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Industrial Hemp Enterprise

The purpose of this factsheet is to introduce industrial hemp as a potential business opportunity. The focus is on the key management issues to be resolved in developing and operating a viable commercial hemp operation in Alberta. This overview isn't intended to be a substitute for individual managers making their own thorough assessment of all the key issues that would influence the success of their particular enterprise.

1. Industry Highlights

- Hemp (*Cannabis sativa* L) has been grown many centuries for the fibre produced in its stems and for hemp seed, a source of vegetable oil.¹
- Hemp and marijuana are the same genus and species (*Cannabis sativa*). Hemp is the fibre producing strain while marijuana is the narcotic strain of *Cannabis*.
- In all cultivars of marijuana and most cultivars of hemp there's a drug known as delta-9 tetrahydrocannabinol (THC) that's produced by the plant. A THC level of 0.3 per cent has been adopted in Canada as the concentration that separates non-narcotic strains from narcotic strains.²
- The commercial production of low-THC fibre hemp is permitted in Canada under licenses and permits issued by Health Canada.³
- Numerous regulations are in place to ensure that growers grow only low-THC hemp. These provisions restrict the sources of hemp seed and require official testing of THC levels.⁴
- Industrial hemp is low-THC hemp grown for the strong fibres in the stems, the seeds and the oil in the seeds. Hemp fibre and hemp seed are used in the production of a wide range of goods including food products, personal care products, animal bedding, textiles and structural materials.⁵
- The fibres of industrial hemp are made up of the bast fibres. They are strong, woody fibres used in the manufacturing of ropes and fabric. The hurds, which are less fibrous, are used in the manufacturing of paper products and composite building materials.
- Hemp was grown on Alberta research plots in 1995, 1996 and 1997. Beginning in 1998, hemp was grown in Alberta under both research and commercial licences.
- Table 1 presents licenced acres of hemp in Canada for both 1998 and 1999. The actual seeded acres for 1999 may be less than the total licenced acres as many licences were received late in the spring.

1 Although there is no written history, it's generally believed that hemp originated in Central Asia where it was used for both fibre and food as much as 6,500 years ago.

2 Stanford F. Blade. (1998). Industrial Hemp in Alberta; Alberta Hemp Symposia Proceedings, p. 2.

3 *The Controlled Substances and Drugs Act 1997*.

4 *The Industrial Hemp Regulations*

5 Hemp was so important to the Navies of England and the American colonies that farmers were legislated to dedicate a portion of their land to this crop each year.

Table 1. Licenced Acres of Hemp in Canada

	1998	1999
British Columbia	178	556
Alberta	94	1862
Saskatchewan	650	7640
Manitoba	1497	21950
Ontario	2873	2523
Quebec	59	212
New Brunswick	529	10
Nova Scotia	47	312
Prince Edward Island	0	10
Canada	5927	35075

Obtained from *Special Crops Newsletter, October 1999, AAFRD*; original source *Health Canada*.

- World production of hemp fibre and hemp seed declined between 1987 to 1997, largely due to decreased production in the traditional producing countries of Eastern Europe. The 1997 estimates of hemp fibre (96,021 tonnes) and hemp seed (34,677 tonnes) are less than half the production estimates for 1987.⁶
- The majority of hemp production is used domestically. Because only small amounts of hemp are traded between countries, world prices are very sensitive to changes in the supply available to the global market.⁷
- Hemp markets could benefit from increased consumer demands for biodegradable products, health foods, and “tree free” paper. However, at this time, increased consumer interest in purchasing natural products hasn’t reversed the decline in world production of hemp.
- Hemp can be grown in many areas of Alberta and there’s considerable interest in this crop as a diversification opportunity. This interest in hemp has produced considerable attention which may lead to unrealistic expectations for this crop.
- Potential hemp growers must carefully assess the viability of their proposed operation and use realistic expectations for markets, prices, yields and costs.
- The business potential for commercial hemp production is uncertain due to the following factors:

- There’s limited experience in growing this crop and new growers will have to gain their experience by growing the crop.
- Hemp hasn’t been grown commercially in Canada since the 1930s and there are no established markets for raw hemp material. Development of markets for raw hemp material is expected to take place, but this will be dependent on the acceptance of hemp by consumers and processors.
- There are many low cost producers including China, India, Hungary, Poland and Romania. These countries dominate world production.
- Industrial hemp faces competition from other natural fibre (cotton) and oil seeds (soybeans).
- Currently, Canada lacks a processing infrastructure and competitive processing technology.

2. Regulatory Basics

- Hemp was a popular crop in Eastern and Central Canada in the 1930s. In 1938 the *Opium and Narcotics Act* made the cultivation of *Cannabis sativa* L illegal.⁸
- *The Controlled Drug and Substances Act* (CDSA) came into effect on May 14, 1997. *The Industrial Hemp Regulations* (to the CDSA) came into effect on March 12, 1998 and permitted the commercial production of industrial (low THC) hemp in Canada under licences and authorizations issued by Health Canada.
- Health Canada, through *The Industrial Hemp Regulations*, controls the importation, production, processing, possession, sale, transportation, delivery and offering for sale of industrial hemp.⁹ Detailed information, documents and application forms are available from Health Canada’s Internet site; www.hc-sc.gc.ca/hpb-dgps/therapeut
- Specific regulations include:
 - Individuals or companies must be licenced in order to import, grow, export, process, and sell hemp seed or hemp products.
 - Health Canada will not licence cultivation of less than 10 acres except in special circumstances such as breeder seed plots.

6 Nicole Charest. (1998) *Industrial Hemp: Markets, the Next Challenge*; Alberta Hemp Symposia Proceedings.

7 Nicole Charest. (1998) *Industrial Hemp: Markets, the Next Challenge*; Alberta Hemp Symposia Proceedings.

8 A small amount of production was allowed during the war period of 1939 to 1945.

9 The regulations define hemp as the plant and parts of the Cannabis plant whose leaves and flowering heads do not contain more than 0.30 per cent THC as well as derivatives of the seeds such as oil and seedcake.

- Growers must give GPS (Global Positioning System) co-ordinates of the location where they plan to grow hemp.¹⁰
- The growing location must not be less than one kilometer from places frequented by persons less than 18 years of age (e.g. schools).
- Beginning January 1, 2000, only pedigree seeds on the OECD (Organization for Economic Cooperation and Development) list of approved varieties may be planted.
- Growers will be required to maintain records of production and distribution.
- Growers are required to have a sample tested by an approved lab or approved sampler to determine the THC content under their conditions.
- Licences and audit trails will be required for all processing activities.
- Growers must have a background check completed prior to obtaining a licence.¹¹
- The regulatory requirements for hemp can be expected to continually evolve as production increases and processing grows. A review of the current regulations is scheduled to take place in 2000.

3. Marketing Basics

- Hemp fibre and hemp seed are used by processors to produce hemp products for numerous niche markets. The viability of hemp as an agricultural crop will be determined by the development of these markets, as well as the development of a processing infrastructure to support these markets.
- The markets for hemp products are new and developing. The business potential of commercial hemp production remains uncertain while markets for hemp products evolve. Potential growers of industrial hemp in Alberta need to research the markets for hemp products and the markets for raw hemp.
- Hemp growers must be prepared to undertake on-going market research in order to:
 - identify the markets for hemp products
 - assess consumer demand for hemp products
 - assess the growth potential for hemp based products
- understand the technical requirements for different hemp products
- forecast the expected size and structure of the markets
- Industrial hemp can provide a high quality fibre and high quality oil for use in a wide range of applications. Generally, the demand for hemp products is expected to benefit from a growing demand for products that are environmentally and economically sustainable.
- The following new and emerging hemp product markets have been identified in a recent marketing study of industrial hemp.¹²
 - Oil and health food markets
 - Hemp oil provides a balanced source of essential fatty acids. This composition provides benefits and penetrating qualities that are in demand in health food and body-care markets.
 - Hemp oil products are competitive with other high end products made from natural oils, and may have an advantage in the form of longer shelf life.¹³
 - North American consumption of hemp oil products such as health foods, shampoos, cosmetics and skin care products is unknown. Increased demand for these products depends on growing consumer desire for new health products, increased environmental awareness and rising disposable income levels.
 - Hemp oil is also used to produce industrial oils for the production of paints, wood sealants, inks and lubricating oils. Hemp oil improves the ability of paints, sealant and inks to penetrate surfaces. As well, hemp oil contains 20 per cent linolenic acid. This has strong drying properties and contributes to high quality products.
 - Linseed oil is the main ingredient in industrial oils that require strong drying properties. Hemp oil would have to be price competitive with linseed oil in order to gain market share.

10 Co-ordinates will be used by drug enforcement agencies to distinguish licenced crops from illegal crops.

11 Previous drug charges will prevent a grower from obtaining a licence.

12 Gardner Pinfold Consulting Economists Ltd. and Dr. Jim White. (1998) A Maritime Industrial Hemp Marketing Study. Prepared For Nova Scotia Department of Agriculture and New Brunswick Department of Agriculture and Rural Development

13 Eric C. Thompson, Mark C. Berger, Steven N. Allen. (1998). The Economic Impact of Industrial Hemp in Kentucky; Center for Business and Economic Research, University of Kentucky; p.7.

- Most hemp oil originates from the United States where it's pressed from sterilized Asian, Indian or European hemp seed.¹⁴ Canadian crushing and processing plants are being considered and some already exist.
- Alberta growers would need to develop business relationships with these processors and provide a reliable supply of high quality hemp seed.
- Contracts with a processing plant ensure market access to growers who have proven they can produce a quality product and deliver on time.
- Organic hemp seed may give certified growers access to processor markets or consumer markets where there's a demand for organic products. Organic hemp will have less competition from hemp seed produced in China and India.
- Textiles-woven and knitted such as draperies, carpets, apparel, etc.
 - Woven and knitted hemp textiles are used in the production of clothing, canvas, rugs and upholstery. Manufacturers claim hemp fibres are strong and wear better than other natural or synthetic fibres.
 - The production of hemp into textiles and clothing is limited in North America due to a lack of equipment and processing technology. Currently, most production of hemp textiles takes place in China, Romania, Russia and Ukraine¹⁵, where wages are low.
 - There are few domestic processors of hemp textiles due to the price competition from imported hemp textiles, synthetic fibres and other natural fibres.
 - The demand for hemp textiles and clothing is limited by its high price. Currently, the production of hemp apparel in Canada is a cottage scale industry.
 - Increased consumer demand for hemp textiles and clothing would require a greater number of consumers willing to pay the higher price for hemp apparel. Significantly increased demand for hemp textiles and clothing could provide manufacturers with an incentive to use new, specialized equipment.
- Hemp fibre may have greater potential in the production of canvas, rugs and upholstery as the fibre is compatible with the high-speed equipment used in these industries. Growers seeking access to this market need to ensure long fibres by preventing the breaking of stalks and retting off the outside tissue (bark) that binds the fibre portion of the plant and the non-fibre portion.
- Textiles-molded or pressed
 - Molded or pressed hemp textiles are used to make a wide range of automotive parts and accessories. This includes headliners, rear window shelving, door panels, trunk liners and air bag parts. These hemp products are lighter, more fire resistant and recyclable.
 - The market for molded or pressed hemp automotive products may present a significant opportunity to the industrial hemp industry. The processing technology is available, but needs to be located close to automobile plants. This location factor will limit Alberta growers from taking advantage of this opportunity.
- Pulp and paper
 - A wide range of paper products can be made from industrial hemp. Hemp fibres have superior strength and length to wood fibres, but higher processing costs for hemp result in hemp pulp that is considerably higher priced than wood pulp. This cost differential, together with technical obstacles, limits the use of industrial hemp in Canadian pulp and paper mills.
 - The fibre characteristics of hemp are suited for use in specialty papers such as food wrapping, cigarette papers, tea bags, coffee filters and currencies. These fibre characteristics are similar to flax straw, which has the largest share of the specialty paper market. In order to gain a greater share of this market, industrial hemp has to compete with flax straw and jute.
 - Industrial hemp is also used in the production of specialty paper sold in high value niche markets. This specialty paper may benefit from consumer demand for "tree-free" paper and new technology in pulp making.

14 Tony Marshall. (1998). Is There a Market For Hemp Oil?; Alberta Hemp Symposia Proceedings, p.64.

15 Eric C. Thompson, Mark C. Berger, Steven N. Allen. (1998). The Economic Impact of Industrial Hemp in Kentucky; Center for Business and Economic Research, University of Kentucky; p.5.

- Building materials
 - Industrial hemp can be used in the production of a number of composite building materials. This market is at the developmental stage, but Alberta is well positioned as it has invested in research to study the manufacturing and use of panel boards made from industrial hemp.
 - A number of fiberboard plants have recently been established in Alberta and other parts of Western Canada. If price allows, these plants may consider using hemp stalk as an ingredient in their production.
- Alcoholic beverages
 - Hemp seed has been used in the production of beer by small specialty breweries. The market for hemp beer is expected to remain a small specialty market, with limited growth potential.
- Livestock feed
 - Hemp seed can be processed as a livestock feed, but before a feed market can develop extensive research and feeding trials are required. Hemp seed would also have to be price competitive with other livestock feed.
- Livestock bedding
 - Hemp hurds can be processed into livestock bedding that's both absorbent and biodegradable. It's also reported to be price competitive with other bedding materials such as wood chips and wheat straw. The hurds can be produced as a by-product of other higher value products. This can contribute to the economic viability of growing the crop.
 - In addition to the cattle industry, Alberta's large horse population may offer some market potential for hemp livestock bedding. However, in order for livestock producers to consider and use hemp bedding, it must be readily available at a price competitive with sawdust and straw.
- Marketing Factors
 - The existing markets for hemp product tend to be small scale (niche markets), offering limited amounts of high valued goods. Marketing is a continuous activity and growers need to make their own assessment of whether these markets will remain the same or grow over time. Key factors to monitor are:
 - changes in the level of consumer demand for the hemp product
 - the profitability and scale of processing required to serve these markets
 - the potential for growth through an increase in the number of domestic processors.
 - competition from alternative crops, imported hemp fibre and hemp seed
 - Price information for hemp isn't readily available and may be difficult to collect. Growers need to qualify all price information as either prices for actual transactions, asking prices or bid prices. Actual transaction prices are the most meaningful information, but also be the most difficult to come by.
 - The price a grower receives for his/her crop in a particular year is influenced by the following factors:
 - changes in consumer demand for hemp products
 - the supply and demand of raw hemp to processors as hemp markets tend to be limited in size and new production could increase supply to the point where it exceeds demand, resulting in drastic price declines
 - the level of imports and exports of hemp products or partially processed hemp products
 - the quality of the hemp product as buyers have specific requirements and price is the most effective tool for expressing those requirements
 - There is no existing market infrastructure for hemp and growers need to develop their own marketing channels to gain access to markets. Generally, providing a reliable supply of high quality hemp is the best way to gain access to a market.
 - Hemp growers should apply a global perspective to the management of their business, particularly in marketing. Many of the hemp product markets discussed are commercially viable industries in Europe. As the North American markets develop, producers have to be competitive in the world market in terms of price and product quality.
 - New hemp growers must avoid focusing on production and ignoring the marketing side of the business. Individuals considering investing in hemp production need to ask themselves whether they are prepared to do all the tasks necessary to market their product.
 - *The critical marketing activities* for the manager of a hemp enterprise are to monitor the development of markets for hemp products and determine how they impact on the market for raw hemp.

4. Production Basics

- New entrants to hemp production in Alberta will need to carefully assess:
 - the risks associated with producing the crop
 - their ability to produce a product that meets the requirements of buyers
 - the processing requirements needed to meet the requirements of buyers
 - their ability to achieve a cost of production that is competitive as the industry evolves
 - their willingness to deal with the regulatory requirements of growing hemp
- Growers may have difficulty getting answers to specific production questions at this time, but hemp production in Alberta is being researched on an ongoing basis. Growers also need to do their own on-farm research to determine the growing techniques that give desired results.
- *The Cultivation of Hemp*, by Dr. I. Bosca and M. Karus published by Hemptech and *Hemp Horizons*, by John W. Roulac published by Chelsea Green Publishing provide detailed production information for growers.
- Production practices, particularly harvesting and processing, are dependent on the market the grower is producing for. Generally, growers can focus on:
 - long fibres
 - seed
 - seed and fibre
- The primary production objective is to know the requirements of the target market and provide the market with the specified product. Key production management issues in achieving this objective are variety selection, seeding, fertilization, weed control, disease control, harvesting and processing.
- The agronomic characteristics of hemp determine the production practices and factors to be considered when establishing a commercial hemp operation. Some important agronomic factors are:
 - although hemp can grow in a wide range of climates, optimal growth occurs in a mild humid climate
 - three months free of killing frosts are needed to produce good quality fibre, but four to five months are needed for seed production
- both seedlings and mature plants can endure mild frosts to -5° C
- hemp requires ample moisture until the plant is well rooted, but then it can endure drier conditions
- hemp can grow in a wide range of soils, but it's intolerant of poorly drained conditions. Well-drained loam soils are best suited for producing high yields of good quality hemp.
- hemp will not grow well on acidic soils. A soil pH over 6.0 is recommended with 7.0 - 7.5 preferred.
- hemp is very sensitive to soil compaction
- the "best" fibre is obtained at the flowering stage
- hemp is generally a dioecious plant, having separate male and female plants. The result is that the male plant is the best fibre producer and the female plant is the seed producer. They would have different maturation times.
- monoecious cultivars have been developed which overcome the problem of different maturation times.
- hemp can out compete weeds if it germinates prior to the weeds, is grown in a relatively clean field and spring growing conditions are good.
- hemp has been photoperiod sensitive, meaning it tends to flower at the same calendar date no matter when it is planted. New varieties are available that are not photoperiod sensitive.
- The Health Canada website provides a current list of approved hemp varieties. Variety trials have been completed in Alberta and Manitoba to assess total biomass, seed weight, plant weight, seeding densities, the application of herbicides and fertilizer response.^{16 17} The Health Canada website is located at www.hc-sc.ca/hpb-dgpps/therapeut
- The following factors need to be considered with respect to seeding.
 - Hemp can be seeded using conventional seeding equipment. Good depth control and packing after seeding, to ensure good soil contact, are important considerations in seedbed preparation and equipment selection. Direct seeding into stubble has had only moderate success.
 - Little research information is available on hemp seeding dates in Alberta. Generally, earlier seeding dates will result in higher yields.

16 Stanford F. Blade. (1998). Industrial Hemp in Alberta; Alberta Hemp Symposia Proceedings, p. 2.

17 Industrial Hemp For Manitoba, 1996 Hemp Evaluation; at <http://www.gov.mb.ca/agriculture/crops/hemp/bko05s00.html>

- Seeding depth is recommended at two to four centimetres. Deeper seeding may result in delayed and reduced emergence.
 - Dense stands (200 to 750 plants per square metre) are preferred when growing hemp as a fibre crop. Less dense stands (5 to 120 plants per square metre) are sought when growing hemp as a seed crop.
 - Seeding rates for a fibre crop would be higher (60 to 80 pounds per acre) than rates for a seed crop (10 to 15 pounds per acre).
 - Seed costs have ranged between \$1.25 and \$3.00 per pound.¹⁸
- At this time there is insufficient research to allow specific recommendations for fertilizer applications. However, the high yields and rapid growth of industrial hemp requires considerable fertilizer. Soil testing and analysis are generally recommended. Suggested rates based on European experience are¹⁹:
 - Nitrogen – 120 pounds per acre
 - Phosphorous – 100 pounds per acre
 - Potassium – 150 pounds per acre
 The levels of fertilizer that can be placed with the seed are not known.
 - Hemp is competitive with most weeds as long as there are good growing conditions that allow a uniform stand to emerge ahead of weeds. Then, the dense shade created by hemp plants can choke out most weed problems.
 - *Sclerotinia sclerotium* and *Botrytis cinerea* are known diseases. Management practices include rotation with non-susceptible crops, disease free seed and management of hosts such as volunteer canola.
 - Bertha armyworm and grasshoppers have caused considerable damage to hemp crops in Manitoba and Alberta.
 - Harvest management must focus on achieving the most desirable products for the target market. The following management factors need to be considered with respect to harvesting.
 - The highest quality fibre is available at early flowering. Harvesting hemp for the long bast fibres used in the textile industry means these stalks cannot be damaged, chopped or broken in the harvest process. Specialized equipment and new harvesting technology is required to harvest high quality hemp fibre.
- Seed crops can be harvested using a combine with the cutter bar four to five feet above ground.
 - Dual-purpose crops of hemp harvest both seed and fibre that's suitable for paper and fiberboard production. After the seed heads are cut off, the remaining stalk is harvested with traditional equipment such as mowers/conditioners, discbines and round balers.
- Drying, storage and processing techniques are largely determined by the market being served. The following management factors should be considered with respect to this aspect of production.
 - Guidelines for the harvest and storage of hemp seed are not available. Recommendations from Manitoba are to store at less than 12 per cent.
 - Hemp seed needs to be cleaned to rigorous standards, removing all foreign material and weed seeds, if it's destined for health food markets.
 - THC is not present in hemp seed so it's necessary to remove all leaf and flower fragments from the seed before processing.
 - Retting is a requirement of markets for high quality fibres and short fibre. The basic process of retting is to break down the bark so that the long bast fibres are more easily separated by machine. Field retting or dew retting relies on rain or dew to produce the micro-organisms that break down the bark tissue that bind the fibre and nonfibre portions of the stem. Other retting techniques are available, but may not be commercially feasible.
 - **The focus of production management** is to achieve the precise product required by the market at an acceptable price. Generally, this means the manager must achieve good performance in the areas of production, harvesting, drying and cleaning.

18 Seed prices are expected to drop with increased Canadian production.

19 Stanford F. Blade. (1998). Industrial Hemp in Alberta; Alberta Hemp Symposia Proceedings, p. 16.

5. Economic/Finance Basics

- Hemp production on the Canadian Prairies is a highly uncertain undertaking. New entrants must be prepared to carefully assess the profitability and cash flow implications of their proposed operation.
- Since little hemp has been harvested in Alberta, cost information for hemp production is difficult to obtain. Potential growers must be prepared to research and carefully estimate prices, costs and operating requirements for their proposed hemp operation.
- The following budget information is presented to illustrate the basic expenditures required to establish and operate a 50 acre industrial hemp operation in Alberta. It's important to recognize that the following budgets are estimates and are included to provide growers with a framework that identifies the type of information required and the type of analysis they should undertake.
- The budgets presented indicate that the key determinants of profitability in an industrial hemp enterprise are prices received for hemp seed, yields, operating costs and fixed costs.
- Table 2 provides estimates of the capital investment required for establishing an industrial hemp operation. The operation size of 50 acres reflects the need to start small but also operate at a size that gains some economies of scale. Machinery requirements for this scenario are obtained through custom operators and are included as operating costs.

Table 2. Industrial Hemp Operation Capital Investment Requirements

Item	Acres	\$/Acre	Investment	Useful Life	Depreciation \$ per Year	Opportunity Cost \$ per Year
Land						
Cropland	50	\$1,000	\$50,000			\$2,500
Total Land Costs			\$50,000			\$2,500
Improvements and Facilities						
	Cost	Share	Investment	Life	Depreciation	Opportunity Cost
Storage buildings	\$40,000	25.00%	\$10,000	20	\$500	\$250
Total Improvement Costs			\$10,000		\$500	\$250
Equipment						
Pick-up truck	\$25,000	2.50%	\$625	5	\$125	\$16
Total Equipment Costs			\$625		\$125	\$165
Total Capital Investment			\$60,625		\$625	\$2,766

Opportunity costs are the cost of using capital estimated at 5%

■ Financing a hemp operation is a separate, but related issue. Conventional lenders, such as banks, are likely to see hemp enterprises as high-risk ventures. In order to acquire the capital needed to develop an enterprise, individual managers are required to:

- have a solid business plan
- have high levels of equity capital to put into the venture
- have a proven and reliable market for their production
- have a sound production process

■ Table 3 presents the production parameters for the hemp operation. These parameters are based on a dual product (hemp seed and residual fibre) operation. As well, estimates for inputs and yields are felt to be achievable in an Alberta enterprise. However, each individual needs to estimate these parameters when planning for their specific operation. The most significant costs are for custom machinery charges. Producers with existing operations and existing lines of equipment may be able to lower these costs and add to the viability of the operation.

Table 3. Industrial Hemp Production Parameters – 50 Acres

		Units	Quantity/Acre	Total Quantity	Price/Unit	Total Revenues
Revenues	Hemp seed	lbs.	500	25,000	\$0.50	\$12,500
	Residual stalks	tonnes	3.00	150.00	\$30.00	\$4,500
		Units	Quantity/Acre	Total Quantity	Price/Unit	Total Cost
Seed (\$1.25 - \$3.00)		lbs.	20	1,000	\$1.25	\$1,250
Fertilizer						
Nitrogen		lbs.	120	6,000	\$0.40	\$2,400
Phosphorus		lbs.	100	5,000	\$0.50	\$2,500
Potassium		lbs.	150	7,500	\$0.20	\$1,500
Total Fertilizer Costs						\$6,400
Roundup		litres	1	50	\$10.00	\$500
Custom Machinery						
Chemical application		acre	1	50	\$4.00	\$200
Cultivation		acre	1	50	\$5.00	\$250
Fertilizer application		acre	1	50	\$4.00	\$200
Air seeder		acre	1	50	\$7.00	\$350
Harrowing		acre	1	50	\$2.00	\$100
Combine		acre	1	50	\$16.00	\$800
Discbine		acre	1	50	\$10.00	\$500
Roundbaler		bale	5.51	275.57	\$6.00	\$1,653
Bale hauling (up to 100 miles)		bale	5.51	275.57	\$3.00	\$827
Hauling seed (up to 100 miles)		lbs	500	25,000	\$0.15	\$3,750
Seed drying		lbs	500	25,000	\$0.08	\$2,000
Seed cleaning for food grade		lbs	500	25,000	\$0.10	\$2,500
Total Custom Machinery Costs						\$13,130
Licencing fee		acre	1	50	\$20.00	\$1,000
Sampling and analysis fees		acre	1	50	\$20.00	\$1,000

- Table 4 presents projected revenues and expenses for the industrial hemp operation. The projected net income indicates that the proposed enterprise (based on production parameters presented) will incur losses. Yields, prices and high operating costs particularly for machinery custom charges contribute to this result. It is important to note that individual operators may be able to beat these numbers particularly if they have their own low cost machinery investment.
- Yields and prices received for product(s) are likely to have the greatest impact on the economic performance of a hemp enterprise. Since this is a relatively new industry, there's considerable uncertainty concerning achievable yields and market prices. Interested growers must consider the profit performance under a range of price and yield scenarios in order to assess the situation they might be entering into.

Table 4. Projected Revenues and Expenses for Industrial Hemp Enterprise – Dual Production on 50 Acres

		Units	Quantity	Price/Unit	Total
Projected revenues	Hemp seed	lbs.	25,000	\$0.60	\$15,000
	Stalks	tonnes	150.00	\$30.00	\$4,500
Total Sales Revenues					\$19,500
Operating Costs					
	Seed				\$1,250
	Fertilizer costs				\$6,400
	Herbicide cost				\$500
	Machinery custom charges				\$13,130
	Licencing fee				\$1,000
	Sampling and analysis fee				\$1,000
	Interest on operating				\$500
Total Operating Expenses					\$23,780
Fixed Costs					
	Land taxes				\$500
	Annual depreciation costs				\$625
	Opportunity cost on capital investment				\$2,766
Total Fixed Costs					\$3,891
Total Operating Costs					\$27,171
Net Operating Income					-\$8,171

- Table 5 presents a sensitivity analysis, which shows the changes to net operating income over a range of price combinations (for hemp seed) and a range of yield combinations (for hemp seed). In this sensitivity analysis, the residual fibre is kept at a constant yield of three tonnes per acre and a constant price of \$30 per tonne.

Table 5. Sensitivity Analysis – Net Operating Returns for Various Yields and Prices of Hemp Seed

Seed prices (\$/lb.)	Seed yields (lbs. per acre)				
	700	600	500	400	300
\$1.00	\$11,829	\$6,829	\$1,829	(\$3,171)	(\$8,171)
\$0.80	\$4,829	\$829	(\$3,171)	(\$7,171)	(\$11,171)
\$0.60	(\$2,171)	(\$5,171)	(\$8,171)	(\$11,171)	(\$14,171)
\$0.50	(\$5,671)	(\$8,171)	(\$10,671)	(\$13,171)	(\$15,671)
\$0.40	(\$9,171)	(\$11,171)	(\$13,171)	(\$15,171)	(\$17,171)

- Many operators are able to reduce machinery operating costs through the use of their existing line of machinery, instead of relying on custom operators. Table 6 shows net operating income for a range of seed yields and prices when machinery operating costs are reduced by 50 per cent.

Table 6. Sensitivity Analysis – Net Operating Returns for Various Seed Yields and Prices with Reduced Machinery Costs

Seed prices (\$/lb.)	Seed yields (lbs. per acre)				
	700	600	500	400	300
\$1.00	\$18,394	\$13,394	\$8,394	\$3,394	(\$1,606)
\$0.80	\$11,394	\$7,394	\$3,394	(\$606)	(\$4,606)
\$0.60	\$4,394	\$1,394	(\$1,606)	(\$4,606)	(\$7,606)
\$0.50	\$894	(\$1,606)	(\$4,106)	(\$6,606)	(\$9,106)
\$0.40	(\$2,606)	(\$4,606)	(\$6,606)	(\$8,606)	(\$10,606)

- *The critical economic issues* for hemp producers are to carefully evaluate the economics of production before investing and to develop strategies for achieving low cost production. Individual producers need to achieve all of the following factors for their enterprise to be profitable.

Producing the product that meets the buyer's specifications means:

- ensuring they have access to the market
- achieving a good market price for the product
- achieving effective production, harvest, drying and marketing performance at a cost that is below the market price for their product

6. Resources

Industry Associations

Canadian Hemp Growers Association
5811 - 156 Street
Surrey, British Columbia V3S 8E7
Phone: (604) 506-2357
Fax: (604) 574-5258
E-mail: delta3@whidbey.com

Canadian Industrial Hemp Council
58 - 27 Avenue SW
Calgary, Alberta T2S 2X8
Phone: (403) 232-8576
Fax: (403) 262-1263
E-mail: hiphemp@tcel.com

Saskatchewan Hemp Association
P.O. Box 24007
Regina, Saskatchewan S4P 4J8
Phone: (306) 757-HEMP
Fax: (306) 757-4367
E-mail: saskhemp@sk.sympatico.ca

The Alberta New Crops Network
C/O Crop Diversification Centre North
17507 Fort Road
Edmonton, Alberta T5B 4K3
Phone: (780) 415-2681
Fax: (780) 422-6096

Publications

The Cultivation of Hemp
Dr. I Bosca & M. Karus
Hemptech
Box 1716
Sebastol, CA
95473
USA
Phone: (800) 265-HEMP
E-mail: orders@hemptech.com

Hemp Horizons
John W. Roulac
Chelsea Publishing
Box 428
White River Junction, VT
05001
USA

Alberta Hemp Symposia Proceedings
Alberta Agriculture, Food and Rural Development
Phone 1-800-292-5697

Low-THC Hemp Research in the Black and Brown Soil Zones of Alberta Canada
S.F. Blade , R.G. Gaudiel and N. Kerr
An article in *Perspectives on New Crops and New Uses* (1999)
ASHA Press, Alexandria VA

Assessment of Fodder Potential for Field Pea/Barley, Fenugreek and Low-THC Hemp
S.F. Blade, Ken J. Lopetinsky, Curtis H. Weeks and Paul La Flamme

Additional Web Sites

Alberta Agriculture Food, and Rural Development:
<http://www.agric.gov.ab.ca/crops/special>

1999 Alberta Organic Producers and Processors Directory:
<http://www.agric.gov.ab.ca/food/organic/directory/index.html>

The Industrial Hemp Network:
<http://www.hemptech.com>

Government Resources

Production

Pulse and Special Crops Specialists; contact your local Alberta Agriculture, Food and Rural Development office

Dr. Manjula Bandara
Research Agronomist (Special Crops)
Crop Diversification Centre South
Phone: (403) 362-1356
Fax: (403) 362-1311
E-mail: manjula.bandara@gov.ab.ca

For More Information

Visit Alberta Agriculture, Food and Rural Development's website at: <http://www.agric.gov.ab.ca>

Contact Alberta Agriculture, Food and Rural Development's Ag-Info Centre (toll-free) at 1-866-882-7677.

7. Key Management Issues

- Growing hemp in Alberta is a relatively new venture. Since there's limited industry experience, new entrants must carefully assess the viability of their proposed enterprise before investing capital.
- If you continue to investigate this agricultural business opportunity, it's essential that you are able to answer the following questions concerning the production, marketing and management of such a hemp enterprise.

- Are you prepared to learn all you can about hemp production and marketing, visit existing operations, join the industry associations, attend workshops and read all you can about production and marketing?
- Have you clearly defined the market(s) and the buyers that you will be marketing to?
- Have you clearly defined the production practices needed to implement in order to produce the quality of product required by your markets?
- Have you clearly defined the marketing activities that you will be required to perform in order to market your product to the specific market segment mentioned above?
- Are you aware of the amount of time you have to devote to continuously market your product and improve your production performance?
- Are you aware of the resources required to establish a hemp enterprise and the returns that can be expected?
- Are you prepared to take the risk associated with hemp production?

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For more information on diversification and other business profiles please visit Alberta Agriculture's Internet Site at <http://www.agric.gov.ab.ca/diversify>

This profile was developed with co-operation from the Alberta Agriculture Special Crops Product Team.