption market. The third recommendation applied to the oats industry would be useful for adding value to oats in the area of nutraceuticals and functional foods.

In this paper, historical background is provided through an explanation of historical oat acreages, prices and yields. Trends for these historical data sets are analyzed graphically and statistically. Historical policies and markets for Alberta and western Canada are evaluated in an effort to determine how the oats industry has worked in the past. Trends in oat utilization of Canadian oats are presented covering the last fifty

years. A general description on the processing of oats is supplied to identify opportunities for value added processing.

Finally, industry representatives are contacted for their perspective on the oats industry and market. Processors, suppliers, government representatives and association representatives are contacted and asked questions relating to value added in the Alberta oats industry. Based on the background, current and forecasted situations, conclusions are given on the potential for value added activity in the oats industry in Alberta and western Canada.

Alberta and Western Canada Oat Background

Trends in historical oat acreages, prices and yields are identified in order to analyze present and future activity in the oats industry. Comparing acreage, price and yield trends for oats and other major western Canadian crops reveal relative crop importance and the change in this over time. Trend recognition and comparison provides one with some of the fundamental background needed for industry assessment and in turn potential for value added activity.

Historical Oat Acreage

In terms of the number of hectares seeded in oats (Figures 1a, 1b and 2), in 1913 the area in oats production was 663,000 hectares and 2,363,600 hectares for Alberta and western Canada, respectively. This area increased to reach a high in Alberta of 1,457,000 hectares and 4,593,800 hectares in western Canada in 1943. In 1985 the area in oats production reached a low of 445,000 hectares and 967,300 hectares in Alberta and western Canada, respectively. Today we see a slightly larger area in production of 586,800 hectares and 2,035,600 hectares for Alberta and western Canada respectively. As

seen in Figure 2, Saskatchewan is the dominant producer of oats in western Canada based on seeded area, followed Alberta and Manitoba.

The historical determinants of oat acreage were evaluated using a simple linear regression of oats crop acres as the dependent variable for the time period of 1914 to 1997. The independent variables used are shown in Table 1. This analysis is designed to reveal the importance of variables that influence oat acreage but it is not an exhaustive statistical analysis. Aitkin et al (1998) provides a description of the data sources and further analysis both for oats and other major crops in the Prairie Provinces of Canada.

Table 1: Acreage Response Function for Oats in Alberta
R-SQUARE = 0.8331 (data entries: 1914 to 1997)

| ALBERTA VARIABLES | COEFFICIENT | ST.ERROR | T-RATIO |
|---|-------------|----------|---------|
| Last Years Oats Area (unscaled hectares) | 0.6 | 0.0634 | 9.394 |
| Last Years Oats Price (\$ / tonnes) | 581.79 | 292.8 | 1.987 |
| Last Years All Wheat Price (\$ / tonnes) | -215.78 | 192.4 | -1.121 |
| Time Trend | -4578.6 | 971.4 | -4.713 |
| Last Years Flaxseed Price (\$ / tonnes) | -73.4 | 75.49 | -0.972 |
| Last Years Summer Fallow Area (unscaled hectares) | 0.07 | 0.0217 | 3.279 |
| Constant | 388770 | 81880 | 4.748 |

A positive relationship is present with last year's oat area as well as with last year's oat price in predicting current oat acreage. The relationship between oat acreage from one year to the next means that if oats area is high one year then it is expected to be high the next year. Last year's price shows a positive relationship, suggesting past prices are used for forecasting future prices. A higher oat price in one year leads farmers to grow more oats in the following year. In Alberta previous year's summer fallow is positively related with oats acreage, suggesting a rotation where oats are seeded in a crop year following summer fallow years. Thus in years after high summer fallow area in Alberta oats acreage is expected to be higher. This rotation with summer fallow may be seen as an attempt to control wild oats, a weed problem in oat production.

The time trend variable (Table 1) shows a significantly negative relationship with oat acreage, which statistically supports the notion that oat acreage has had a decreasing trend over time. We attribute the declining trend to several factors:

- 1) Increased use of machines on farms (decreased demand for oats as feed for draught animals).
- 2) Availability of superior substitute feeds (i.e. barley and corn as higher energy feed grain).
- 3) Crop production technology (wild oat herbicides).
- 4) Declining real farm gate price for oats (discussed later).

Although the traditional demand for oats as horse feed is decreasing there have been recent increases in oat production area. This increase is likely due to the increasing popularity of recreational horses (e.g., racehorses) and the increased awareness of the nutritional value of oats as a component of functional foods and nutraceuticals.

Historical Oat Prices

Real oat prices were calculated using the annual Consumer Price Index (CANSIM, 1997 base year) to deflate nominal prices. Figure 3, shows the average real farm-gate price for oats (CANSIM & Canadian Grain Industry). We observe a decreasing price trend over a number of twenty to twenty-five year periods. The first cycle started with a high price of \$430 per tonne in 1947. Over the following twenty-five years real average farm gate price of oats decrease to a low of \$138 per tonne in 1971. This low price is then followed by a dramatic increase in price over the next two years and we end up with a high price in 1973 of \$399 per tonne, \$261 more per tonne than just two years earlier. This high price, similar to that in 1947 is followed by years of

decrease and hits a low of \$77 per tonne in 1990. The average price in 1990, adjusted for inflation, is lower than any average price observed during the 1930's, even with the 1930's often being considered the period of lowest grain prices this century in western Canada. Oats are generally the lowest priced Canadian feed grain (Aitkin et al, 1998).

Monthly feed oats prices for an Edmonton elevator are shown in Figure 4 allowing a closer look at the feed oats industry in Alberta over the past twenty years (AGDATA). The overall trend shows a decrease in the real price of feed oats in Edmonton. Real price was calculated using the monthly Consumer Price Index (CANSIM, January 1997 base period) to deflate nominal prices. In December of 1980 the average high price is \$367.40 for feed oats. The price has generally decreased from that point in time although there have been periodic price "spikes" such as in May 1985, September 1988 and May 1996 when the high feed oats bids reach just over \$270. In December of 1997 the average high and low feed oat bids in Edmonton elevators were \$182.21 and \$141.14 respectively.

Historical Oat Yield

The historical trend in oats yield has generally followed other grain crop yield trends in Alberta (Figure 5). Yields were highly variable until the 1950's, averaging approximately 1,250 kg/hectare. Yields have since increased to just under 2,500 kg/hectare in 1997. In most recent years barley has produced superior yields in Alberta with a yield of 3,100 kg/hectare in 1997. This may indicate faster advances in the production technology and genetics of barley over the last twenty years. This is a potential explanation for the trend of increasing area in production of barley in Alberta. The causality may truly be reversed; barley has increased in area and importance so

research involving crop improvements has had an emphasis on barley, resulting in a superior barley yield. It is unknown which factor caused which result. In general, the yield of oats in Alberta is higher than the yield of oats in the other prairie provinces and in many of the oat producing states in the United States. This superior yield is due to Alberta's cool wet climate that is generally preferred by oats (Peat Marwick, 1989).

Background Summary

Oat acreage has generally displayed a decreasing trend with a slight increase in oat crop area in recent years. This trend is largely due to decreased oat demand and production problems with regard to wild oats. Declining real prices for oats indicate a lower valued crop and this may have contributed to the decline in oat acreage. Oats are now typically sold as the lowest valued feed grain in Canada (Aitkin et al, 1998). Oat yield has been increasing since the Second World War but has not been increasing as fast as barley's superior yield. Substitutes such as barley, which make a higher energy feed, replaced oats dominant position in the feed market.

Historical Overview of Oat Policy and Marketing

Policy and marketing of oats in western Canada has varied greatly throughout the twentieth century. The majority of the marketing and policy history discussed in this section is from a report by the Peat Marwick Consulting Group (1989). Prior to 1948, since the introduction of the Canadian Wheat Board (CWB) in 1935, selling oats to the CWB was an option available to producers (Morris, 1987). Having the choice left up to producers was ineffective for the CWB because they offered a consistent publicly known price. As a result, in times when the market price was higher than the CWB price the producers would sell in the open market and the CWB would have no stocks. When the

opposite occurred and the market prices fell below the offered CWB price then the producers would sell stocks to the CWB and the CWB would lose money. As a result of these inefficiencies, on August 1, 1949, the CWB was given exclusive rights to the marketing of oats in western Canada and export markets.

In the first crop year that the CWB had monopoly control over the marketing of oats, 1949/50, 1,236,890 tonnes of oats were marketed by the CWB (CWB annual report 1949) up from 460,643 tonnes marketed by the CWB just two years earlier (CWB annual report 1947). Total production of oats in 1947 and 1949 were 3,027,000 tonnes and 3,003,900 tonnes respectively in western Canada (CANSIM). In 1947, before the CWB had monopoly control of the marketing of oats, they only marketed about 15% of the total oats produced in western Canada. However, in 1949, the first year the CWB had monopoly control of oats, they marketed 41% of the total oats produced in western Canada. This suggests that over 50% of oats were used for on farm feed purposes.

In 1974, domestic markets were opened to producers and interprovincial trade restrictions were eliminated. Not all interprovincial trade had to be conducted through the CWB. The producer now had a choice of selling to the CWB, selling to other farms or selling oats as feed within Canada. The CWB marketed 621,512 tonnes oats in 1974 (CWB annual report 1974). It was also during this period that the corn competitive pricing formula (Canadian Wheat Board Annual Report 1974) was implemented, in an attempt to keep a competitive domestic feed grain price. The corn competitive pricing formula was developed by the Canadian Wheat Board and the Canadian Livestock Feed Board. The formula established a value for Canadian feed grains in the domestic market that was competitive with United States corn in Montreal. The formula specifies a

relative percentage value of oats at different corn price levels with an allowable adjustment built in as plus or minus four percent. Similar formulas were also used for feed grades of wheat and barley until this system of pricing was terminated in 1985.

A major pricing strategy implemented by the CWB throughout its existence involved price pooling, initial payments, interim payments and final payments. The CWB has been both criticized and commended for this approach. Price pooling is a system of pricing which allows all producers to share in both the highs and the lows of any given crop year. Price pooling ensures that all farmers receive the same price for the same grade of oats regardless of the date of delivery during the crop year. The same average price is awarded to all producers regardless of the time of delivery in that crop year. Pool prices are calculated based on an average of prices taken after all stock delivered in that crop year to the CWB is sold. Initial payments are those payments to producers from the CWB on delivery and are usually based on some expected final pooling price. Interim payments are payments to the producer above the initial payments if the market for a specific crop looks more favorable and final pool prices are expected to be higher than the initial payment.

It should be noted that both the initial and the interim oat payments were federally guaranteed; therefore, if the pool price happened to fall short of what was already paid to producers by way of initial and interim payments, the producer could keep the extra that was paid and the federal government would pick up this difference. If, on the other hand, the pooling price was greater than the existing payment then a final payment was given out to producers to make up for this difference. Price pooling, used as a method to control risk for producers in the world market was seen as an effective tool by

Groenewegen (1986) on the condition that CWB had continued control over exports. Price pooling is still used today in the CWB for wheat and barley.

The Family Farm Foundation (1990) questioned the effectiveness of the CWB concerning oat pricing in the 1980's. Critics suggested that the CWB tended not to give oats enough priority due to the relatively small quantity of oats traded compared with wheat and barley. A more aggressive selling strategy, more in tune with market demands, may have been implemented had oats been a more significant component of the CWB's interests. It was also thought that producers did not directly see the signals or reap the benefits for producing high quality oats with the initial payment and price pooling system used for oats. For example, no premium was offered for hullless oats developed in the late 1970's and early 1980's, to compensate for the increased quality. Hullless oats are further discussed later in this paper. It is also questioned whether or not the CWB system of marketing allowed for the flexibility in price and oats quality demanded by Canada's major export market the United States. Peat Marwick Consulting Group (1989) state that "some have charged that the Board's pricing policy in the domestic market has inhibited development of a competitive oats milling industry" (page 19). There are limited opportunities for adding value at the production end, in oats. Therefore, a competitive milling industry may be essential if one is looking for areas to add value to the local oats industry.

These concerns were addressed by the CWB in a number of ways. In the 1980's much of the marketing of exports to the United States was done by private firms and co-op companies acting as agents of the CWB. Interim adjustments in initial payment levels provided for clearer price signals for producers. These efforts were not considered

sufficient because in 1989 the federal government saw no strong rationale for continued CWB control of the oats market. In 1989 the minister responsible for the Canadian Wheat Board stated that Oats had become more of a specialty crop and the most effective marketing medium for a specialty crop market was through private trade. Organizations such as the United Grain Growers agreed with the suggested action of removing the oats exports from the control of the CWB (1988 annual meeting). On August 1, 1989 the Canadian oats market was removed from CWB control and private grain trade began. In the last crop year of CWB's control of oat marketing 22,288 tonnes, 31,303 tonnes, 169,032 tonnes, and 364 tonnes of 1CW, 2CW, 3CW and 4CW oats were marketed by the CWB respectively (Canadian Wheat Board Annual Report 1988). Estimated total production of oats in 1988 in western Canada is 2,451,900 tonnes (CANSIM). Thus the tonnage of oats marketed by the CWB in the last year of CWB control amounts to less than 10% of the total tonnes of oats produced in western Canada in that year.

A commodity futures oat market at the Winnipeg Commodity Exchange (WCE) has played a role in the oats industry during the years of CWB markets and after in the private trade years. During the CWB's control of oats, the WCE was used to balance prices between the eastern and western regions of Canada. Currently oat contracts are priced at in-store Minneapolis and starting January 1st 1999 will be priced at track Minneapolis (Agriculture Canada 1998). Typically few futures contracts for oats are outstanding and few have been bought and sold in recent years. Canadian grain companies offer prices based on these WCE future prices. Currently oat futures are traded at the WCE and daily prices are available on their web site (<http://www.wce.mb.ca>). WCE future prices for oats are usually the same as the Chicago

Board of Trade oats price plus a premium for the higher quality of Canadian oats (Agriculture Canada 1998). The average futures price for oats in the 1997/1998 crop year is expected to be about \$160 per tonne relative to \$172 per tonne during the 1996/1997 crop year (Agriculture Canada 1998). As of Thursday August 20, 1998 the WCE opened with 615 contracts outstanding and no oat contracts were traded in that week. WCE oat future contracts are not used extensively by the industry.

Historical Utilization of Canadian Oat Production

Statistics for oat usage have changed greatly over the years with domestic animal feed being the dominant use of oats. Figures 6 through 11 depict the proportional distribution of oat utilization for ten-year intervals from the 1948 crop year to the present. Domestic feed made up well over half of the usage of oats produced. We also see a large increase in exports over the last twenty years from 16,800 tonnes in 1978 to a forecast of 1,750,000 tonnes in 1998. Quantities of different oat uses are also given in Table 2 below.

Table 2: Oats use in Canada
tonnes

| | 1948/49 | 1958/59 | 1968/69 | 1978/79 | 1988/89 | 1998/89f |
|-------------|-----------|-----------|-----------|-----------|-----------|-----------|
| Exports | | | | | | |
| Grain | ----- | ----- | ----- | ----- | 717,700 | 1,500,000 |
| Product | ----- | ----- | ----- | ----- | 18,900 | 250,000 |
| Total | 393,930 | 115,864 | 41,994 | 16,800 | 736,600 | 1,750,000 |
| Domestic | | | | | | |
| Human Food | 229,260 | 71,327 | 73,579 | 85,600 | 93,000 | 175,000 |
| Seed | ----- | 41,880 | 313,378 | 154,900 | 179,900 | 175,000 |
| Animal Feed | 735,930 | 6,131,102 | 4,361,394 | 3,539,600 | 2,196,800 | 1,994,000 |
| Total | 965,190 | 6,244,309 | 4,748,351 | 3,780,100 | 2,469,700 | 2,344,000 |
| Total Use | 1,359,120 | 6,360,175 | 4,790,345 | 3,796,900 | 3,206,300 | 4,094,000 |

Source: Statistics Canada Grain Trade if Canada Cat., No. 22-201-XPB

It is unknown why there is a change in all numbers between 1948 and 1958. This shift in numbers could be due to a change in the way Statistics Canada reported its values

during this period. Another potential reason for the varied numbers could have resulted from the marketing power in control. As trading before 1948 was not under CWB control large amounts of domestic feed use may have gone unreported resulting in a small tonnage for feed use in 1948 relative to 1958.

Total exports of Canadian oats decreased from the late 1940's until the early 1980's at which time they begin to increase. This increase may be related to the increasing awareness of oats as a functional food and the popularity of oats as horse feed for an increasing number of recreational horses in North America. This horse market includes the racehorse market, where there is a large demand for quality feed oats with a high bushel weight. These oats are most commonly referred to as pony oats and are an important part of Alberta's oat processing industry. However the majority of the oats exported are shipped out as raw grain and leave Canada without further processing.

The use of Canadian oats for domestic human food has been steadily increasing from the late 1950's. However, this portion of oats use only is forecast to be about 4% of the total oats use in 1998. The use of oats for animal feed has been steadily decreasing since the late 1950's but still remains the most significant portion of Canada's total oats use. Oat product exports have increased between 1988 and 1998. The increased processing involved in production of more oat products implies that value added activity is increasing in Canada. If one seeks more value added activity in Alberta it would be advantageous to have increased amounts of product exports from Alberta.

As seen in Figure 12 the prairie region of western Canada is the biggest exporter of raw oats. Total oat exports by destination show the United States to be the biggest

importer of Canadian oats. In 1997 Alberta exported more than 322,000 tonnes of oats to the United States making up 95% of Alberta's total oat exports (Figure 13).

Some examples of oat product exports are oatmeal, rolled oats, bran, shorts and middlings (Figures 14 and 15). Although these exports are a relatively small amount in total, the majority of them are exported to the United States.

Oat Products and Production

Taking a close look into the processing of oats allows us to identify potential areas where value can be added domestically. Figure 16 shows the different steps in the processing of oats and the potential final and intermediate products, which could be either further processed or sold for further milling elsewhere. Currently, there is very little further processing done in Alberta and western Canada. Oats are typically either sold at the early stages of processing as livestock feed or exported to the United States for milling closer to the major populated centers. The ultimate goal of this paper is to explore some of these processing options as local value added opportunities.

The majority of processing steps described below are defined by Coffman (1961) and Peat Marwick Consulting Group (1989). The first step in the processing of any raw oats is cleaning and grading. In this step foreign material such as dirt, weed seeds and defective oats are removed. The oats are then graded by size, shape and density. Some oats may go through only one cleaning and screening (removal of foreign material) and are then used for livestock feed. Oats intended for further milling or for use as pony oats require another cleaning.

The distribution of milling oats by percent of unprocessed weight is provided in the following table:

Table 3: Make-up of Unprocessed Oat Weight in Percent

| | |
|-------------------------------------|------|
| Unprocessed oats | 100% |
| Milling oats | 76% |
| Rejected oats | 20% |
| Hulled oats | 1.2% |
| Barley, Wheat, Corn etc. | 0.4% |
| Weed Seed, dust, dirt and Mill Loss | 2.4% |

Source: Coffman (1961)

Oats suitable for milling for human consumption products comprise 76% of unprocessed oats. The remainders are hulled oats, some other crop, foreign material, or rejected oats. Rejected oats consist of double oats, slim oats, pin oats, and light oats, all of which fall outside of human consumption milling standards. Many of the rejected oats can be utilized in feeds.

If it is desired to produce human foods, nutraceuticals or specialty feeds, the next step in the processing of oats is to remove the hulls, which makes up approximately 25% of the oat kernel. This hull weight percent varies and is an important characteristic when determining grade and ultimately the best use for any oat kernel. There are a number of things that can then be done with the hulls. They can be mixed in with livestock feeds, used as furfural with industrial applications, used as fiber for paper products (Peat Marwick, 1989) or simply discarded as waste. Industrial uses for oat hulls, such as furfural, are quite extensive and include uses in oil refining, purification of wood resin, production of synthetic resins, components in valuable pharmaceuticals and as an important intermediate in the production of nylon (Stanton, 1951). Very little has been done to pursue the industrial use of oats in Canada with only 37 tonnes out of a total of 6,360,210 tonnes of oats in Canada in the late 1950's and none recorded since that time (Statistics Canada). The size and nature of this industrial oats market is one area that

should be further explored. After the hull is removed the remaining part of the oat kernel is the groat and is the part most commonly used in human foods and more recently nutraceuticals.

There is also such a product as hullless oats, which provide for a more efficient milling process. Hullless oats are a higher energy feed product, making oats more competitive with other high energy feed products such as barley and corn. Due to the fact that hulls provide durability to an oat kernel in shipment the problem of durability arises with hullless oats. With an increased demand and a fair price for hullless oats Alberta can look to add value to the oats industry by higher values at the production level. There is a need to increase awareness of the hullless oats and the benefits of higher processing efficiency which they demonstrate (Burrows et al 1998). One of our survey respondents believes that today hullless oats are still not recognized with a premium price.

At this point it is beneficial to define some of the byproducts that arise during the processing of oats. Oat middlings are pieces of the oat groat that chip off during processing. Oat shorts and oat bran are fines that can be separated from the hulls. All of these byproducts can be utilized if further processed into oatmeal or oat flour.

If the oat groats are shipped to other milling facilities for further processing the problem of durability can arise. Raw oats shipped with hulls intact have some protection from agitation in transport. Shipping just the groats, however, can result in damage, leaving groats unsuitable for human consumption. However if hulls are utilized in local feed markets close to the area of production and groats shipped away for further processing the overall cost of shipment will be reduced as byproducts (hulls) are not shipped with the groats. Currently in Alberta there are mills processing oat groats for

human consumption. All of these mills export their groats to foreign processors for further processing. Durability is one area in this study that needs to be looked into further.

Further processing into traditional human foods involves cutting (steel cutting) the groats into uniform sizes to provide for even cooking. Tampering is simply the process of drying the groat before it is further processed. Steaming allows the groats to be flaked, if desired, with minimum breakage. Ultimately the traditional processing of oats, which still holds a high demand today, results in two major product groups; rolled oats and fines. The rolled oats will come in two types, quick cooking and regular. These types are determined by how they are cut. Fines are such products as oat flour, oatmeal, oat bran and oat shorts.

The other processing option that exists after obtaining the groats is the production of nutraceuticals. The process of fractionation, by way of wet milling, is carried out on an oat groat and extracts are derived. Dry milling is the alternative process and can make similar products but wet milling claims to create these products in a more pure form. These extracts (example: Beta-Glucan) can be used in cosmetics, pharmaceuticals and food products (CEAPRO, Production Facilities). This is the most recent and most intensively researched use for oats and tends to give the oats industry more of a specialty crop image (Peat Marwick, 1989).

Nutraceuticals and Functional Foods

Nutraceutical is simply defined as the “science of breaking down a natural food product to its basic ingredients and then reconstructing it, eliminating some of the less desirable elements” (Deters, 1996, Web Page). A functional food, as a result of this, is a

food that confers a specific medical or health benefit. It is the Beta-Glucan component of oats, which has been getting the greatest amount of attention. Beta-Glucan has been documented as having pharmaceutical properties "including the ability to reduce blood cholesterol levels, moderate post-meal glucose levels in the blood and stimulate the immune system" (CEAPRO Web Page, Human Pharmaceutical Products). A study done by Doehlert et al (1997) found Beta-Glucan to lower serum cholesterol. However, in Canada regulation on the sale of foods with health claims are strict and are seen by some as holding this part of the oats industry from reaching its full potential (Inter / Sect Alliance Inc. 1996).

In Canada if a health claim is made about a food then it falls under drug guidelines and must pass all drug research and testing before it can become a saleable product in Canada. In Canada there is no category for functional foods. These products are either a food with no health claims or a drug with health claims. Japan and the United States, with more lenient regulations, have both allowed health claims to be placed on oats products. "The United States Food and Drug Administration (FDA) approved the use of health claims for oat products, based on evidence that Beta-Glucan in oats reduced serum cholesterol levels" (Agriculture Canada Web Page, 1998). This allows marketers of oats in the United States to state that products with fiber from whole oats, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease (FDA Talk Papers 1997). There is nothing preventing the production of such products in Canada for export markets where nutraceuticals are accepted. The Canadian regulations are being reviewed closely, with the objective of a more efficient system concerning functional

food approval while still maintaining the safety of the well-informed consumer (Inter / Sect Alliance Inc., 1996).

Wet milling of oats for extracts is currently the fractionation method used, which reportedly produces the purest products. The wet milling process typically yields high fiber bran with 16-20% Beta-Glucan, as compared to 6-9% concentrations for commercial dry milling (CEAPRO, 1997). The wet milling process was developed in the mid 1980's and is currently a patented process. CEAPRO Inc. has a fractionation facility in Saskatchewan and holds the patent. CEAPRO also holds the patent to several oat extract products, which are exported to firms and then used as components in such products as pet shampoo. Research is a major component for this sector of oat processing relative to the more conventional uses (i.e., feeds and traditional foods).

Industry Contacts

In order to gauge the level and nature of oat processing that is taking place in Alberta and to assess the potential for further value added opportunities, industry representatives were contacted and surveyed via telephone. Two sets of questions were put together; one to be directed at the Alberta oat processors and one to be directed at government and association members that deal with Alberta oats. These questions are provided in Appendix II. Calls were made with three main objectives in mind:

1. Identify current usage of oats in Alberta
2. Identify the level of oat processing in Alberta and western Canada
3. Identify future opportunities for value added activity in the Alberta oat industry.

Contact responses were recorded.

A list of oat processors located in Alberta was found on the Alberta Agriculture web site. The list of processors for which contact was attempted is provided in Table 4. For some of the processors two people were contacted for information and for others no contact could be made. Some contacts were not interested in having their individual or company names in this report, so the list in Table 4 is not exhaustive. However, this list is considered to be a fair representation of the range of oat products that are produced in Alberta.

Table 4: List of oat processing facilities in Alberta and other contacts

| Milling Facility (location) | Product(s) |
|--|--|
| Westglen Milling (Barrhead) | Food grade oat groats |
| Alberta Oats Limited (Edmonton) | Racehorse oats & food grade oat groats |
| Alberta Wheat Pool (Camrose, Calgary) | Racehorse oats |
| Prairie Sun Grains | Breakfast cereal |
| Certified Organic Products (Edmonton) | Racehorse oats & oat groats |
| Champion Oat Processors (Grande Prairie) | Racehorse oats & feed grade oat groats |
| United Grain Growers Limited (Edmonton) | Racehorse oats |

| Other Contacts |
|--|
| Alberta Agriculture (a number of branches were contacted) |
| Alberta Grain Commission (AGC) |
| Oats Producers Association of Alberta |
| Alberta Food Processors Association (AFPA) |
| CEAPRO Inc. (wet milling facility located in Saskatchewan) |

Processing of Oats in Alberta

As Table 4 shows Alberta has very little oat processing for the retail consumer market. The majority of oat processing results in re-cleaned oats that meet certain quality attributes for sale into export pony oat markets. The majority of the processors indicated that 100% of their re-cleaned oats were sold as exports and the overwhelming majority of these into the United States. The by-products from the cleaning and screening of oats for pony oats, however, are largely sold locally into the domestic feed market, as are hulls

and other by-products from the processing of oat groats. Feed grade oat groats are also sold into the domestic feed market. However, survey respondents indicated that 100% are exported for packaging and further processing elsewhere. The United States, Latin America and Mexico were reported to be the biggest importers of one processor's oat groat product.

Processors gave similar responses when asked about quality attributes that are considered in purchasing of raw oats for processing. Attributes required for selection as a pony oat are:

1. a high bushel weight
2. a color that is even over the kernel and is slightly silvery
3. fairly uniform size that has a big plump groat
4. few contaminants
5. moisture to be with in a certain acceptable range

These qualities are given in the order of importance based on the number of times they were referred to by processors and other contacts. Survey respondents indicated that these qualities are important for determining if an oat kernel is suitable for the pony oats market because grades are not necessarily considered when selection is made.

For the production of food grade oat groats a similar list of qualities were reported with slightly different characteristics. Quality attributes required for oats used in the production of food grade oat groats are:

1. low percent hull weight to kernel weight
2. few contaminants
3. size uniformity

4. durable oat groat
5. moisture content
6. high protein and fiber content

Response was mixed in terms of how well Alberta oat producers are meeting these desired quality attributes, with a majority of the respondents feeling satisfied with the quality of Alberta oats. Some feel that Alberta oat producers are the best at meeting these demands. These respondents felt that Alberta producers can compete with any one in the world for high quality oats at the farm gate level. Others felt that Alberta producers have the potential to produce high quality oats, but are not currently satisfying these quality demands. It was suggested that more investment at the production level is needed in order to improve the quality of oats being produced in the province. Regardless of their opinions on the quality of Alberta oats the majority of oats purchased by these processing companies were produced in Alberta and/or western Canada.

As this case study is about value added it is important to recognize the increase in value of products as they are processed in Alberta and western Canada. Figure 17 provides a flow chart indicating the required qualities of raw oats in order to produce particular products. Prices are given for all of the different intermediate products as well as yields that can be achieved while making these products. The reported prices varied widely among contacts. The prices are based on 1998 Canadian dollars.

Total production levels of different intermediate products were estimated based on the production data supplied by those contacts who chose to participate. Note that the production statistics are not exhaustive. For the production of those who considered their level of production confidential and for those processors that could not be contacted an

average level of production based on the numbers that were supplied was assigned. Estimates of total production of intermediate oat products in Alberta and of those produced in Saskatchewan by CEAPRO are shown in Table 5.

Table 5: Estimated Total Production of Intermediate Products for CEAPRO and in Alberta

| Product | Tonnes Produced | Value Added in Alberta / tonne of product |
|---------------------------------|---------------------------|---|
| Pony Oats | 180,998 tonnes of product | \$36/ tonne |
| Human Food Grade Oat Groats | 81,000 tonnes of product | \$190/ tonne |
| Feed Grade Oat Groats | 41,500 tonnes of product | \$11/tonne |
| CEAPRO Wet Milling Oat Extracts | 2,052 tonnes of groats | N/A |

The majority of Alberta's oat processing capacity is used to provide double cleaned oats to the race horse market in the United States. The estimated amount of racehorse oats processed in Alberta is 180,000 tonnes per year, which represents a value added of approximately \$6,474,000. The per unit value added figures in Table 5 are derived based on yields, input oat costs and final product values as provided in Figure 14. Note that any byproducts from processing may also contain value but are not included in this value added assessment. Production of food grade oat groats and feed grade oat groats in Alberta is an estimated of 81,000 tonnes and 41,500 tonnes, respectively. Total value added dollar values in Alberta for food and feed grade oat groats are estimated at \$15,438,000 and \$461,000 respectively. This suggests that food grade oat groats have the greatest per unit value added of the three oat products known to be produced in Alberta.

Oat Processing Competitors

Competitors that pose a threat to the Alberta oat processing industry are the United States oat milling industry as well as similar industries in other countries that export their raw oats to the United States. As the United States is Alberta's biggest export

market for pony oats, food grade oat groats and raw oats, any other countries that export raw oats to the United States for milling, pose a threat to Alberta's processing industry. Countries that were suggested by survey respondents to be major threats to Alberta's processing industry are Finland, Sweden, Australia and Chile.

On more of a local scale the mills in Saskatchewan that produce pony oats as well as food grade oat groats directly compete for a limited market share. These well-established Saskatchewan mills are seen as strong competitors.

CEAPRO is a special case in that they have no direct competitors due to the fact that they hold, the patent to their wet milling fractionation process. However, they do have indirect competitors in the way of substitutes. Dry milling substitutes are widely produced but are reportedly not as pure as the wet milling products. There also exist substitute markets with such products as cornstarch, aloe, flax, lanolin and wheat protein, which share similar characteristics as CEAPRO's oat extracts.

Future of the Oats Industry in Alberta

If it is desirable to increase value added activity in the oats industry over the next ten years it is imperative to recognize those factors that will constrain the industry. One must know their weaknesses to fully understand their strengths. The biggest constraint to processing oats in Alberta is the location of the market. Alberta, as a consumption market, would not be able to support one oat product mill let alone what is being implied with value added in terms of numerous high valued product mills. Alberta is competitive in terms of being able to produce quality oat products, but the industry cannot compete price wise due to extra freight costs. Highly populated centers in the United States and Asia are where the products will be consumed. Milling near these centers to save freight

expense and for reasons of timely delivery, in most cases, gives the advantage to foreign oat processors. Until it makes more sense to process near the production end instead of at the consumption end it is difficult to see the efficiency in a large amount of domestic processing. One instance where this may be the case is with the high valued extracts from fractionation, due to the characteristics of the products. With high valued highly specialized products from a given oat kernel there may be savings in freight cost if extracts were derived near the producer with the extracts then being sent out to product manufacturers.

The market for human food consumption products and pony oats is saturated with little expectation for market growth. In order to increase the processing of oats within Alberta for these uses, a bigger market share is needed. If Alberta processors want to increase their market share in processed oats then the industry must move beyond the current image, as suggested by a survey respondent, of being solely a feed lot industry. Alberta needs to move some of its resources into higher valued products and away from lower valued feeds.

The production of oat extracts by fractionation also has built in constraints seen as holding this portion of the oat industry back. It was suggested by survey respondents that one must start big when getting into this component of oat processing. Typically, expensive facilities and relatively large amounts of investment are required for research in this industry. Based on this, it is difficult for companies to enter this market place. Regulations also play a role in where these products can be sold and what claims can be attached to them. One respondent suggested that the industry is driven by the market faster than the regulations allow, thus impeding the full potential of the market.

Processors in general seem skeptical that there is room in their respective markets for increased capacity. Generally, the racehorse market is seen as being fairly steady and is not expected to see an increase in demand into the long term. It was suggested by a contact that if Alberta producers are able to maintain a high quality oat product they could compete to take over a bigger share in this limited market.

Another area that a number of the respondents emphasized is research. Research to find new products, improve old products and find niche markets are areas that could increase the opportunity for oat processing in Alberta. Ultimately by research the industry would be making and/or finding the markets that would allow it to increase value added activities in Alberta for the oats industry. The nutraceutical market is one area that emphasizes research. However the processing of oats for its extracts has experienced problems in the past and some contacts are skeptical of the viability of the processing of oats for this purpose.

The processors that were contacted were asked if they had any plans for expansion over the next ten years. The majority of the processors said that they were going to increase in size in some way. Two of the mills that were contacted are considering trying some higher valued products, processing their groats a step further to produce products such as flakes. One mill suggested that if they started flaking it would be on a small scale and would likely target western Canada and Pacific Rim Countries for sales. Another mill was considering doubling in size and capacity in the same product areas as they had been working. CEAPRO is continually investing in research, working toward new product patents.

Industry Summary

Industry response provided a better understanding of the oat processing industry in Alberta. Racehorse oats are the biggest volume component of the oat processing industry in Alberta. However, if the Alberta oat processing industry is evaluated in terms of the greatest value added contribution, the human food grade oat groat processors are the biggest contributors followed by racehorse oat producers. The majority of the raw oats purchased for these processing activities are grown in Alberta and or western Canada. Some of the representatives contacted felt that Alberta could improve on its quality of oats produced and others felt that Alberta consistently produces quality oats competitive with any producers in the world.

The location of the consumption markets and their size are reported to be important factors constraining the level of value added activity in the oats industry in Alberta. As Alberta has a relatively small consumption market, almost all oats processed in Alberta are sold to export markets with the exception of feed grade oat groats and byproducts, which are sold to local feed markets. When asked, processors reported that the market for their products were saturated and gave a pessimistic view on the potential for more processing in Alberta. However, the majority of the respondents also indicate they were going to expand in some way. This contradiction is most likely present because each processor feels confident that they can secure more market share but may not feel that the introduction of new facilities would be in Alberta's best interest.

Value added potential in the oats industry in Alberta

Oats is generally the lowest valued feed grain in Canada. It is therefore important to increase the value of oats at the production end while processing new oat products if

more value added is desired. Hulless oats are one example of a production innovation, providing increased processing efficiency as well as an increase in the level of energy the oats provide as a feed grain. This product has yet to be recognized with a premium price, however. The processing of oats for pure extracts for functional foods and nutraceuticals as well as the targeting of niche markets such as feed for racehorses are a few areas that have been increasing over the last ten years.

Historically oat acreage has been declining with a recent increase into the 1990's, potentially indicating the increased demand for some of the newer uses for oats. Yield has been increasing at a similar rate to other cereal crops with the exception of barley, which has demonstrated a superior increase in yield. This is significant because barley is a higher energy feed substitute. In general these historical trends leaves the authors with a pessimistic view of value added in the current oats industry in terms of traditional oat uses. This is not to say that there is not a thriving market for Alberta oats as feed, it simply means that there is currently little value added activity in this area of the market.

As the oats industry inches toward new product in niche markets the dynamics of the crops shifts to more of a specialty crop. With the specialized attention demanded by a specialty crop it is thought that private control of the market will satisfy the different demands more efficiently than if oats were one small component of a larger organization such as Canadian Wheat Board (Peat Marwick, 1989). The example of hulless oats has not shown this to be true as their marketing has not generally been more successful in the years of private trade as compared to those of CWB control.

Product areas that create value added in Alberta and western Canada are: pony oats, oats groats, breakfast cereal products ready for retail, some intermediate product,

high valued feed mixtures and extracts. These are the products that are being produced in Alberta and western Canada. More information must be collected on breakfast cereal products as well as high valued feed mixtures to truly assess the value added potential in these areas. Raw oat and oat product markets in the United States, Alberta's major export market, should be assessed for size and nature for a better understanding of market potential for oat exports.

Alberta's and western Canada's domestic market for oats and oat products is minimal. It is important to understand that the nature of the oats market is such that it is largely an export market. Here arises the potential problem of location. Since Alberta is located far from consumption markets, freight costs, potential durability problems and timely delivery are all relevant factors. It is thought however, that such activities as the processing for oat extracts makes processing near the production location beneficial even though attempts to process these products have been viewed as less than financially successful.

Based on all of the data collected both from literature and industry contacts the authors conclude that there is limited opportunity for further value added in the oats industry in Alberta at this time.

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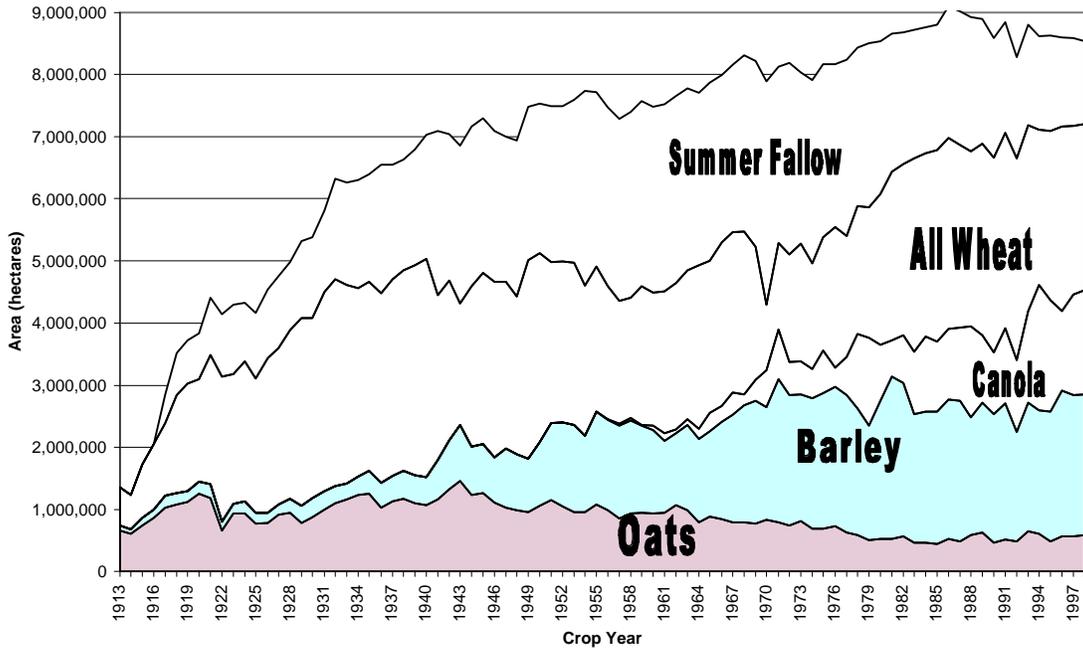
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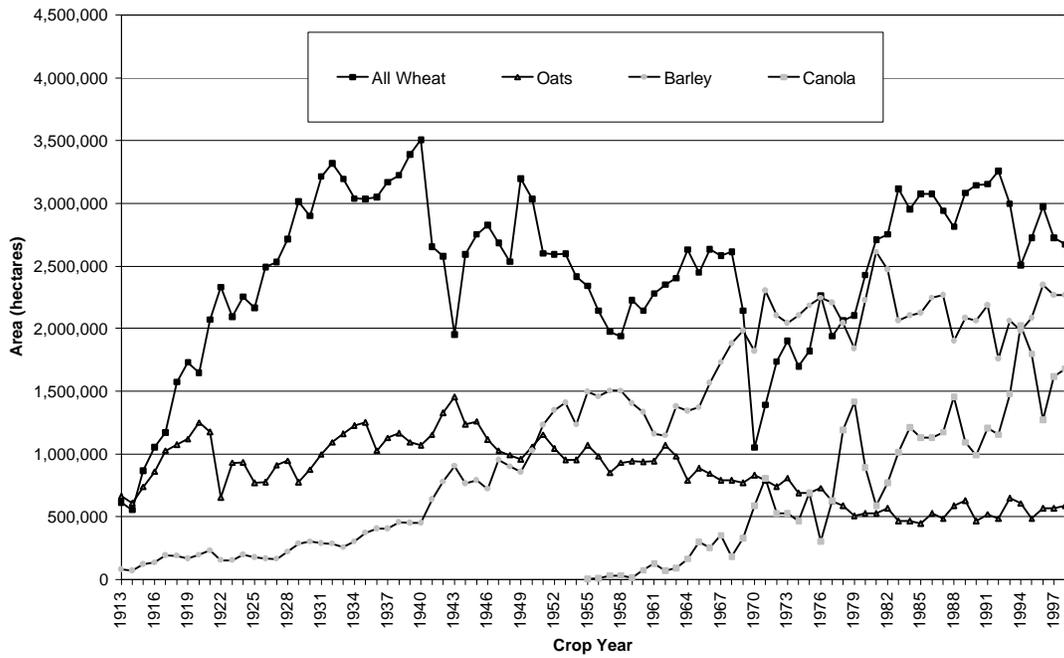
Appendix I

Figure 1a: Stacked Area Graph of Historical Alberta Field Crop Area Allocations (1913 to 1998)



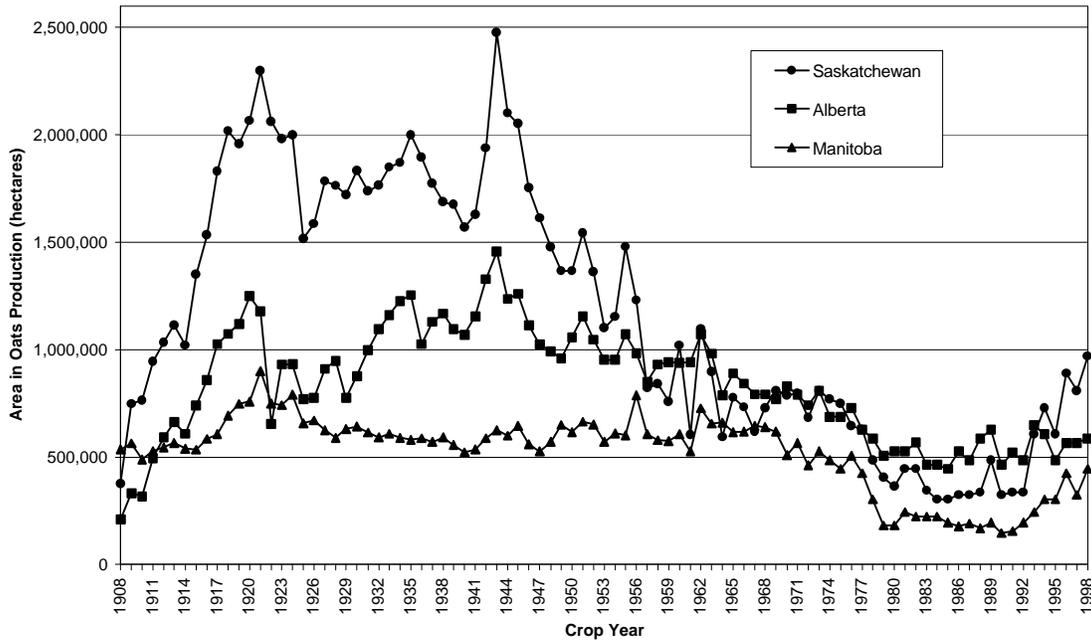
Source: Statistics Canada Electronic Database CANSIM

Figure 1b: Graph of Historical Alberta Field Crop Areas (1913 to 1998)



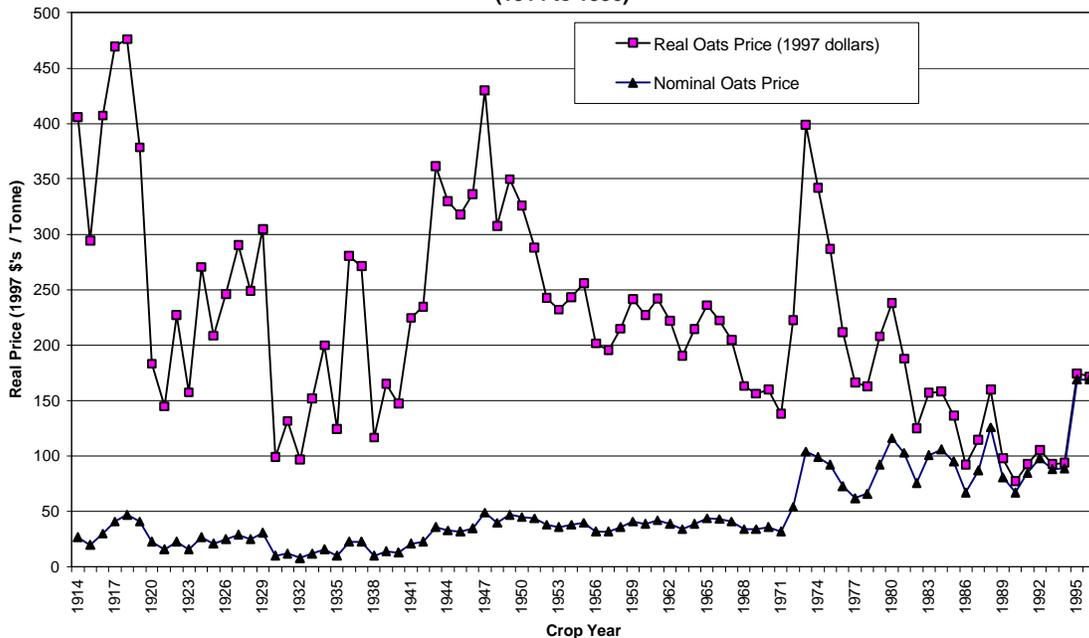
Source: Statistics Canada Electronic Database CANSIM

Figure 2: Historical Area of Oats Production in the Prairie Provinces of Canada (1908 to 1998)



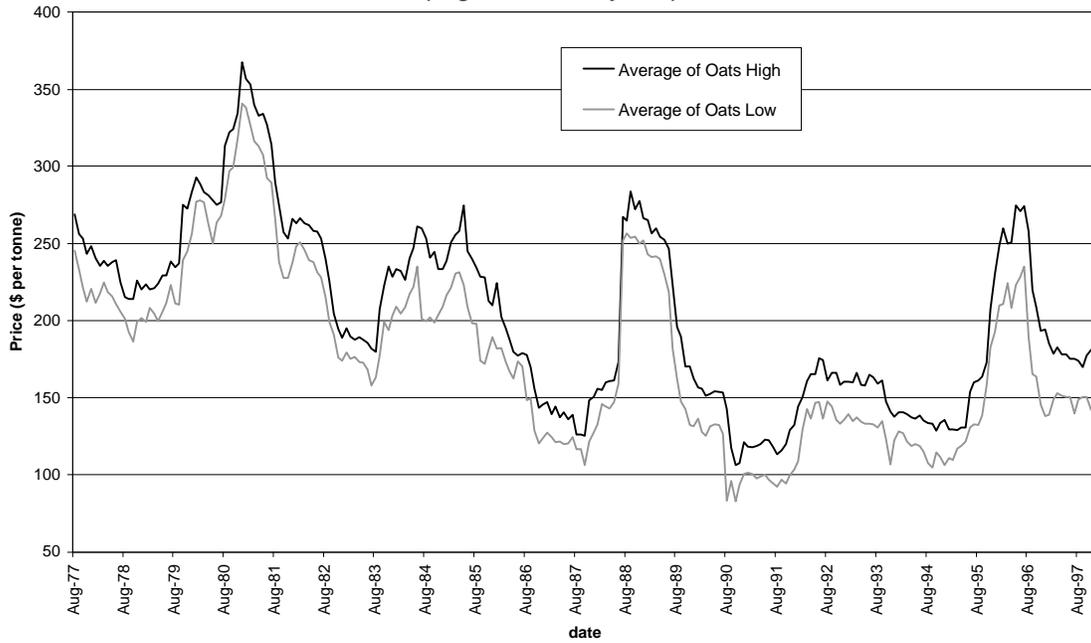
Source: Statistics Canada Electronic Database CANSIM

Figure 3: Real and Nominal Historical Prices of Oats in Alberta (1914 to 1996)



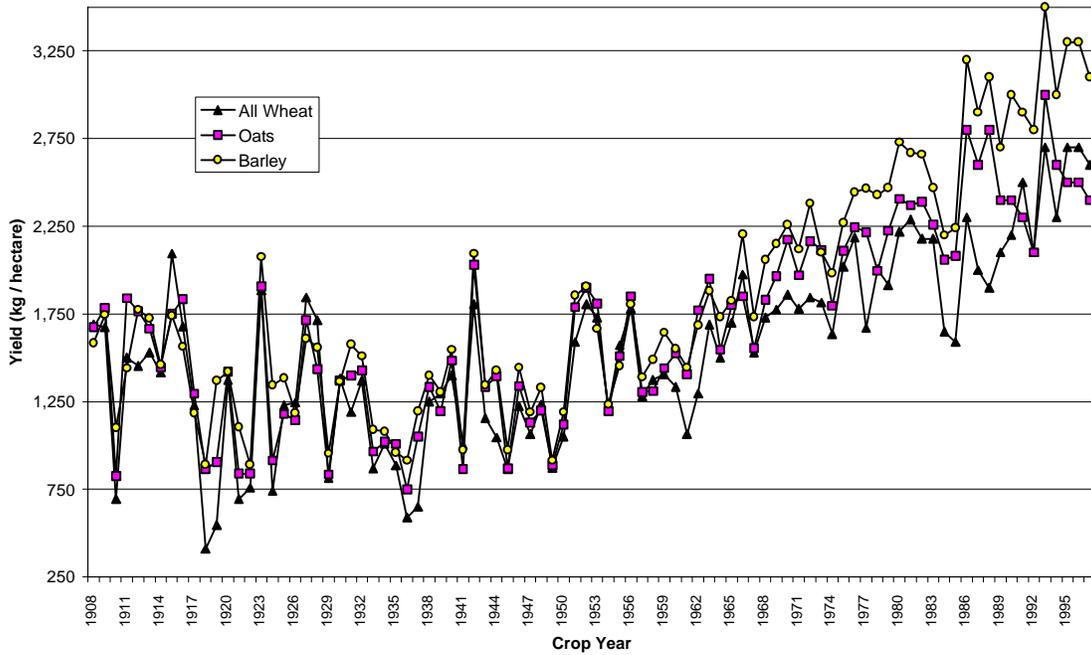
Source: Statistics Canada Electronic Database CANSIM & Canadian Grain Industry Statistical Handbook
 Note: Real price was calculated with a yearly Consumer Price Index with a base year of 1997.

**Figure 4: Edmonton Feed Oats Real Monthly Price In 1997 Dollars
(August 1977 to July 1997)**



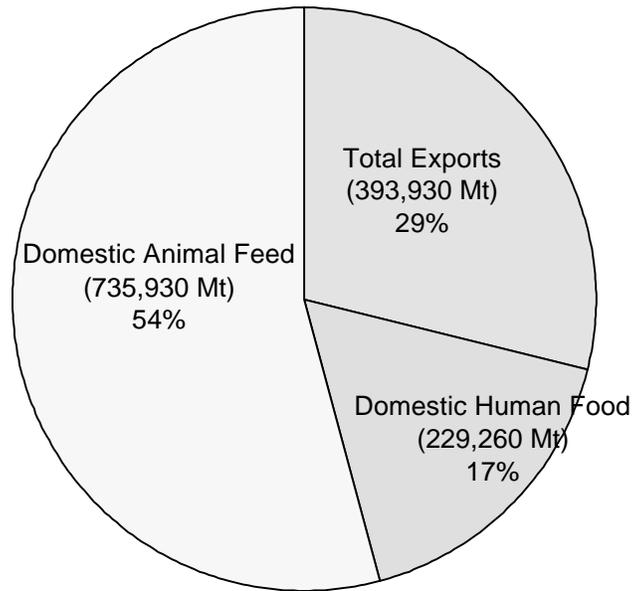
Note: Real price calculated based on a monthly Consumer Price Index with a base month of January 1997.
Source: AGDATA directory for Grains and Oilseeds, ID # 40

Figure 5: Historical Yield for Cereal Crops in Alberta (1908 to 1997)



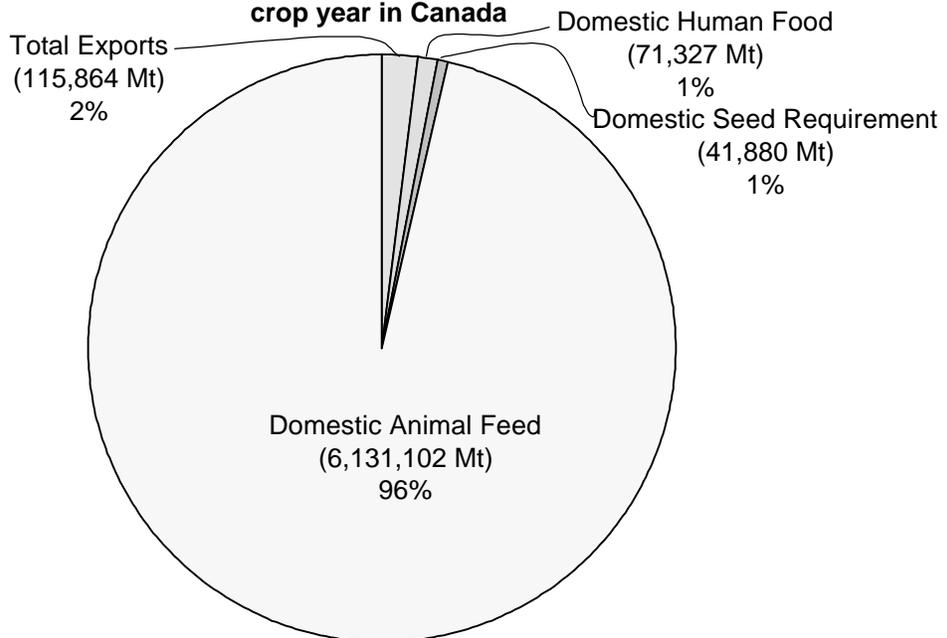
Source: Statistics Canada Electronic Database CANSIM

Figure 6: Proportion of Oat Exports and Domestic Use in the 1948 crop year in Canada



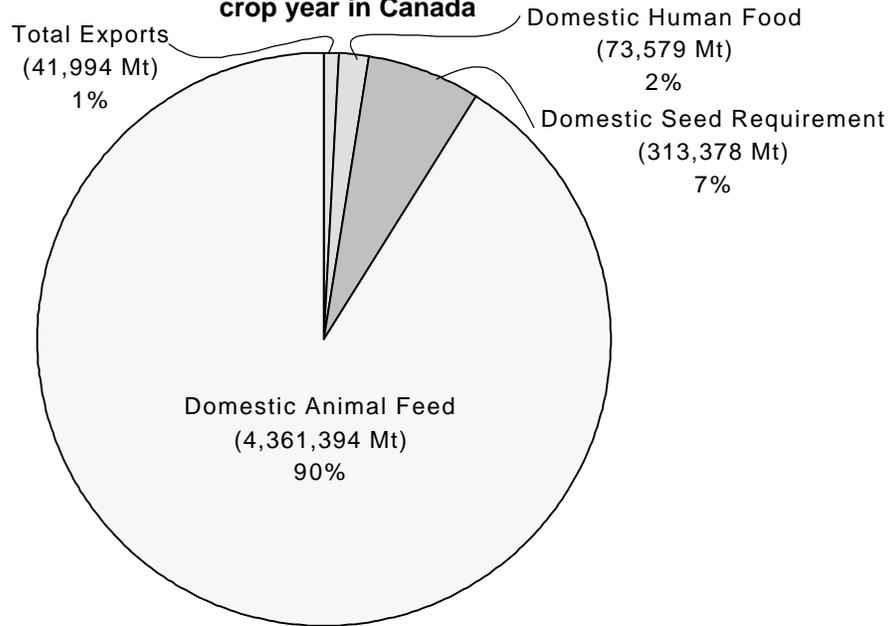
Source: Statistics Canada Grain Trade of Canada 1948-1949. Cat. No. 22-201-XPB

Figure 7: Proportion of Oat Exports and Domestic Use in the 1958 crop year in Canada



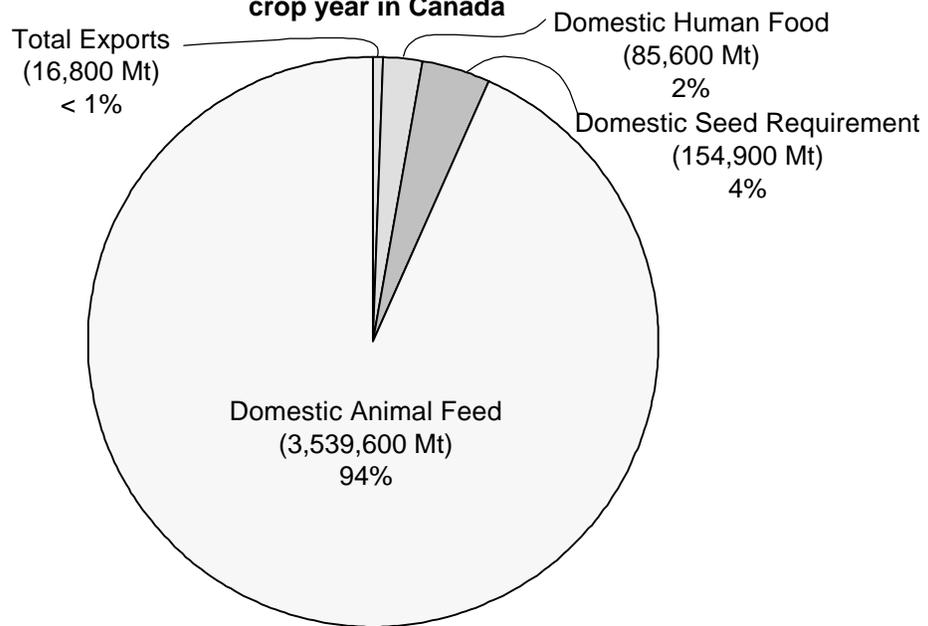
Source: Statistics Canada Grain Trade of Canada 1958-1959. Cat. No. 22-201-XPB

Figure 8: Proportion of Oat Exports and Domestic Use in the 1968 crop year in Canada



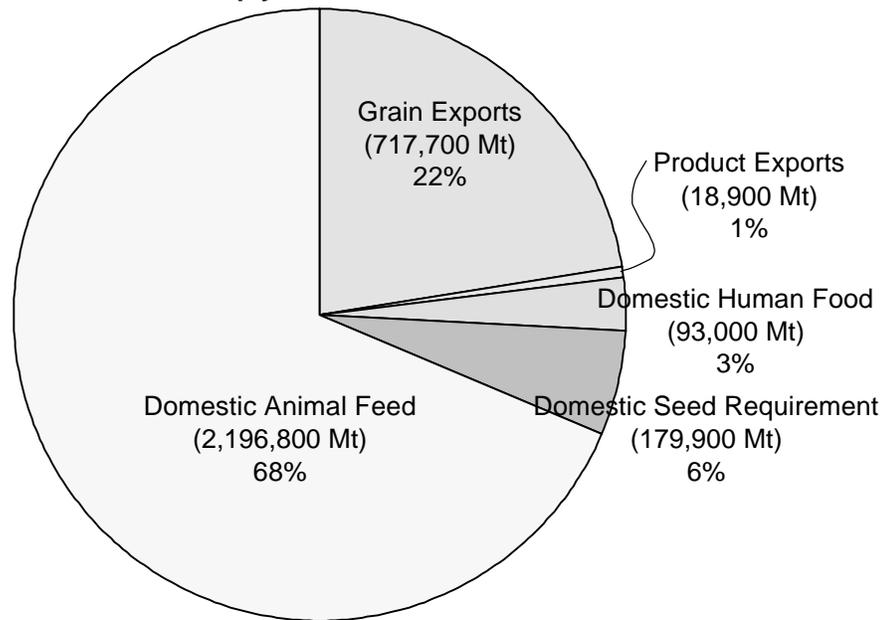
Source: Statistics Canada Grain Trade of Canada 1968-1969. Cat. No. 22-201-XPB

Figure 9: Proportion of Oat Exports and Domestic Use in the 1978 crop year in Canada



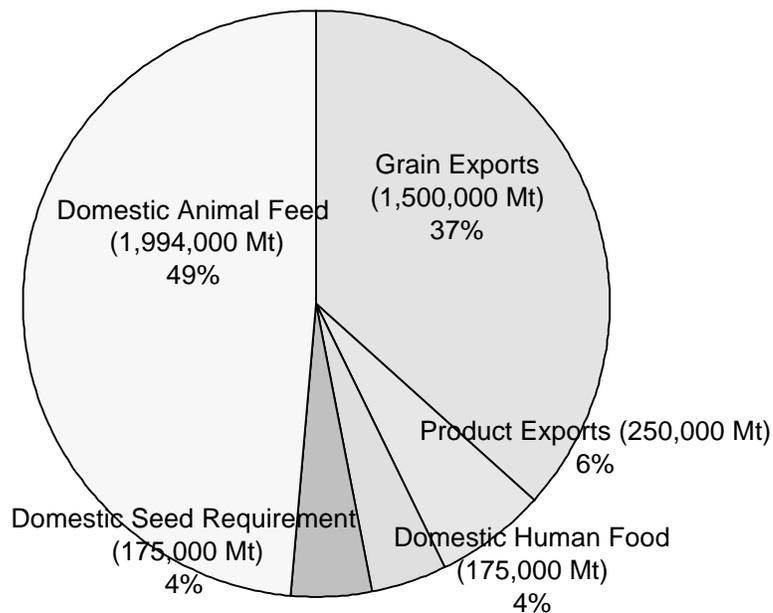
Source: Statistics Canada Grain Trade of Canada 1978-1979. Cat. No. 22-201-XPB

Figure 10: Proportion of Oat Exports and Domestic Use in the 1988 crop year in Canada



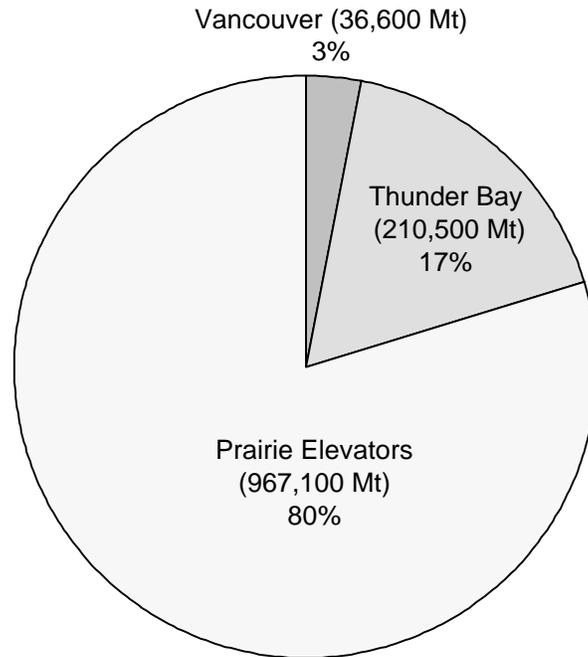
Source: Statistics Canada Grain Trade of Canada 1988-1989. Cat. No. 22-201-XPB

Figure 11: Proportion of Oat Exports and Domestic Use Forecast for the 1998 crop year in Canada



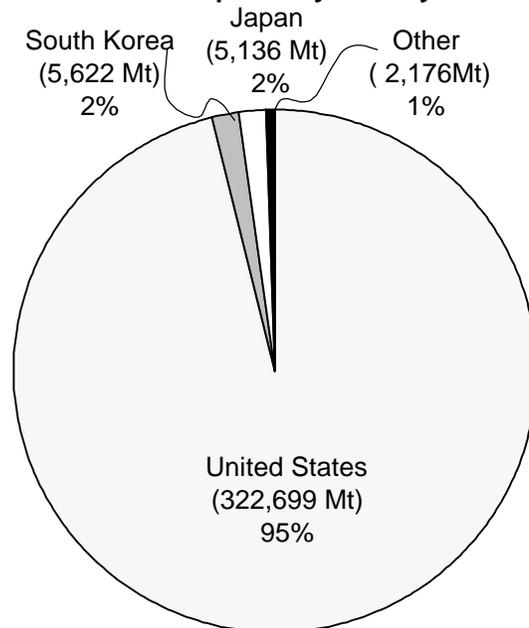
Source: Agriculture and Agri-Food Canada 1998

Figure 12: Bulk Canadian Exports of Oats by Clearance Sector 1996



Source: Canadian Grain Industry. Statistical Handbook 1996.

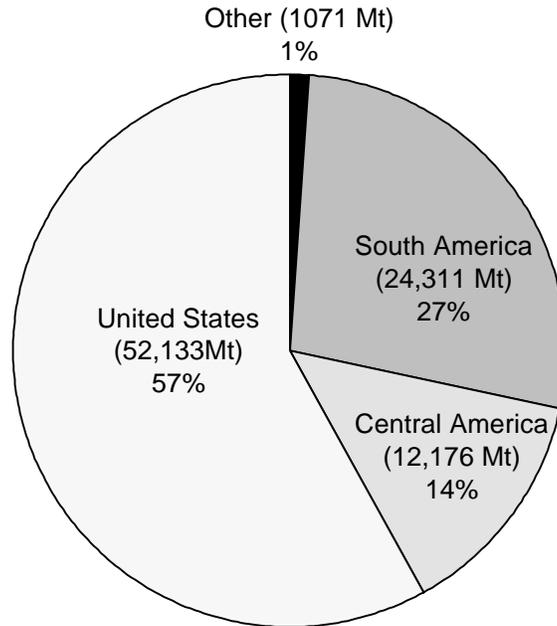
Figure 13: Alberta Oat exports by country of destination (1997)



Source: Statistics Canada. Canadian Trade Analyzer

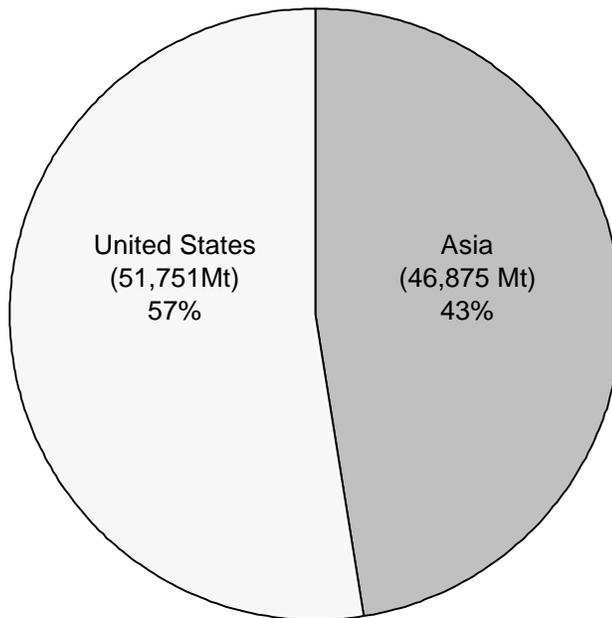
Note: Other consists of Columbia, Peru, Mexico, United Kingdom, Saudi Arabia, Netherlands, Venezuela, Panama, Switzerland, Taiwan, Phillipines, Trinidad, Jamaica, Argentina and Germany.

Figure 14: Canadian Exports of Oatmeal and Rolled Oats by Destination Country 1995



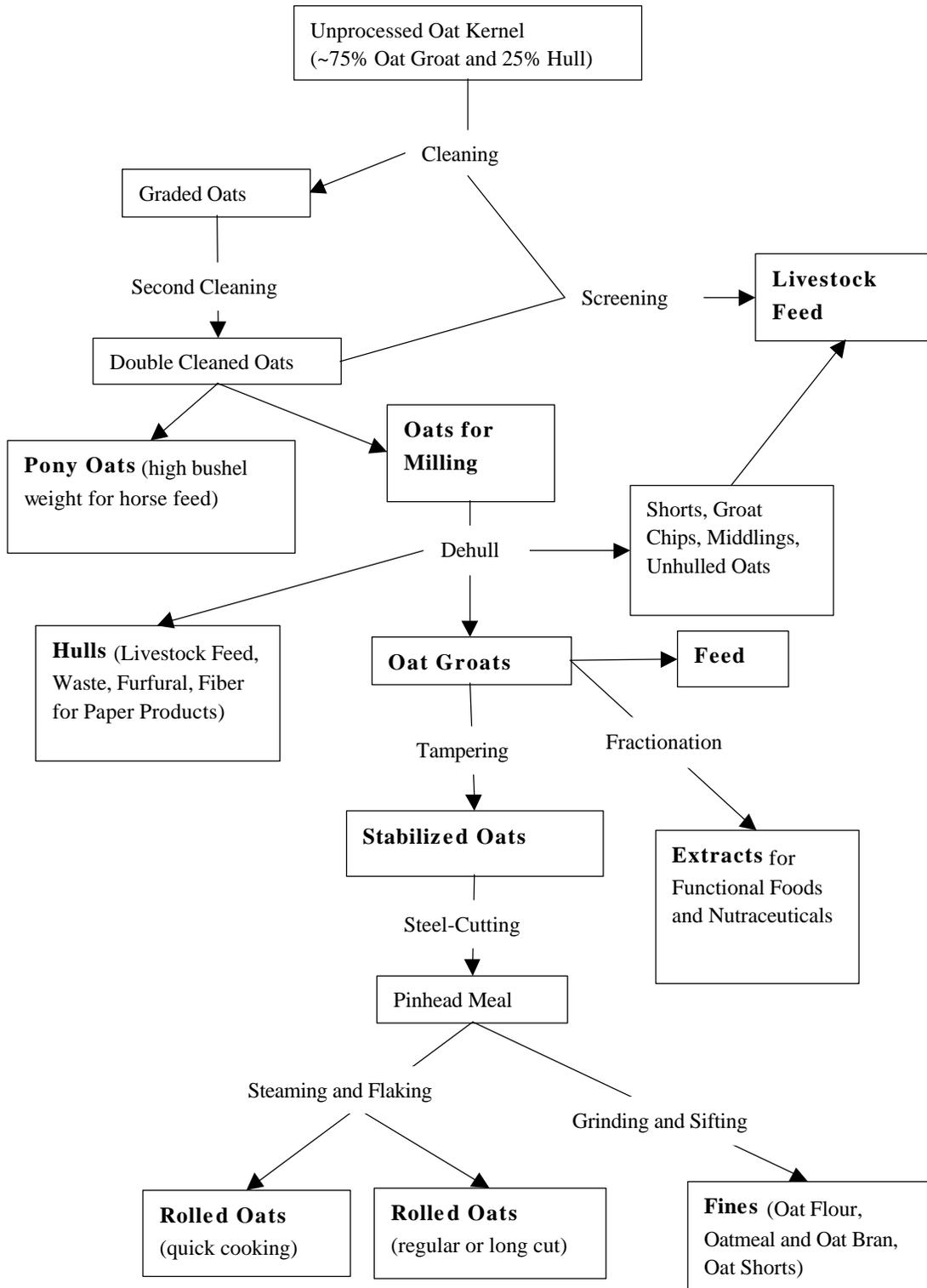
Source: Statistics Canada Grain Trade of Canada 1995-1996. Cat. No. 22-201-XPB

Figure 15: Canadian Exports of Bran, Shorts and Middlings by Destination Country 1995



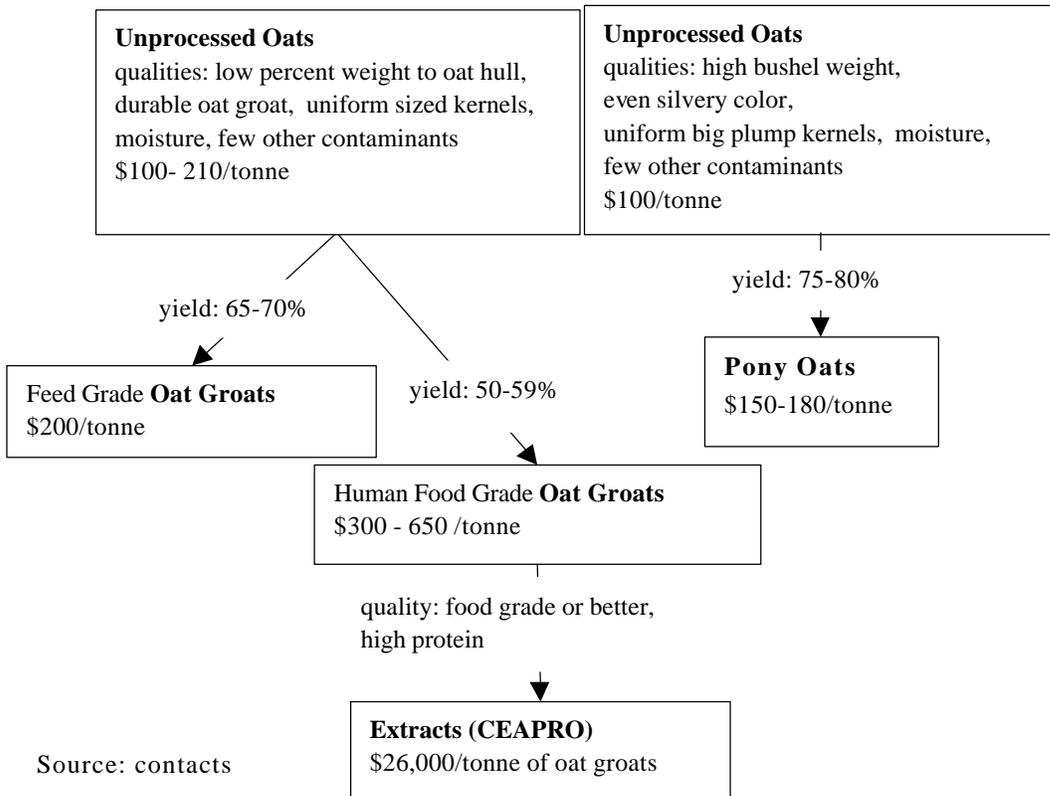
Source: Statistics Canada Grain Trade of Canada 1995-1996. Cat. No. 22-201-XPB

Figure 16: Steps involved in Processing an Oat



Source: Peat Marwick Consulting Group, 1989. Oat Marketing and Processing, A Western Canadian and Alberta Prospective for Alberta Agriculture.

Figure 17: Oat Processing Activity in Alberta (required oat qualities, yields and approximate prices for the first half of 1998)



Appendix II

Telephone Survey Questions Directed at the Domestic Oat Producers

- 1) Briefly describe your operation and how it relates to the oats market.
What role do you play in the oats market?

- 2) What are the top five quality attributes that your company looks for when you buy oats for processing? How are Alberta producers at meeting these demands? Could they be better?

- 3) What portion of your finished products are sold domestically and what portion is sold as exports.

- 4) Markets
 - Are Alberta's and western Canada's demand for your products being satisfied by domestic processors?

 - What opportunities do you for see in the future for domestically processed oats?

 - What competitors do you see to be a threat to Alberta's oat processing industry?

- 5) What do you see as the biggest constraint to value added / further processing activity in the oats industry in Alberta?

- 6) In order to evaluate value added related to oats, one must know the price of input oats the price of output oats as well as the quantity processed.
 - At what average price are your finished products sold for in 1998?

- What is the average price of oat inputs in 1998?

- How many tonnes of input oats do you require to make how much product?

- Approximately how much finished product do you produce in one year?

- Do you have any plans for expansion, either with new oat products or more of the same oat products, in the next ten years?

Telephone Survey Questions Directed at Government and Oat Associations

- 1) What kinds of products are produced with Alberta oats?

Which of these are being produced in Alberta?

Which of these products are being exported?

- 2) Markets

- What processed oat products are demanded in Alberta?

- What opportunities do you see in the future for domestically processed oats?

- What competitors do you see to be a threat to Alberta's oat processing industry?
-
- 3) What top five quality attributes are markets demanding? How is Alberta in meeting these demands?

 - 4) What do you see as the biggest constraint to value added / further processing activity in the oats industry in Alberta?

 - 5) Do you have a list of all the processing facilities in western Canada that primarily deal with oats? Is more information available on these facilities?